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R&D STUDY REPORT No. R-20-0253

NEUTRALIZING ANTIBODY TITER AND SARS-COV-2 S1- AND RBD-SPECIFIC ANTIBODY CONCENTRATION IN SERUM FROM PARTICIPANTS IN THE BNT162-01 TRIAL

Version 02
Date: 28 NOV 2020

Reported by Alexander Muik

Test item: SARS-CoV-2 vaccines BNT162b1 and BNT162b2

Key words: BNT162-01 trial, BNT162b1, BNT162b2, virus neutralization, antibody binding

This R&D report consists of 52 pages.

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LIST OF ABBREVIATIONS

BNT162b1	Investigational SARS-CoV-2 vaccine
BNT162b2	Investigational SARS-CoV-2 vaccine
COVID-19	Coronavirus disease 2019
dLIA	Luminex-based direct immunoassay
ELISpot	Enzyme-linked immunosorbent spot assay
GMFI	Geometric means fold increase
GMC	Geometric mean concentration
GMT	Geometric mean titer
HCS	Human convalescent sample
ICS	Intracellular cytokine staining
IgG	Immunoglobulin G
IMP	Investigational medicinal product
LOD	Limit of detection
MFI	Mean fluorescent intensities
mNG NT	mNeonGreen Microneutralization
N/A	Not applicable
QA	Quality assurance
QC	Quality control
RBD	Receptor-binding domain
R&D	Research and development
S protein	Spike protein
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
TDV	Titer determining value
VNT	Virus neutralization assay

RESPONSIBILITIES

Person responsible for the study:	A. Mulk	27 Nov 2020
	Dr. Alexander Mulk, Head of Immunomodulators, BioNTech RNA Pharmaceuticals GmbH	Date
Author:	A. Mulk	27 Nov 2020
	Dr. Alexander Mulk, Head of Immunomodulators, BioNTech RNA Pharmaceuticals GmbH	Date
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	BioNTech SE	Date
QA representative:	(b) (6)	28 NOV 2020
	BioNTech SE	Date

Meaning of the signatures:

Person responsible for the study: I am responsible for the content of the R&D report and confirm that it represents an accurate record of the results. This study was performed according to the SOPs and methods as well as the rules and regulations described in the report.

Author: I am the author of this document.

Reviewer: I reviewed the R&D report and confirm that this document complies with the scientific and technical standards and requirements.

QA representative: I confirm that this document complies with the relevant quality assurance requirements.

1 SUMMARY

The clinical trial BNT162-01 investigates the safety and immunogenicity of four prophylactic SARS-CoV-2 RNA vaccines against COVID-19 using different dosing regimens in healthy adults. It is accompanied by an extensive immune monitoring program to analyze participants' immune responses against vaccine-encoded antigens specific to SARS-CoV-2 spike (S) protein, S1 fragment, or receptor-binding domain (RBD), including Luminex-based direct immunoassay (dLIA), virus neutralization assay (VNT), *ex vivo* enzyme-linked immunosorbent spot (ELISpot) assay, and intracellular cytokine staining (ICS).

The objective of this study was to assess the SARS-CoV-2 virus neutralizing titers (secondary endpoint) and the SARS-CoV-2 S1- and RBD-specific immunoglobulin G (IgG) concentrations (exploratory endpoint) at pre-immunization baseline, 7±1, and 21±2 days after the BNT162b1 and BNT162b2 priming immunization (Days 1, 8, and 22), and 7±1, 21±2, 28±2, and 63±5 days after the booster immunization (Days 29, 43, 50, and 85). At the cut-off date for this report, data was available up until Day 43 for BNT162b1-dosed younger participants aged 18 to 55 years dosed with 1, 10, 30, 50, or 60 µg on Days 1 (all dose levels) and 22 (all dose levels except 60 µg) (n=12 per group). For BNT162b2-dosed participants, data was available for younger participants aged 18 to 55 years dosed with 1, 3, 10, 20, or 30 µg, and older participants aged 56 to 85 years dosed with 20 µg on Days 1 and 22 (n=12 per group). Data for younger participant dose groups was available up until Day 50 for dose groups 1 µg and 3 µg, and up until Day 85 for dose groups 10, 20, and 30 µg. For the BNT162b2-dosed older participants, data was available up until Day 29

Secondary endpoint - Functional antibody titer data

Participants dosed with **BNT162b1** showed a strong dose-dependent antibody response. On Day 22, at 21 days after dose 1, virus neutralizing antibody geometric mean titers (neutralizing GMTs) had increased in a dose-dependent manner for the 1, 10, 30, and 50 µg dose groups. At 7 days after dose 2 (Day 29), virus neutralizing GMTs showed a strong, dose level dependent booster response. In the 60 µg dose group, which was only dosed once, neutralizing GMTs remained at a lower level, indicating that a booster dose is necessary to increase functional antibody titers. On Day 43 (21 days after dose 2), neutralizing GMTs decreased (with exception of the 1 µg dose level). Day 43 virus neutralizing GMTs were 0.7-fold (1 µg) to 3.6-fold (50 µg) those of a COVID-19 human convalescent serum (HCS) panel.

Participants dosed with **BNT162b2** showed a strong IMP-induced antibody response. Virus neutralizing GMTs were detected at 21 days after dose 1 (Day 22) and had increased substantially in younger participants (aged 18 to 55 years) immunized with ≥3 µg BNT162b2, and older participants (aged 56 to 85 years) immunized with 20 µg BNT162b2 by 7 days after dose 2 (Day 29). Day 29 neutralizing GMTs were comparable between the younger and older adult 20 µg dose level cohorts. After an

initial decrease in neutralizing GMTs in between Days 29 and 43, neutralizing GMTs remained stable up to Day 85 (63 d after dose 2) for younger adult dose groups 10, 20, and 30 µg and were 1.3-fold to 1.9-fold those of a COVID-19 HCS panel.

All participants dosed with dose 1 at ≥30 µg BNT162b1 or BNT162b2 GMT-seroconverted either by 7 days or 21 days after dose 2 (Day 29 or Day 43). All participants dosed with 30 µg BNT162b2 remained seropositive throughout the follow-up until Day 85.

Exploratory endpoint - Binding antibody concentrations

Participants dosed with **BNT162b1** showed a strong dose-dependent antibody response against the SARS-CoV-2 S protein S1 subunit and RBD at 21 days after dose 1 (Day 22). At 7 days after dose 2 (Day 29), S1- and RBD-binding immunoglobulin G (IgG) geometric mean concentrations (GMCs) showed a strong, dose-dependent booster response. In the 60 µg dose group, which was only dosed once, S1- and RBD-binding IgG GMCs remained at a lower level, indicating that a booster dose is necessary to increase antibody concentrations. At 21 days after the dose 2 (Day 43), S1- and RBD-binding IgG GMCs decreased (with exception of the 1 µg dose group), but were clearly above those of a COVID-19 HCS panel for all doses tested.

BNT162b2 dosed participants showed a strong BNT162b2-induced S1- and RBD-binding IgG response at 21 days after dose 1 (Day 22) with evidence of a dose-dependent response only between the 1 µg and 10 µg dose levels. S1- and RBD-binding IgG GMCs showed a substantial booster response by 7 d after dose 2 (Day 29). Day 29 S1- and RBD-binding IgG GMCs were comparable between the younger and older participants at the 20 µg dose level. Across all dose-level cohorts, antibody levels decreased over time, but with S1- and RBD-binding antibody GMCs well above that observed in a COVID-19 HCS panel at Day 85 (63 d after dose 2; 10 µg to 30 µg dose level).

Independent of age, all participants dosed with dose 1 at ≥20 µg BNT162b1 and or BNT162b2 seroconverted either by 7 d or 21 d after dose 2 (Day 29 or Day 43).

A. Muik	27Nov2020
Responsible person: Dr. Alexander Muik, Head of Immunomodulators, BioNTech RNA Pharmaceuticals GmbH	Date

2 GENERAL INFORMATION

2.1 Sponsor and Test Facilities

Sponsor:

BioNTech RNA Pharmaceuticals GmbH
An der Goldgrube 12
55131 Mainz
Germany

Test Facilities:

Pfizer Inc.
Vaccine Research & Development Division
401 North Middletown Rd.
Pearl River, NY 10965
USA

University of Texas Medical Branch (UTMB)
T.G. Blocker Medical Research Building Rm. 5.136 (L15532)
224 11th Street
Galveston, TX 77555
USA

2.2 Participating Personnel

Responsible person: (as defined in SOP-100-024)	Dr. Alexander Muik, Head of Immunomodulators, BioNTech RNA Pharmaceuticals GmbH
Author:	Dr. Alexander Muik, Head of Immunomodulators, BioNTech RNA Pharmaceuticals GmbH
Experimenter:	David Cooper, PhD Executive Director & Head, High-throughput Clinical Immunoassays & Diagnostics Luminex-based direct immunoassay (dLIA) Lead Pfizer, Inc.
Experimenter:	Dr. Pei-Young Shi Principal Investigator Virus Neutralization (NT) Assay (VNT) Lead University of Texas Medical Branch

2.3 Study Dates

Start of experiments: 28 JUN 2020 (dLIA)

29 JUN 2020 (VNT)

Completion of experiments: 23 OCT 2020 (dLIA)*

23 OCT 2020 (VNT)*

*Completion of experiment dates represent the date that the assays were completed, and data delivered. It should be noted that sample workboxes are still being received and active testing is ongoing.

2.4 Guidelines and Regulations

All experiments are executed in accordance with the existing standard operating procedures and described processes from BioNTech SE. Applicable documents are listed below.

BioNTech SE:

- SOP-100-003 Archiving of Paper-Based Documents

Pfizer, Inc. for dLIA

- VR-TM-10293 Single-plex Luminex Assay for Quantitation of IgG Antibodies to SARS-CoV-2S1 Protein in Human Serum
- VR-TM-10294 Single-plex Luminex Assay for Quantitation of IgG Antibodies to SARS-CoV-2 RBD Protein in Human Serum
- VR-SOP-LC-11186 Standard Operating Procedure for Running (b) (4) Method using (b) (4) Robot
- VR-SOP-LC-11120 Data Review Procedures for Direct Luminex Immunoassays in LIMS v6

UTMB for VNT

- SHI-TM-10011 Manual 96-well Neutralization Assay for the Detection of Functional Antibodies to SARS-CoV-2 in Test Serum using Cytation 7 Image Reader
- SHI-TM-10011-FM01 MANUAL 96-WELL SARS-COV-2 NEUTRALIZATION ASSAY WORKSHEET

- SHI-TM-10011-FM02 MANUAL SAMPLE PREPARATION FOR THE 96-WELL SARS-COV-2 NEUTRALIZATION ASSAY WORKSHEET
- SHI-SOP-10012 Neutralization Assay for the Detection of Functional Antibodies to SARS-CoV-2 in Test Serum Data Analysis using Gen5, Excel, and Prism

2.5 Changes and Deviations

Not applicable. There is no formal R&D plan available.

2.6 Documentation and Archive

Study plans and reports are stored and archived according to BioNTech's SOP-100-003 Archiving of Paper-Based Documents.

For the SARS-CoV-2 S1 and RBD IgG direct Luminex assays (dLIA) at Pfizer, assay plates are read by the Bio-Plex reader, capturing individual well median fluorescent intensities (MFI). For each assay plate, a CSV file containing the raw data is generated from the Bio-Plex reader. These raw data files are stored on the local PC connected to the Bio-Plex reader(s), and an exact copy of each file is moved to a secured server where access restrictions are in place. This raw data is additionally parsed into Pfizer's VRD LabWare LIMS instance from the secure server, aggregating the raw data into the LIMS batch (e.g., grouping of samples tested together).

The raw MFI data maintained within LIMS are then analyzed by a custom written SAS application, using a regression model to calculate antigen-specific antibody concentrations from MFI data. The final, calculated data, and the corresponding PDF report from the SAS application are transferred back to VRD LabWare LIMS, where they are stored.

Finally, for each batch, the executed test method, robotic instrument input and output files, and final SAS PDF output file are archived per VR-SOP-QU-10517 (Administration of the Pfizer Vaccine Research (VRD) Records Management Program) and VR-SOP-QU-10852 (Management of Records Rooms within Vaccine Research and Development).

For the SARS-CoV-2 mNeonGreen Microneutralization (mNG NT) assay (VNT) at UTMB, assay plates are read by a Cytation-7 Cell Imaging Multi-Mode Reader, capturing fluorescent viral foci for each well. This raw data is used to calculate a sample titer, the reciprocal serum dilution at 50% and 90% of which the virus was neutralized. Both the raw data files from the instrument, the intermediate calculated results, and the final calculated results (in the format per VR-RI-DA-10020) are stored in a Pfizer SharePoint site with restricted access. The final, calculated data are formatted per VR-RI-DA-10020 (Research Informatics Data Agreement for External Partners - University of Texas Medical Branch), and parsed into VRD LabWare LIMS, where they are stored.

3 INTRODUCTION

3.1 Background

The clinical trial BNT162-01 investigates the safety and immunogenicity of four prophylactic SARS-CoV-2 RNA vaccines against COVID-19 using different dosing regimens in healthy adults. It is accompanied by an extensive immune monitoring program to analyze participants' immune responses against vaccine-encoded antigens specific to SARS-CoV-2 S protein, S1 fragment or RBD, including Luminex-based direct immunoassay (dLIA), virus neutralization assay (VNT), *ex vivo* ELISpot, and ICS.

3.2 Objectives

The objective of this study was to assess the SARS-CoV-2 virus neutralizing titers (secondary endpoint) and the SARS-CoV-2 S1- and RBD-specific IgG concentrations (exploratory endpoint) at pre-immunization baseline, 7±1, and 21±2 days after the BNT162b1 or BNT162b2 priming immunization (Days 1, 8, and 22), and 7±1, 21±2, 28±2, and 63±5 days after the booster immunization (Days 29, 43, 50, and 85).

3.3 Study Design

Serum prepared from blood of study participants collected at pre-immunization baseline, 7±1, and 21±2 days after the BNT162b1 or BNT162b2 priming immunization (Days 1, 8, and 22), and 7±1, 21±2, 28±2, and 63±5 days after the booster immunization (Days 29, 43, 50, and 85), was analyzed by Luminex-based dLIA for SARS-CoV-2 S1- or RBD-specific antibodies, and by VNT for functional antibody titer.

At the cut-off date for this report, data was available up until Day 43 for BNT162b1-dosed younger participants aged 18 to 55 years dosed with 1, 10, 30, 50, or 60 µg on Days 1 (all dose levels) and 22 (all dose levels except 60 µg) (n=12 per group). For BNT162b2-dosed participants, data was available for younger participants aged 18 to 55 years dosed with 1, 3, 10, 20, or 30 µg, and older participants aged 56 to 85 years dosed with 20 µg on Days 1 and 22 (n=12 per group). Data for younger participant dose groups was available up until Day 50 for dose groups 1 µg and 3 µg, and up until Day 85 for dose groups 10, 20, and 30 µg. For the BNT162b2-dosed older participants, data was available up until Day 29

4 MATERIALS AND METHODS

4.1 Test Item

Serum samples from participants (n=12 per dose group) in the BNT162-01 trial vaccinated with BNT162b1 in younger adult dose groups 1 µg, 10 µg (1 drop-out after dose 1), 30 µg, 50 µg (1 drop-out after dose 1), and 60 µg (Table 1), or vaccinated with BNT162b2 in younger adult dose groups 1 µg (1 drop-out after dose 1), 3 µg, and 10 µg (1 drop-out after dose 1; 1 delayed booster on Day 28), 20 µg, and 30 µg (Table 2), or in the older adult dose group 20 µg (Table 3).

Table 1: BNT162b1 study participant material (younger adults aged 18 to 55 years)

V1: pre-immunization baseline; V3: 7±1 days after primary immunization; V4: 21±2 days after primary immunization (pre-booster); V5: 29±3 days after primary immunization; V6: 43±4 days after primary immunization; V7: end of treatment or 50±4 days after primary immunization

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0001	BNT162b1	10 µg	Visit 1 (Pre-dose)	24.04.2020	N/A
276-01-0001	BNT162b1	10 µg	Visit 3	30.04.2020	N/A
276-01-0001	BNT162b1	10 µg	Visit 4 (Pre-dose)	15.05.2020	N/A
276-01-0001	BNT162b1	10 µg	Visit 5	22.05.2020	N/A
276-01-0001	BNT162b1	10 µg	Visit 6	04.06.2020	N/A
276-01-0003	BNT162b1	10 µg	Visit 1 (Pre-dose)	28.04.2020	N/A
276-01-0003	BNT162b1	10 µg	Visit 3	05.05.2020	N/A
276-01-0003	BNT162b1	10 µg	Visit 4 (Pre-dose)	19.05.2020	N/A
276-01-0003	BNT162b1	10 µg	Visit 5	27.05.2020	N/A
276-01-0003	BNT162b1	10 µg	Visit 6	09.06.2020	N/A
276-01-0004	BNT162b1	10 µg	Visit 1 (Pre-dose)	24.04.2020	N/A
276-01-0004	BNT162b1	10 µg	Visit 3	30.04.2020	N/A
276-01-0004	BNT162b1	10 µg	Visit 4 (Pre-dose)	15.05.2020	N/A
276-01-0004	BNT162b1	10 µg	Visit 5	22.05.2020	N/A
276-01-0004	BNT162b1	10 µg	Visit 6	04.06.2020	N/A
276-01-0005	BNT162b1	10 µg	Visit 1 (Pre-dose)	24.04.2020	N/A
276-01-0005	BNT162b1	10 µg	Visit 3	30.04.2020	N/A
276-01-0005	BNT162b1	10 µg	Visit 4 (Pre-dose)	15.05.2020	N/A
276-01-0005	BNT162b1	10 µg	Visit 5	22.05.2020	N/A
276-01-0005	BNT162b1	10 µg	Visit 6	04.06.2020	N/A
276-01-0006	BNT162b1	10 µg	Visit 1 (Pre-dose)	28.04.2020	N/A
276-01-0006	BNT162b1	10 µg	Visit 3	05.05.2020	N/A
276-01-0006	BNT162b1	10 µg	Visit 4 (Pre-dose)	19.05.2020	N/A
276-01-0006	BNT162b1	10 µg	Visit 5	27.05.2020	N/A
276-01-0006	BNT162b1	10 µg	Visit 6	09.06.2020	N/A
276-01-0007	BNT162b1	10 µg	Visit 1 (Pre-dose)	23.04.2020	N/A
276-01-0007	BNT162b1	10 µg	Visit 3	30.04.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0007	BNT162b1	10 µg	Visit 4 (Pre-dose)	14.05.2020	N/A
276-01-0007	BNT162b1	10 µg	Visit 5	25.05.2020	N/A
276-01-0007	BNT162b1	10 µg	Visit 6	04.06.2020	N/A
276-01-0008	BNT162b1	10 µg	Visit 1 (Pre-dose)	28.04.2020	N/A
276-01-0008	BNT162b1	10 µg	Visit 3	05.05.2020	N/A
276-01-0008	BNT162b1	10 µg	Visit 4 (Pre-dose)	19.05.2020	N/A
276-01-0008	BNT162b1	10 µg	Visit 5	27.05.2020	N/A
276-01-0008	BNT162b1	10 µg	Visit 6	09.06.2020	N/A
276-01-0009	BNT162b1	10 µg	Visit 1 (Pre-dose)	28.04.2020	N/A
276-01-0009	BNT162b1	10 µg	Visit 3	05.05.2020	N/A
276-01-0009	BNT162b1	10 µg	Visit 4 (Pre-dose)	19.05.2020	N/A
276-01-0009	BNT162b1	10 µg	Visit 5	27.05.2020	N/A
276-01-0009	BNT162b1	10 µg	Visit 6	09.06.2020	N/A
276-01-0010	BNT162b1	10 µg	Visit 1 (Pre-dose)	24.04.2020	N/A
276-01-0010	BNT162b1	10 µg	Visit 3	30.04.2020	N/A
276-01-0010	BNT162b1	10 µg	Visit 7 (drop-out)	19.05.2020	drop-out after dose 1
276-01-0011	BNT162b1	10 µg	Visit 1 (Pre-dose)	24.04.2020	N/A
276-01-0011	BNT162b1	10 µg	Visit 3	30.04.2020	N/A
276-01-0011	BNT162b1	10 µg	Visit 4 (Pre-dose)	15.05.2020	N/A
276-01-0011	BNT162b1	10 µg	Visit 5	22.05.2020	N/A
276-01-0011	BNT162b1	10 µg	Visit 6	04.06.2020	N/A
276-01-0015	BNT162b1	1 µg	Visit 1 (Pre-dose)	29.04.2020	N/A
276-01-0015	BNT162b1	1 µg	Visit 3	06.05.2020	N/A
276-01-0015	BNT162b1	1 µg	Visit 4 (Pre-dose)	20.05.2020	N/A
276-01-0015	BNT162b1	1 µg	Visit 5	27.05.2020	N/A
276-01-0015	BNT162b1	1 µg	Visit 6	10.06.2020	N/A
276-01-0016	BNT162b1	30 µg	Visit 1 (Pre-dose)	29.04.2020	N/A
276-01-0016	BNT162b1	30 µg	Visit 3	06.05.2020	N/A
276-01-0016	BNT162b1	30 µg	Visit 4 (Pre-dose)	20.05.2020	N/A
276-01-0016	BNT162b1	30 µg	Visit 5	27.05.2020	N/A
276-01-0016	BNT162b1	30 µg	Visit 6	10.06.2020	N/A
276-01-0017	BNT162b1	10 µg	Visit 1 (Pre-dose)	28.04.2020	N/A
276-01-0017	BNT162b1	10 µg	Visit 3	05.05.2020	N/A
276-01-0017	BNT162b1	10 µg	Visit 4 (Pre-dose)	19.05.2020	N/A
276-01-0017	BNT162b1	10 µg	Visit 5	27.05.2020	N/A
276-01-0017	BNT162b1	10 µg	Visit 6	09.06.2020	N/A
276-01-0018	BNT162b1	1 µg	Visit 1 (Pre-dose)	29.04.2020	N/A
276-01-0018	BNT162b1	1 µg	Visit 3	06.05.2020	N/A
276-01-0018	BNT162b1	1 µg	Visit 4 (Pre-dose)	20.05.2020	N/A
276-01-0018	BNT162b1	1 µg	Visit 5	27.05.2020	N/A
276-01-0018	BNT162b1	1 µg	Visit 6	10.06.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0019	BNT162b1	10 µg	Visit 1 (Pre-dose)	28.04.2020	N/A
276-01-0019	BNT162b1	10 µg	Visit 4 (Pre-dose)	19.05.2020	N/A
276-01-0019	BNT162b1	10 µg	Visit 3	05.05.2020	N/A
276-01-0019	BNT162b1	10 µg	Visit 5	27.05.2020	N/A
276-01-0019	BNT162b1	10 µg	Visit 6	09.06.2020	N/A
276-01-0020	BNT162b1	30 µg	Visit 1 (Pre-dose)	29.04.2020	N/A
276-01-0020	BNT162b1	30 µg	Visit 3	06.05.2020	N/A
276-01-0020	BNT162b1	30 µg	Visit 4 (Pre-dose)	20.05.2020	N/A
276-01-0020	BNT162b1	30 µg	Visit 5	27.05.2020	N/A
276-01-0020	BNT162b1	30 µg	Visit 6	10.06.2020	N/A
276-01-0021	BNT162b1	30 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0021	BNT162b1	30 µg	Visit 3	12.05.2020	N/A
276-01-0021	BNT162b1	30 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0021	BNT162b1	30 µg	Visit 5	02.06.2020	N/A
276-01-0021	BNT162b1	30 µg	Visit 6	16.06.2020	N/A
276-01-0023	BNT162b1	1 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0023	BNT162b1	1 µg	Visit 3	12.05.2020	N/A
276-01-0023	BNT162b1	1 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0023	BNT162b1	1 µg	Visit 5	02.06.2020	N/A
276-01-0023	BNT162b1	1 µg	Visit 6	16.06.2020	N/A
276-01-0025	BNT162b1	1 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0025	BNT162b1	1 µg	Visit 3	12.05.2020	N/A
276-01-0025	BNT162b1	1 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0025	BNT162b1	1 µg	Visit 5	02.06.2020	N/A
276-01-0025	BNT162b1	1 µg	Visit 6	16.06.2020	N/A
276-01-0028	BNT162b1	30 µg	Visit 1 (Pre-dose)	07.05.2020	N/A
276-01-0028	BNT162b1	30 µg	Visit 3	14.05.2020	N/A
276-01-0028	BNT162b1	30 µg	Visit 4 (Pre-dose)	28.05.2020	N/A
276-01-0028	BNT162b1	30 µg	Visit 5	04.06.2020	N/A
276-01-0028	BNT162b1	30 µg	Visit 6	18.06.2020	N/A
276-01-0031	BNT162b1	30 µg	Visit 1 (Pre-dose)	07.05.2020	N/A
276-01-0031	BNT162b1	30 µg	Visit 3	14.05.2020	N/A
276-01-0031	BNT162b1	30 µg	Visit 4 (Pre-dose)	28.05.2020	N/A
276-01-0031	BNT162b1	30 µg	Visit 5	04.06.2020	N/A
276-01-0031	BNT162b1	30 µg	Visit 6	20.06.2020	N/A
276-01-0032	BNT162b1	30 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0032	BNT162b1	30 µg	Visit 3	12.05.2020	N/A
276-01-0032	BNT162b1	30 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0032	BNT162b1	30 µg	Visit 5	02.06.2020	N/A
276-01-0032	BNT162b1	30 µg	Visit 6	16.06.2020	N/A
276-01-0033	BNT162b1	1 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0033	BNT162b1	1 µg	Visit 3	12.05.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0033	BNT162b1	1 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0033	BNT162b1	1 µg	Visit 5	02.06.2020	N/A
276-01-0033	BNT162b1	1 µg	Visit 6	16.06.2020	N/A
276-01-0034	BNT162b1	30 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0034	BNT162b1	30 µg	Visit 3	12.05.2020	N/A
276-01-0034	BNT162b1	30 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0034	BNT162b1	30 µg	Visit 5	02.06.2020	N/A
276-01-0034	BNT162b1	30 µg	Visit 6	16.06.2020	N/A
276-01-0036	BNT162b1	1 µg	Visit 1 (Pre-dose)	08.05.2020	N/A
276-01-0036	BNT162b1	1 µg	Visit 3	15.05.2020	N/A
276-01-0036	BNT162b1	1 µg	Visit 4 (Pre-dose)	29.05.2020	N/A
276-01-0036	BNT162b1	1 µg	Visit 5	04.06.2020	N/A
276-01-0036	BNT162b1	1 µg	Visit 6	19.06.2020	N/A
276-01-0037	BNT162b1	30 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0037	BNT162b1	30 µg	Visit 3	12.05.2020	N/A
276-01-0037	BNT162b1	30 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0037	BNT162b1	30 µg	Visit 5	02.06.2020	N/A
276-01-0037	BNT162b1	30 µg	Visit 6	16.06.2020	N/A
276-01-0038	BNT162b1	30 µg	Visit 1 (Pre-dose)	07.05.2020	N/A
276-01-0038	BNT162b1	30 µg	Visit 3	14.05.2020	N/A
276-01-0038	BNT162b1	30 µg	Visit 4 (Pre-dose)	28.05.2020	N/A
276-01-0038	BNT162b1	30 µg	Visit 5	04.06.2020	N/A
276-01-0038	BNT162b1	30 µg	Visit 6	18.06.2020	N/A
276-01-0039	BNT162b1	30 µg	Visit 1 (Pre-dose)	07.05.2020	N/A
276-01-0039	BNT162b1	30 µg	Visit 3	14.05.2020	N/A
276-01-0039	BNT162b1	30 µg	Visit 4 (Pre-dose)	28.05.2020	N/A
276-01-0039	BNT162b1	30 µg	Visit 5	04.06.2020	N/A
276-01-0039	BNT162b1	30 µg	Visit 6	18.06.2020	N/A
276-01-0040	BNT162b1	1 µg	Visit 1 (Pre-dose)	08.05.2020	N/A
276-01-0040	BNT162b1	1 µg	Visit 3	15.05.2020	N/A
276-01-0040	BNT162b1	1 µg	Visit 4 (Pre-dose)	29.05.2020	N/A
276-01-0040	BNT162b1	1 µg	Visit 5	04.06.2020	N/A
276-01-0040	BNT162b1	1 µg	Visit 6	19.06.2020	N/A
276-01-0041	BNT162b1	1 µg	Visit 1 (Pre-dose)	08.05.2020	N/A
276-01-0041	BNT162b1	1 µg	Visit 3	15.05.2020	N/A
276-01-0041	BNT162b1	1 µg	Visit 4 (Pre-dose)	29.05.2020	N/A
276-01-0041	BNT162b1	1 µg	Visit 5	04.06.2020	N/A
276-01-0041	BNT162b1	1 µg	Visit 6	19.06.2020	N/A
276-01-0042	BNT162b1	1 µg	Visit 1 (Pre-dose)	08.05.2020	N/A
276-01-0042	BNT162b1	1 µg	Visit 3	15.05.2020	N/A
276-01-0042	BNT162b1	1 µg	Visit 4 (Pre-dose)	29.05.2020	N/A
276-01-0042	BNT162b1	1 µg	Visit 5	04.06.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0042	BNT162b1	1 µg	Visit 6	19.06.2020	N/A
276-01-0043	BNT162b1	30 µg	Visit 1 (Pre-dose)	07.05.2020	N/A
276-01-0043	BNT162b1	30 µg	Visit 3	14.05.2020	N/A
276-01-0043	BNT162b1	30 µg	Visit 4 (Pre-dose)	28.05.2020	N/A
276-01-0043	BNT162b1	30 µg	Visit 5	03.06.2020	N/A
276-01-0043	BNT162b1	30 µg	Visit 6	18.06.2020	N/A
276-01-0045	BNT162b1	1 µg	Visit 1 (Pre-dose)	05.05.2020	N/A
276-01-0045	BNT162b1	1 µg	Visit 3	13.05.2020	N/A
276-01-0045	BNT162b1	1 µg	Visit 4 (Pre-dose)	26.05.2020	N/A
276-01-0045	BNT162b1	1 µg	Visit 5	02.06.2020	N/A
276-01-0045	BNT162b1	1 µg	Visit 6	16.06.2020	N/A
276-01-0047	BNT162b1	30 µg	Visit 1 (Pre-dose)	07.05.2020	N/A
276-01-0047	BNT162b1	30 µg	Visit 3	14.05.2020	N/A
276-01-0047	BNT162b1	30 µg	Visit 4 (Pre-dose)	28.05.2020	N/A
276-01-0047	BNT162b1	30 µg	Visit 5	04.06.2020	N/A
276-01-0047	BNT162b1	30 µg	Visit 6	18.06.2020	N/A
276-01-0048	BNT162b1	1 µg	Visit 1 (Pre-dose)	08.05.2020	N/A
276-01-0048	BNT162b1	1 µg	Visit 3	15.05.2020	N/A
276-01-0048	BNT162b1	1 µg	Visit 4 (Pre-dose)	29.05.2020	N/A
276-01-0048	BNT162b1	1 µg	Visit 5	04.06.2020	N/A
276-01-0048	BNT162b1	1 µg	Visit 6	19.06.2020	N/A
276-01-0049	BNT162b1	50 µg	Visit 1 (Pre-dose)	12.05.2020	N/A
276-01-0049	BNT162b1	50 µg	Visit 3	19.05.2020	N/A
276-01-0049	BNT162b1	50 µg	Visit 4 (Pre-dose)	02.06.2020	N/A
276-01-0049	BNT162b1	50 µg	Visit 5	09.06.2020	N/A
276-01-0049	BNT162b1	50 µg	Visit 6	23.06.2020	N/A
276-01-0050	BNT162b1	50 µg	Visit 1 (Pre-dose)	15.05.2020	N/A
276-01-0050	BNT162b1	50 µg	Visit 3	22.05.2020	N/A
276-01-0050	BNT162b1	50 µg	Visit 7 (drop-out)	03.06.2020	drop-out after dose 1
276-01-0052	BNT162b1	1 µg	Visit 1 (Pre-dose)	08.05.2020	N/A
276-01-0052	BNT162b1	1 µg	Visit 3	15.05.2020	N/A
276-01-0052	BNT162b1	1 µg	Visit 4 (Pre-dose)	29.05.2020	N/A
276-01-0052	BNT162b1	1 µg	Visit 5	03.06.2020	N/A
276-01-0052	BNT162b1	1 µg	Visit 6	19.06.2020	N/A
276-01-0053	BNT162b1	50 µg	Visit 1 (Pre-dose)	12.05.2020	N/A
276-01-0053	BNT162b1	50 µg	Visit 3	19.05.2020	N/A
276-01-0053	BNT162b1	50 µg	Visit 4 (Pre-dose)	02.06.2020	N/A
276-01-0053	BNT162b1	50 µg	Visit 5	09.06.2020	N/A
276-01-0053	BNT162b1	50 µg	Visit 6	23.06.2020	N/A
276-01-0055	BNT162b1	50 µg	Visit 1 (Pre-dose)	13.05.2020	N/A
276-01-0055	BNT162b1	50 µg	Visit 3	20.05.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0055	BNT162b1	50 µg	Visit 4 (Pre-dose)	03.06.2020	N/A
276-01-0055	BNT162b1	50 µg	Visit 5	09.06.2020	N/A
276-01-0055	BNT162b1	50 µg	Visit 6	23.06.2020	N/A
276-01-0056	BNT162b1	50 µg	Visit 1 (Pre-dose)	13.05.2020	N/A
276-01-0056	BNT162b1	50 µg	Visit 3	20.05.2020	N/A
276-01-0056	BNT162b1	50 µg	Visit 4 (Pre-dose)	03.06.2020	N/A
276-01-0056	BNT162b1	50 µg	Visit 5	09.06.2020	N/A
276-01-0056	BNT162b1	50 µg	Visit 6	23.06.2020	N/A
276-01-0057	BNT162b1	50 µg	Visit 1 (Pre-dose)	15.05.2020	N/A
276-01-0057	BNT162b1	50 µg	Visit 3	22.05.2020	N/A
276-01-0057	BNT162b1	50 µg	Visit 4 (Pre-dose)	05.06.2020	N/A
276-01-0057	BNT162b1	50 µg	Visit 5	12.06.2020	N/A
276-01-0057	BNT162b1	50 µg	Visit 6	26.06.2020	N/A
276-01-0059	BNT162b1	50 µg	Visit 1 (Pre-dose)	13.05.2020	N/A
276-01-0059	BNT162b1	50 µg	Visit 3	20.05.2020	N/A
276-01-0059	BNT162b1	50 µg	Visit 4 (Pre-dose)	03.06.2020	N/A
276-01-0059	BNT162b1	50 µg	Visit 5	09.06.2020	N/A
276-01-0059	BNT162b1	50 µg	Visit 6	23.06.2020	N/A
276-01-0060	BNT162b1	50 µg	Visit 1 (Pre-dose)	13.05.2020	N/A
276-01-0060	BNT162b1	50 µg	Visit 3	20.05.2020	N/A
276-01-0060	BNT162b1	50 µg	Visit 4 (Pre-dose)	03.06.2020	N/A
276-01-0060	BNT162b1	50 µg	Visit 5	09.06.2020	N/A
276-01-0060	BNT162b1	50 µg	Visit 6	24.06.2020	N/A
276-01-0066	BNT162b1	60 µg	Visit 1 (Pre-dose)	19.05.2020	N/A
276-01-0066	BNT162b1	60 µg	Visit 3	26.05.2020	N/A
276-01-0066	BNT162b1	60 µg	Visit 4 (Pre-dose)	09.06.2020	N/A
276-01-0066	BNT162b1	60 µg	Visit 5	16.06.2020	N/A
276-01-0066	BNT162b1	60 µg	Visit 6	30.06.2020	N/A
276-01-0067	BNT162b1	50 µg	Visit 1 (Pre-dose)	15.05.2020	N/A
276-01-0067	BNT162b1	50 µg	Visit 3	22.05.2020	N/A
276-01-0067	BNT162b1	50 µg	Visit 4 (Pre-dose)	05.06.2020	N/A
276-01-0067	BNT162b1	50 µg	Visit 5	12.06.2020	N/A
276-01-0067	BNT162b1	50 µg	Visit 6	26.06.2020	N/A
276-01-0068	BNT162b1	50 µg	Visit 1 (Pre-dose)	15.05.2020	N/A
276-01-0068	BNT162b1	50 µg	Visit 3	22.05.2020	N/A
276-01-0068	BNT162b1	50 µg	Visit 4 (Pre-dose)	05.06.2020	N/A
276-01-0068	BNT162b1	50 µg	Visit 5	12.06.2020	N/A
276-01-0068	BNT162b1	50 µg	Visit 6	26.06.2020	N/A
276-01-0070	BNT162b1	50 µg	Visit 1 (Pre-dose)	15.05.2020	N/A
276-01-0070	BNT162b1	50 µg	Visit 3	22.05.2020	N/A
276-01-0070	BNT162b1	50 µg	Visit 4 (Pre-dose)	05.06.2020	N/A
276-01-0070	BNT162b1	50 µg	Visit 5	12.06.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0070	BNT162b1	50 µg	Visit 6	26.06.2020	N/A
276-01-0073	BNT162b1	50 µg	Visit 1 (Pre-dose)	15.05.2020	N/A
276-01-0073	BNT162b1	50 µg	Visit 3	22.05.2020	N/A
276-01-0073	BNT162b1	50 µg	Visit 4 (Pre-dose)	05.06.2020	N/A
276-01-0073	BNT162b1	50 µg	Visit 5	12.06.2020	N/A
276-01-0073	BNT162b1	50 µg	Visit 6	26.06.2020	N/A
276-01-0075	BNT162b1	60 µg	Visit 1 (Pre-dose)	22.05.2020	N/A
276-01-0075	BNT162b1	60 µg	Visit 3	29.05.2020	N/A
276-01-0075	BNT162b1	60 µg	Visit 4 (Pre-dose)	12.06.2020	N/A
276-01-0075	BNT162b1	60 µg	Visit 5	19.06.2020	N/A
276-01-0075	BNT162b1	60 µg	Visit 6	03.07.2020	N/A
276-01-0076	BNT162b1	60 µg	Visit 1 (Pre-dose)	22.05.2020	N/A
276-01-0076	BNT162b1	60 µg	Visit 3	29.05.2020	N/A
276-01-0076	BNT162b1	60 µg	Visit 4 (Pre-dose)	12.06.2020	N/A
276-01-0076	BNT162b1	60 µg	Visit 5	19.06.2020	N/A
276-01-0076	BNT162b1	60 µg	Visit 6	03.07.2020	N/A
276-01-0078	BNT162b1	60 µg	Visit 1 (Pre-dose)	22.05.2020	N/A
276-01-0078	BNT162b1	60 µg	Visit 3	29.05.2020	N/A
276-01-0078	BNT162b1	60 µg	Visit 4 (Pre-dose)	12.06.2020	N/A
276-01-0078	BNT162b1	60 µg	Visit 5	19.06.2020	N/A
276-01-0078	BNT162b1	60 µg	Visit 6	03.07.2020	N/A
276-01-0083	BNT162b1	60 µg	Visit 1 (Pre-dose)	20.05.2020	N/A
276-01-0083	BNT162b1	60 µg	Visit 3	27.05.2020	N/A
276-01-0083	BNT162b1	60 µg	Visit 4 (Pre-dose)	10.06.2020	N/A
276-01-0083	BNT162b1	60 µg	Visit 5	16.06.2020	N/A
276-01-0083	BNT162b1	60 µg	Visit 6	30.06.2020	N/A
276-01-0084	BNT162b1	60 µg	Visit 1 (Pre-dose)	22.05.2020	N/A
276-01-0084	BNT162b1	60 µg	Visit 3	29.05.2020	N/A
276-01-0084	BNT162b1	60 µg	Visit 4 (Pre-dose)	12.06.2020	N/A
276-01-0084	BNT162b1	60 µg	Visit 5	19.06.2020	N/A
276-01-0084	BNT162b1	60 µg	Visit 6	03.07.2020	N/A
276-01-0085	BNT162b1	60 µg	Visit 1 (Pre-dose)	22.05.2020	N/A
276-01-0085	BNT162b1	60 µg	Visit 3	29.05.2020	N/A
276-01-0085	BNT162b1	60 µg	Visit 4 (Pre-dose)	12.06.2020	N/A
276-01-0085	BNT162b1	60 µg	Visit 5	19.06.2020	N/A
276-01-0085	BNT162b1	60 µg	Visit 6	03.07.2020	N/A
276-01-0089	BNT162b1	60 µg	Visit 1 (Pre-dose)	20.05.2020	N/A
276-01-0089	BNT162b1	60 µg	Visit 3	27.05.2020	N/A
276-01-0089	BNT162b1	60 µg	Visit 4 (Pre-dose)	10.06.2020	N/A
276-01-0089	BNT162b1	60 µg	Visit 5	16.06.2020	N/A
276-01-0089	BNT162b1	60 µg	Visit 6	30.06.2020	N/A
276-01-0093	BNT162b1	60 µg	Visit 1 (Pre-dose)	20.05.2020	N/A

Participant ID	Construct	Dose	Visit	Collection date	Comment
276-01-0093	BNT162b1	60 µg	Visit 3	27.05.2020	N/A
276-01-0093	BNT162b1	60 µg	Visit 4 (Pre-dose)	10.06.2020	N/A
276-01-0093	BNT162b1	60 µg	Visit 5	16.06.2020	N/A
276-01-0093	BNT162b1	60 µg	Visit 6	30.06.2020	N/A
276-01-0096	BNT162b1	60 µg	Visit 1 (Pre-dose)	19.05.2020	N/A
276-01-0096	BNT162b1	60 µg	Visit 3	26.05.2020	N/A
276-01-0096	BNT162b1	60 µg	Visit 4 (Pre-dose)	09.06.2020	N/A
276-01-0096	BNT162b1	60 µg	Visit 5	17.06.2020	N/A
276-01-0096	BNT162b1	60 µg	Visit 6	30.06.2020	N/A
276-01-0103	BNT162b1	60 µg	Visit 1 (Pre-dose)	22.05.2020	N/A
276-01-0103	BNT162b1	60 µg	Visit 3	29.05.2020	N/A
276-01-0103	BNT162b1	60 µg	Visit 4 (Pre-dose)	12.06.2020	N/A
276-01-0103	BNT162b1	60 µg	Visit 5	19.06.2020	N/A
276-01-0103	BNT162b1	60 µg	Visit 6	03.07.2020	N/A
276-01-0104	BNT162b1	60 µg	Visit 1 (Pre-dose)	20.05.2020	N/A
276-01-0104	BNT162b1	60 µg	Visit 3	27.05.2020	N/A
276-01-0104	BNT162b1	60 µg	Visit 4 (Pre-dose)	10.06.2020	N/A
276-01-0104	BNT162b1	60 µg	Visit 5	16.06.2020	N/A
276-01-0104	BNT162b1	60 µg	Visit 6	30.06.2020	N/A

Table 2: BNT162b2 study participant material (younger adults aged 18 to 55 years)

V1: pre-immunization baseline; V3: 7±1 days after primary immunization; V4: 21±2 days after primary immunization (pre-booster); V5: 29±3 days after primary immunization; V6: 43±4 days after primary immunization; V7: end of treatment or 50±4 days after primary immunization; V8: follow-up or 85±7 days after primary immunization.

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0101	BNT162b2	10 µg	Visit 1 (Pre-dose)	16.06.2020	N/A
276-02-0101	BNT162b2	10 µg	Visit 3	22.06.2020	N/A
276-02-0101	BNT162b2	10 µg	Visit 4 (Pre-dose)	07.07.2020	N/A
276-02-0101	BNT162b2	10 µg	Visit 5	14.07.2020	N/A
276-02-0101	BNT162b2	10 µg	Visit 6	28.07.2020	N/A
276-02-0101	BNT162b2	10 µg	Visit 7	04.08.2020	N/A
276-02-0101	BNT162b2	10 µg	Visit 8	08.09.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 1 (Pre-dose)	16.06.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 3	23.06.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 4 (Pre-dose)	07.07.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 5	14.07.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 6	28.07.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 7	04.08.2020	N/A
276-02-0102	BNT162b2	10 µg	Visit 8	08.09.2020	N/A
276-02-0103	BNT162b2	10 µg	Visit 1 (Pre-dose)	15.06.2020	N/A
276-02-0103	BNT162b2	10 µg	Visit 3	22.06.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0103	BNT162b2	10 µg	Visit 4 (Pre-dose)	06.07.2020	N/A
276-02-0103	BNT162b2	10 µg	Visit 5	13.07.2020	N/A
276-02-0103	BNT162b2	10 µg	Visit 6	27.07.2020	N/A
276-02-0103	BNT162b2	10 µg	Visit 7	03.08.2020	N/A
276-02-0103	BNT162b2	10 µg	Visit 8	07.09.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 1 (Pre-dose)	16.06.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 3	22.06.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 4 (Pre-dose)	07.07.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 5	14.07.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 6	28.07.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 7	04.08.2020	N/A
276-02-0104	BNT162b2	10 µg	Visit 8	14.09.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 1 (Pre-dose)	16.06.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 3	22.06.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 4 (Pre-dose)	06.07.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 5	14.07.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 6	28.07.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 7	04.08.2020	N/A
276-02-0105	BNT162b2	10 µg	Visit 8	08.09.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 1 (Pre-dose)	16.06.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 3	22.06.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 4 (Pre-dose)	07.07.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 5	14.07.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 6	24.07.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 7	07.08.2020	N/A
276-02-0110	BNT162b2	10 µg	Visit 8	10.09.2020	N/A
276-02-0111	BNT162b2	10 µg	Visit 1 (Pre-dose)	18.06.2020	N/A
276-02-0111	BNT162b2	10 µg	Visit 3	24.06.2020	N/A
276-02-0111	BNT162b2	10 µg	Unscheduled Visit	09.07.2020	Day 21 after primary immunization but deferred booster immunization
276-02-0111	BNT162b2	10 µg	Visit 4 (Pre-dose)	15.07.2020	Pre-dose sample at day of booster immunization (Day 27)
276-02-0111	BNT162b2	10 µg	Visit 5	23.07.2020	N/A
276-02-0111	BNT162b2	10 µg	Visit 6	30.07.2020	N/A
276-02-0111	BNT162b2	10 µg	Visit 7	06.08.2020	N/A
276-02-0111	BNT162b2	10 µg	Visit 8	04.09.2020	N/A
276-02-0114	BNT162b2	10 µg	Visit 1 (Pre-dose)	18.06.2020	N/A
276-02-0114	BNT162b2	10 µg	Visit 3	24.06.2020	N/A
276-02-0114	BNT162b2	10 µg	Visit 4 (Pre-dose)	09.07.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0114	BNT162b2	10 µg	Visit 5	16.07.2020	N/A
276-02-0114	BNT162b2	10 µg	Visit 6	28.07.2020	N/A
276-02-0114	BNT162b2	10 µg	Visit 7	07.08.2020	N/A
276-02-0114	BNT162b2	10 µg	Visit 8	10.09.2020	N/A
276-02-0116	BNT162b2	10 µg	Visit 1 (Pre-dose)	18.06.2020	N/A
276-02-0116	BNT162b2	10 µg	Visit 3	24.06.2020	N/A
276-02-0116	BNT162b2	10 µg	Visit 5	16.07.2020	drop-out after dose 1
276-02-0116	BNT162b2	10 µg	Visit 7	30.07.2020	CAVE: only prime immunization
276-02-0117	BNT162b2	10 µg	Visit 1 (Pre-dose)	18.06.2020	N/A
276-02-0117	BNT162b2	10 µg	Visit 3	24.06.2020	N/A
276-02-0117	BNT162b2	10 µg	Visit 4 (Pre-dose)	09.07.2020	N/A
276-02-0117	BNT162b2	10 µg	Visit 5	13.07.2020	N/A
276-02-0117	BNT162b2	10 µg	Visit 6	30.07.2020	N/A
276-02-0117	BNT162b2	10 µg	Visit 7	06.08.2020	N/A
276-02-0117	BNT162b2	10 µg	Visit 8	10.09.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 1 (Pre-dose)	18.06.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 3	24.06.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 4 (Pre-dose)	09.07.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 5	16.07.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 6	30.07.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 7	06.08.2020	N/A
276-02-0118	BNT162b2	10 µg	Visit 8	10.09.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 1 (Pre-dose)	18.06.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 3	24.06.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 4 (Pre-dose)	09.07.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 5	16.07.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 6	30.07.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 7	06.08.2020	N/A
276-02-0121	BNT162b2	10 µg	Visit 8	10.09.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 1 (Pre-dose)	22.06.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 3	29.06.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 4 (Pre-dose)	14.07.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 5	20.07.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 6	03.08.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 7	10.08.2020	N/A
276-02-0127	BNT162b2	30 µg	Visit 8	14.09.2020	N/A
276-02-0128	BNT162b2	30 µg	Visit 1 (Pre-dose)	23.06.2020	N/A
276-02-0128	BNT162b2	30 µg	Visit 3	29.06.2020	N/A
276-02-0128	BNT162b2	30 µg	Visit 4 (Pre-dose)	14.07.2020	N/A
276-02-0128	BNT162b2	30 µg	Visit 5	21.07.2020	N/A
276-02-0128	BNT162b2	30 µg	Visit 6	04.08.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0128	BNT162b2	30 µg	Visit 7	11.08.2020	N/A
276-02-0128	BNT162b2	30 µg	Visit 8	15.09.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 1 (Pre-dose)	25.06.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 3	02.07.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 4 (Pre-dose)	15.07.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 5	23.07.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 6	07.08.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 7	13.08.2020	N/A
276-02-0134	BNT162b2	30 µg	Visit 8	21.09.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 1 (Pre-dose)	23.06.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 3	30.06.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 4 (Pre-dose)	14.07.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 5	21.07.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 6	04.08.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 7	11.08.2020	N/A
276-02-0137	BNT162b2	30 µg	Visit 8	15.09.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 1 (Pre-dose)	25.06.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 3	03.07.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 4 (Pre-dose)	15.07.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 5	23.07.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 6	07.08.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 7	14.08.2020	N/A
276-02-0138	BNT162b2	30 µg	Visit 8	17.09.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 1 (Pre-dose)	25.06.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 3	02.07.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 4 (Pre-dose)	15.07.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 5	23.07.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 6	06.08.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 7	12.08.2020	N/A
276-02-0142	BNT162b2	30 µg	Visit 8	17.09.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 1 (Pre-dose)	25.06.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 3	02.07.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 4 (Pre-dose)	15.07.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 5	23.07.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 6	06.08.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 7	13.08.2020	N/A
276-02-0143	BNT162b2	30 µg	Visit 8	17.09.2020	N/A
276-02-0144	BNT162b2	30 µg	Visit 1 (Pre-dose)	25.06.2020	N/A
276-02-0144	BNT162b2	30 µg	Visit 3	02.07.2020	N/A
276-02-0144	BNT162b2	30 µg	Visit 4 (Pre-dose)	15.07.2020	N/A
276-02-0144	BNT162b2	30 µg	Visit 5	23.07.2020	N/A
276-02-0144	BNT162b2	30 µg	Visit 6	06.08.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0144	BNT162b2	30 µg	Visit 7	13.08.2020	N/A
276-02-0144	BNT162b2	30 µg	Visit 8	17.09.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 1 (Pre-dose)	25.06.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 3	02.07.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 4 (Pre-dose)	15.07.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 5	23.07.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 6	06.08.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 7	13.08.2020	N/A
276-02-0145	BNT162b2	30 µg	Visit 8	17.09.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 1 (Pre-dose)	22.06.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 3	29.06.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 4 (Pre-dose)	14.07.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 5	20.07.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 6	03.08.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 7	12.08.2020	N/A
276-02-0149	BNT162b2	30 µg	Visit 8	16.09.2020	N/A
276-02-0150	BNT162b2	30 µg	Visit 1 (Pre-dose)	23.06.2020	N/A
276-02-0150	BNT162b2	30 µg	Visit 3	30.06.2020	N/A
276-02-0150	BNT162b2	30 µg	Visit 4 (Pre-dose)	14.07.2020	N/A
276-02-0150	BNT162b2	30 µg	Visit 5	21.07.2020	N/A
276-02-0150	BNT162b2	30 µg	Visit 7	11.08.2020	N/A
276-02-0150	BNT162b2	30 µg	Visit 8	21.09.2020	N/A
276-02-0153	BNT162b2	1 µg	Visit 1 (Pre-dose)	29.06.2020	N/A
276-02-0153	BNT162b2	1 µg	Visit 3	07.07.2020	N/A
276-02-0153	BNT162b2	1 µg	Visit 4 (Pre-dose)	20.07.2020	N/A
276-02-0153	BNT162b2	1 µg	Visit 5	27.07.2020	N/A
276-02-0153	BNT162b2	1 µg	Visit 6	11.08.2020	N/A
276-02-0153	BNT162b2	1 µg	Visit 7	18.08.2020	N/A
276-02-0154	BNT162b2	1 µg	Visit 1 (Pre-dose)	29.06.2020	N/A
276-02-0154	BNT162b2	1 µg	Visit 3	07.07.2020	N/A
276-02-0154	BNT162b2	1 µg	Visit 4 (Pre-dose)	20.07.2020	N/A
276-02-0154	BNT162b2	1 µg	Visit 5	27.07.2020	N/A
276-02-0154	BNT162b2	1 µg	Visit 6	11.08.2020	N/A
276-02-0154	BNT162b2	1 µg	Visit 7	18.08.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 1 (Pre-dose)	23.06.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 3	30.06.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 4 (Pre-dose)	14.07.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 5	21.07.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 6	04.08.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 7	11.08.2020	N/A
276-02-0155	BNT162b2	30 µg	Visit 8	15.09.2020	N/A
276-02-0156	BNT162b2	20 µg	Visit 1 (Pre-dose)	02.07.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0156	BNT162b2	20 µg	Visit 3	08.07.2020	N/A
276-02-0156	BNT162b2	20 µg	Visit 4 (Pre-dose)	23.07.2020	N/A
276-02-0156	BNT162b2	20 µg	Visit 5	30.07.2020	N/A
276-02-0156	BNT162b2	20 µg	Visit 6	13.08.2020	N/A
276-02-0156	BNT162b2	20 µg	Visit 7	20.08.2020	N/A
276-02-0156	BNT162b2	20 µg	Visit 8	24.09.2020	N/A
276-02-0157	BNT162b2	1 µg	Visit 1 (Pre-dose)	29.06.2020	N/A
276-02-0157	BNT162b2	1 µg	Visit 3	07.07.2020	N/A
276-02-0157	BNT162b2	1 µg	Visit 4 (Pre-dose)	20.07.2020	N/A
276-02-0157	BNT162b2	1 µg	Visit 5	27.07.2020	N/A
276-02-0157	BNT162b2	1 µg	Visit 6	11.08.2020	N/A
276-02-0157	BNT162b2	1 µg	Visit 7	18.08.2020	N/A
276-02-0158	BNT162b2	1 µg	Visit 1 (Pre-dose)	13.07.2020	N/A
276-02-0158	BNT162b2	1 µg	Visit 3	20.07.2020	N/A
276-02-0158	BNT162b2	1 µg	Visit 4 (Pre-dose)	03.08.2020	N/A
276-02-0158	BNT162b2	1 µg	Visit 5	07.08.2020	N/A
276-02-0158	BNT162b2	1 µg	Visit 6	24.08.2020	N/A
276-02-0158	BNT162b2	1 µg	Visit 7	31.08.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.07.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 3	08.07.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.07.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 5	29.07.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 6	07.08.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 7	19.08.2020	N/A
276-02-0159	BNT162b2	20 µg	Visit 8	23.09.2020	N/A
276-02-0160	BNT162b2	1 µg	Visit 1 (Pre-dose)	29.06.2020	N/A
276-02-0160	BNT162b2	1 µg	Visit 3	07.07.2020	N/A
276-02-0160	BNT162b2	1 µg	Visit 4 (Pre-dose)	20.07.2020	drop-out after dose 1
276-02-0160	BNT162b2	1 µg	Visit 5	30.07.2020	CAVE: only prime immunization
276-02-0163	BNT162b2	1 µg	Visit 1 (Pre-dose)	29.06.2020	N/A
276-02-0163	BNT162b2	1 µg	Visit 3	07.07.2020	N/A
276-02-0163	BNT162b2	1 µg	Visit 4 (Pre-dose)	20.07.2020	N/A
276-02-0163	BNT162b2	1 µg	Visit 5	28.07.2020	N/A
276-02-0163	BNT162b2	1 µg	Visit 6	12.08.2020	N/A
276-02-0163	BNT162b2	1 µg	Visit 7	18.08.2020	N/A
276-02-0164	BNT162b2	1 µg	Visit 1 (Pre-dose)	13.07.2020	N/A
276-02-0164	BNT162b2	1 µg	Visit 3	20.07.2020	N/A
276-02-0164	BNT162b2	1 µg	Visit 4 (Pre-dose)	03.08.2020	N/A
276-02-0164	BNT162b2	1 µg	Visit 5	10.08.2020	N/A
276-02-0164	BNT162b2	1 µg	Visit 6	24.08.2020	N/A
276-02-0164	BNT162b2	1 µg	Visit 7	04.09.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0166	BNT162b2	1 µg	Visit 1 (Pre-dose)	29.06.2020	N/A
276-02-0166	BNT162b2	1 µg	Visit 3	07.07.2020	N/A
276-02-0166	BNT162b2	1 µg	Visit 4 (Pre-dose)	20.07.2020	N/A
276-02-0166	BNT162b2	1 µg	Visit 5	27.07.2020	N/A
276-02-0166	BNT162b2	1 µg	Visit 6	11.08.2020	N/A
276-02-0166	BNT162b2	1 µg	Visit 7	18.08.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.07.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 3	08.07.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.07.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 5	29.07.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 6	12.08.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 7	19.08.2020	N/A
276-02-0168	BNT162b2	20 µg	Visit 8	23.09.2020	N/A
276-02-0171	BNT162b2	1 µg	Visit 1 (Pre-dose)	13.07.2020	N/A
276-02-0171	BNT162b2	1 µg	Visit 3	20.07.2020	N/A
276-02-0171	BNT162b2	1 µg	Visit 4 (Pre-dose)	03.08.2020	N/A
276-02-0171	BNT162b2	1 µg	Visit 5	11.08.2020	N/A
276-02-0171	BNT162b2	1 µg	Visit 6	27.08.2020	N/A
276-02-0171	BNT162b2	1 µg	Visit 7	31.08.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 1 (Pre-dose)	02.07.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 3	08.07.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 4 (Pre-dose)	23.07.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 5	27.07.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 6	13.08.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 7	20.08.2020	N/A
276-02-0172	BNT162b2	20 µg	Visit 8	24.09.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 1 (Pre-dose)	02.07.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 3	08.07.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 4 (Pre-dose)	23.07.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 5	30.07.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 6	13.08.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 7	20.08.2020	N/A
276-02-0173	BNT162b2	20 µg	Visit 8	24.09.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 1 (Pre-dose)	06.07.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 3	13.07.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 4 (Pre-dose)	27.07.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 5	06.08.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 6	17.08.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 7	24.08.2020	N/A
276-02-0174	BNT162b2	20 µg	Visit 8	28.09.2020	N/A
276-02-0175	BNT162b2	20 µg	Visit 1 (Pre-dose)	06.07.2020	N/A
276-02-0175	BNT162b2	20 µg	Visit 3	13.07.2020	N/A

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276-02-0175	BNT162b2	20 µg	Visit 4 (Pre-dose)	27.07.2020	N/A
276-02-0175	BNT162b2	20 µg	Visit 5	05.08.2020	N/A
276-02-0175	BNT162b2	20 µg	Visit 6	17.08.2020	N/A
276-02-0175	BNT162b2	20 µg	Visit 7	24.08.2020	N/A
276-02-0175	BNT162b2	20 µg	Visit 8	28.09.2020	N/A
276-02-0176	BNT162b2	3 µg	Visit 1 (Pre-dose)	29.07.2020	N/A
276-02-0176	BNT162b2	3 µg	Visit 3	05.08.2020	N/A
276-02-0176	BNT162b2	3 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0176	BNT162b2	3 µg	Visit 5	26.08.2020	N/A
276-02-0176	BNT162b2	3 µg	Visit 6	09.09.2020	N/A
276-02-0176	BNT162b2	3 µg	Visit 7	16.09.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 1 (Pre-dose)	06.07.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 3	14.07.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 4 (Pre-dose)	27.07.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 5	05.08.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 6	18.08.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 7	24.08.2020	N/A
276-02-0177	BNT162b2	20 µg	Visit 8	28.09.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 1 (Pre-dose)	06.07.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 3	13.07.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 4 (Pre-dose)	27.07.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 5	05.08.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 6	17.08.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 7	24.08.2020	N/A
276-02-0178	BNT162b2	20 µg	Visit 8	28.09.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 1 (Pre-dose)	06.07.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 3	13.07.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 4 (Pre-dose)	29.07.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 5	05.08.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 6	17.08.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 7	24.08.2020	N/A
276-02-0179	BNT162b2	20 µg	Visit 8	28.09.2020	N/A
276-02-0180	BNT162b2	20 µg	Visit 1 (Pre-dose)	13.07.2020	N/A
276-02-0180	BNT162b2	20 µg	Visit 3	20.07.2020	N/A
276-02-0180	BNT162b2	20 µg	Visit 4 (Pre-dose)	03.08.2020	N/A
276-02-0180	BNT162b2	20 µg	Visit 5	10.08.2020	N/A
276-02-0180	BNT162b2	20 µg	Visit 6	24.08.2020	N/A
276-02-0180	BNT162b2	20 µg	Visit 7	31.08.2020	N/A
276-02-0181	BNT162b2	1 µg	Visit 1 (Pre-dose)	28.07.2020	N/A
276-02-0181	BNT162b2	1 µg	Visit 3	04.08.2020	N/A
276-02-0181	BNT162b2	1 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0181	BNT162b2	1 µg	Visit 5	26.08.2020	N/A

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276-02-0181	BNT162b2	1 µg	Visit 6	08.09.2020	N/A
276-02-0181	BNT162b2	1 µg	Visit 7	15.09.2020	N/A
276-02-0183	BNT162b2	20 µg	Visit 1 (Pre-dose)	13.07.2020	N/A
276-02-0183	BNT162b2	20 µg	Visit 3	20.07.2020	N/A
276-02-0183	BNT162b2	20 µg	Visit 4 (Pre-dose)	03.08.2020	N/A
276-02-0183	BNT162b2	20 µg	Visit 5	10.08.2020	N/A
276-02-0183	BNT162b2	20 µg	Visit 6	24.08.2020	N/A
276-02-0183	BNT162b2	20 µg	Visit 7	03.09.2020	N/A
276-02-0185	BNT162b2	3 µg	Visit 1 (Pre-dose)	29.07.2020	N/A
276-02-0185	BNT162b2	3 µg	Visit 3	05.08.2020	N/A
276-02-0185	BNT162b2	3 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0185	BNT162b2	3 µg	Visit 5	26.08.2020	N/A
276-02-0185	BNT162b2	3 µg	Visit 6	09.09.2020	N/A
276-02-0185	BNT162b2	3 µg	Visit 7	16.09.2020	N/A
276-02-0188	BNT162b2	1 µg	Visit 1 (Pre-dose)	28.07.2020	N/A
276-02-0188	BNT162b2	1 µg	Visit 3	04.08.2020	N/A
276-02-0188	BNT162b2	1 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0188	BNT162b2	1 µg	Visit 5	25.08.2020	N/A
276-02-0188	BNT162b2	1 µg	Visit 6	08.09.2020	N/A
276-02-0188	BNT162b2	1 µg	Visit 7	15.09.2020	N/A
276-02-0189	BNT162b2	1 µg	Visit 1 (Pre-dose)	28.07.2020	N/A
276-02-0189	BNT162b2	1 µg	Visit 3	04.08.2020	N/A
276-02-0189	BNT162b2	1 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0189	BNT162b2	1 µg	Visit 5	25.08.2020	N/A
276-02-0189	BNT162b2	1 µg	Visit 6	08.09.2020	N/A
276-02-0189	BNT162b2	1 µg	Visit 7	15.09.2020	N/A
276-02-0191	BNT162b2	3 µg	Visit 1 (Pre-dose)	06.08.2020	N/A
276-02-0191	BNT162b2	3 µg	Visit 3	13.08.2020	N/A
276-02-0191	BNT162b2	3 µg	Visit 4 (Pre-dose)	26.08.2020	N/A
276-02-0191	BNT162b2	3 µg	Visit 5	03.09.2020	N/A
276-02-0191	BNT162b2	3 µg	Visit 6	17.09.2020	N/A
276-02-0192	BNT162b2	3 µg	Visit 1 (Pre-dose)	28.07.2020	N/A
276-02-0192	BNT162b2	3 µg	Visit 3	04.08.2020	N/A
276-02-0192	BNT162b2	3 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0192	BNT162b2	3 µg	Visit 5	25.08.2020	N/A
276-02-0192	BNT162b2	3 µg	Visit 6	08.09.2020	N/A
276-02-0192	BNT162b2	3 µg	Visit 7	15.09.2020	N/A
276-02-0193	BNT162b2	3 µg	Visit 1 (Pre-dose)	29.07.2020	N/A
276-02-0193	BNT162b2	3 µg	Visit 3	05.08.2020	N/A
276-02-0193	BNT162b2	3 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0193	BNT162b2	3 µg	Visit 5	26.08.2020	N/A
276-02-0193	BNT162b2	3 µg	Visit 6	09.09.2020	N/A

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0193	BNT162b2	3 µg	Visit 7	16.09.2020	N/A
276-02-0194	BNT162b2	3 µg	Visit 1 (Pre-dose)	29.07.2020	N/A
276-02-0194	BNT162b2	3 µg	Visit 3	06.08.2020	N/A
276-02-0194	BNT162b2	3 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0194	BNT162b2	3 µg	Visit 5	24.08.2020	N/A
276-02-0194	BNT162b2	3 µg	Visit 6	09.09.2020	N/A
276-02-0194	BNT162b2	3 µg	Visit 7	16.09.2020	N/A
276-02-0195	BNT162b2	3 µg	Visit 1 (Pre-dose)	31.07.2020	N/A
276-02-0195	BNT162b2	3 µg	Visit 3	07.08.2020	N/A
276-02-0195	BNT162b2	3 µg	Visit 4 (Pre-dose)	19.08.2020	N/A
276-02-0195	BNT162b2	3 µg	Visit 5	28.08.2020	N/A
276-02-0195	BNT162b2	3 µg	Visit 6	11.09.2020	N/A
276-02-0195	BNT162b2	3 µg	Visit 7	18.09.2020	N/A
276-02-0197	BNT162b2	3 µg	Visit 1 (Pre-dose)	28.07.2020	N/A
276-02-0197	BNT162b2	3 µg	Visit 3	04.08.2020	N/A
276-02-0197	BNT162b2	3 µg	Visit 4 (Pre-dose)	18.08.2020	N/A
276-02-0197	BNT162b2	3 µg	Visit 5	25.08.2020	N/A
276-02-0197	BNT162b2	3 µg	Visit 6	08.09.2020	N/A
276-02-0197	BNT162b2	3 µg	Visit 7	15.09.2020	N/A
276-02-0200	BNT162b2	3 µg	Visit 1 (Pre-dose)	30.07.2020	N/A
276-02-0200	BNT162b2	3 µg	Visit 3	07.08.2020	N/A
276-02-0200	BNT162b2	3 µg	Visit 4 (Pre-dose)	19.08.2020	N/A
276-02-0200	BNT162b2	3 µg	Visit 5	28.08.2020	N/A
276-02-0200	BNT162b2	3 µg	Visit 6	11.09.2020	N/A
276-02-0200	BNT162b2	3 µg	Visit 7	18.09.2020	N/A
276-02-0201	BNT162b2	3 µg	Visit 1 (Pre-dose)	06.08.2020	N/A
276-02-0201	BNT162b2	3 µg	Visit 3	12.08.2020	N/A
276-02-0201	BNT162b2	3 µg	Visit 4 (Pre-dose)	26.08.2020	N/A
276-02-0201	BNT162b2	3 µg	Visit 5	03.09.2020	N/A
276-02-0201	BNT162b2	3 µg	Visit 6	17.09.2020	N/A
276-02-0203	BNT162b2	3 µg	Visit 1 (Pre-dose)	31.07.2020	N/A
276-02-0203	BNT162b2	3 µg	Visit 3	07.08.2020	N/A
276-02-0203	BNT162b2	3 µg	Visit 4 (Pre-dose)	21.08.2020	N/A
276-02-0203	BNT162b2	3 µg	Visit 5	28.08.2020	N/A
276-02-0203	BNT162b2	3 µg	Visit 6	11.09.2020	N/A
276-02-0203	BNT162b2	3 µg	Visit 7	18.09.2020	N/A
276-02-0204	BNT162b2	3 µg	Visit 1 (Pre-dose)	31.07.2020	N/A
276-02-0204	BNT162b2	3 µg	Visit 3	07.08.2020	N/A
276-02-0204	BNT162b2	3 µg	Visit 4 (Pre-dose)	19.08.2020	N/A
276-02-0204	BNT162b2	3 µg	Visit 5	28.08.2020	N/A
276-02-0204	BNT162b2	3 µg	Visit 6	11.09.2020	N/A
276-02-0204	BNT162b2	3 µg	Visit 7	18.09.2020	N/A

Table 3: BNT162b2 study participant material (older adults aged 56 to 85 years)

V1: pre-immunization baseline; V3: 7±1 days after primary immunization; V4: 21±2 days after primary immunization (pre-booster); V5: 29±3 days after primary immunization; V6: 43±4 days after primary immunization; V7: end of treatment or 50±4 days after primary immunization; V8: follow-up or 85±7 days after primary immunization.

Participant ID	Construct	Dose	Visit	Collection Date	Comment
276-02-0208	BNT162b2	20 µg	Visit 1 (Pre-dose)	25.08.2020	N/A
276-02-0208	BNT162b2	20 µg	Visit 3	01.09.2020	N/A
276-02-0208	BNT162b2	20 µg	Visit 4 (Pre-dose)	14.09.2020	N/A
276-02-0208	BNT162b2	20 µg	Visit 5	22.09.2020	N/A
276-02-0214	BNT162b2	20 µg	Visit 1 (Pre-dose)	26.08.2020	N/A
276-02-0214	BNT162b2	20 µg	Visit 3	02.09.2020	N/A
276-02-0214	BNT162b2	20 µg	Visit 4 (Pre-dose)	14.09.2020	N/A
276-02-0214	BNT162b2	20 µg	Visit 5	23.09.2020	N/A
276-02-0215	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.09.2020	N/A
276-02-0215	BNT162b2	20 µg	Visit 3	07.09.2020	N/A
276-02-0215	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.09.2020	N/A
276-02-0215	BNT162b2	20 µg	Visit 5	29.09.2020	N/A
276-02-0216	BNT162b2	20 µg	Visit 1 (Pre-dose)	25.08.2020	N/A
276-02-0216	BNT162b2	20 µg	Visit 3	01.09.2020	N/A
276-02-0216	BNT162b2	20 µg	Visit 4 (Pre-dose)	14.09.2020	N/A
276-02-0216	BNT162b2	20 µg	Visit 5	22.09.2020	N/A
276-02-0221	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.09.2020	N/A
276-02-0221	BNT162b2	20 µg	Visit 3	07.09.2020	N/A
276-02-0221	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.09.2020	N/A
276-02-0221	BNT162b2	20 µg	Visit 5	29.09.2020	N/A
276-02-0222	BNT162b2	20 µg	Visit 1 (Pre-dose)	26.08.2020	N/A
276-02-0222	BNT162b2	20 µg	Visit 3	02.09.2020	N/A
276-02-0222	BNT162b2	20 µg	Visit 4 (Pre-dose)	14.09.2020	N/A
276-02-0222	BNT162b2	20 µg	Visit 5	23.09.2020	N/A
276-02-0223	BNT162b2	20 µg	Visit 1 (Pre-dose)	26.08.2020	N/A
276-02-0223	BNT162b2	20 µg	Visit 3	02.09.2020	N/A
276-02-0223	BNT162b2	20 µg	Visit 4 (Pre-dose)	14.09.2020	N/A
276-02-0223	BNT162b2	20 µg	Visit 5	23.09.2020	N/A
276-02-0224	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.09.2020	N/A
276-02-0224	BNT162b2	20 µg	Visit 3	07.09.2020	N/A
276-02-0224	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.09.2020	N/A
276-02-0224	BNT162b2	20 µg	Visit 5	29.09.2020	N/A
276-02-0225	BNT162b2	20 µg	Visit 1 (Pre-dose)	26.08.2020	N/A
276-02-0225	BNT162b2	20 µg	Visit 4 (Pre-dose)	14.09.2020	N/A
276-02-0225	BNT162b2	20 µg	Visit 5	23.09.2020	N/A
276-02-0226	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.09.2020	N/A
276-02-0226	BNT162b2	20 µg	Visit 3	07.09.2020	N/A

276-02-0226	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.09.2020	N/A
276-02-0226	BNT162b2	20 µg	Visit 5	29.09.2020	N/A
276-02-0229	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.09.2020	N/A
276-02-0229	BNT162b2	20 µg	Visit 3	07.09.2020	N/A
276-02-0229	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.09.2020	N/A
276-02-0229	BNT162b2	20 µg	Visit 5	29.09.2020	N/A
276-02-0233	BNT162b2	20 µg	Visit 1 (Pre-dose)	01.09.2020	N/A
276-02-0233	BNT162b2	20 µg	Visit 3	07.09.2020	N/A
276-02-0233	BNT162b2	20 µg	Visit 4 (Pre-dose)	22.09.2020	N/A
276-02-0233	BNT162b2	20 µg	Visit 5	29.09.2020	N/A

4.2 Control Item

Serum samples from 38 human convalescent COVID-19 patients (HCS sera) were drawn from individuals aged 18 to 83 years, at least 14 days after confirmed diagnosis, and at a time when the individuals were asymptomatic. The serum donors predominantly had symptomatic infections (35 of 38 patients), and one had been hospitalized. Serum samples were obtained from Sanguine Biosciences (Sherman Oaks, CA, USA), the MT Group (Van Nuys, CA, USA), and Pfizer Occupational Health and Wellness (Pearl River, NY, USA).

Table 4: Material from recovered COVID-19 patients

Participant number	Biosampling ID	Clinical score/notes	Days after first diagnosis (PCR confirmed)
RSP 13049	CV0001	Severely ill, not hospitalized	>14 days
RSP 13313	CV0003	Severely ill, not hospitalized	>14 days
RSP 13504	CV0005	Severely ill, not hospitalized	>14 days
RSP 13513	CV0009	Severely ill, not hospitalized	>14 days
SAN 96935	CV0012	Not hospitalized	>14 days
SAN 107576	CV0013	Not hospitalized	>14 days
SAN 107511	CV0014	Not hospitalized	>14 days
SAN 107643	CV0015	Not hospitalized	>14 days
SAN 107538	CV0016	Not hospitalized	>14 days
SAN 107526	CV0017	Not hospitalized	>14 days
SAN 107757	CV0018	Not hospitalized	>14 days
SAN 107334	CV0019	Not hospitalized	>14 days
SAN 32690	CV0020	Not hospitalized	>14 days
SAN 34010	CV0021	Not hospitalized	>14 days
SAN 107762	CV0022	Not hospitalized	>14 days
SAN 107336	CV0023	Not hospitalized	>14 days
MT1560-002	CV0028	Not hospitalized, cough, sore throat, diarrhea, body aches	>14 days
MT1560-004	CV0029	Asymptomatic	>14 days
MT1560-008	CV0030	Not hospitalized, fever, cough, nasal congestion, body aches	>14 days
MT1560-009	CV0031	Not hospitalized, fever, tiredness, cough	>14 days
MT1560-010	CV0032	Not hospitalized, fever, tiredness, cough, difficulty breathing	>14 days
MT1560-006	CV0033	Not hospitalized, fever, cough, sore throat, body aches	>14 days
MT1560-003	CV0034	Not hospitalized, fever, cough, sore throat, body aches	>14 days
MT1560-001	CV0035	Not hospitalized, fever, difficulty breathing	>14 days
MT1560-005	CV0036	Not hospitalized, fever, cough, body aches	>14 days
MT1560-007	CV0037	Not hospitalized, cough, nasal congestion	>14 days
MT1560-039	CV0038	Hospitalized, ICU, ventilator	>14 days

Participant number	Biosampling ID	Clinical score/notes	Days after first diagnosis (PCR confirmed)
MT1560-064	CV0039	Not hospitalized, fever, tiredness, nasal congestion	>14 days
MT1560-065	CV0040	Not hospitalized, diarrhea	>14 days
MT1560-067	CV0041	Not hospitalized, fever, tiredness, cough, nasal congestion, difficulty breathing	>14 days
MT1560-040	CV0042	Not hospitalized, fever, tiredness, cough, difficulty breathing	>14 days
MT1560-041	CV0043	Not hospitalized, tiredness, body aches	>14 days
MT1560-042	CV0044	Not hospitalized, fever, tiredness, cough	>14 days
MT1560-043	CV0045	Not hospitalized, fever, tiredness, cough, difficulty breathing	>14 days
MT1560-044	CV0046	Not hospitalized, fever, tiredness, cough, nasal congestion, difficulty breathing	>14 days
MT1560-045	CV0047	Not hospitalized, fever, tiredness, body aches	>14 days
MT1560-046	CV0048	Not hospitalized, fever, diarrhea	>14 days
MT1560-047	CV0049	Not hospitalized, asymptomatic	>14 days

4.3 Test System

SARS-CoV-2 S1 and RBD IgG direct Luminex-based assay and SARS-CoV-2 VNT (mNeonGreen Microneutralization [mNG NT]).

4.4 Materials

Table 5: Material and reagents used

Experimental step/ Materials	Product name	Manufacturer/Lot
SARS-CoV-2 S1 and RBD IgG dLIA	Beads (S1)	Pfizer Lot 00711492-0395
	Beads (RBD)	Pfizer Lot 00711492-0396
	Secondary antibody	Jackson Catalog #: 109-115-098
SARS-CoV-2 mNG NT assay (VNT)	Vero cells	ATCC CCL-81
	icSARS-CoV-2 mNG virus	UTMB
	Vero E6 cells	ATCC CRL-1586

4.5 Methods

4.6 SARS-CoV-2 S1 and RBD IgG direct Luminex-based immunoassay

Serum samples were diluted in assay buffer manually or by a qualified (b) (4) liquid-handling workstation, and (b) (4) of each diluted sample was transferred from the dilution plate to a 96-well assay plate. Sample preparations on the (b) (4) robot consisted of (b) (4) dilutions of each sample (b) (4) Three dilutions were used to increase the likelihood that at least one result for any test sample would fall within the usable range of the standard curve. (b) (4) of S1- or RBD-coated

microspheres were added to the sera in the 96-well assay plate, with a final concentration of approximately (b) (4) microspheres in each well. All tests were performed in duplicate wells. Each assay plate included an (b) (4) dilution of reference standard serum, three control serum samples (QC1, QC2, and QC3), blank and (b) (4) test sera diluted at (b) (4) dilutions starting at (b) (4). The assay plates were incubated, with shaking, for (b) (4) hours at (b) (4) °C. After washing of non-bound components, (b) (4) anti-human IgG secondary antibody was added to the microsphere mixture and incubated for (b) (4) minutes, with shaking, at room temperature. The fluorescent protein coupled to the secondary antibody allowed for measurement of the antibody bound to the antigen coated microspheres by the Bio-Plex reader. Fluorescence was expressed as median fluorescent intensities (MFI), and the assay results were calculated against a reference standard curve that was run on each assay plate. The reference standard serum had an arbitrary assigned concentration of 100.00 U/mL of IgG antibodies to the S1 or RBD antigen. The magnitude of the fluorescent (b) (4) signal was directly proportional to the amount of antigen-specific antibodies in the sample. The raw MFI data were analyzed using a validated custom SAS application, which used a (b) (4) model to calculate antigen-specific antibody concentrations from MFI data. Failed assay plates and individual tests (based on the pre-specified criteria) could be retested, as required.

4.7 SARS-CoV-2 VNT

The SARS-CoV-2 VNT was a three-day manual 96-well assay. On Day 0, Vero cells were seeded into 96-well tissue-culture treated plates. On Day 1, serial dilutions of test sera were incubated with SARS-CoV-2 mNG to allow any antigen-specific antibodies to bind to the virus. The serum-virus mixture was then transferred onto the Vero cell monolayer and allowed to incubate overnight to allow for infection by non-neutralized virus to occur. On Day 2, productive viral infection was enumerated by visualizing fluorescent viral foci on a Cytation-7 Cell Imaging Multi-Mode Reader. The total number of cells per well was calculated by visualizing Hoechst 33342 stained Vero cell nuclei, which are blue. An infection ratio was then calculated for each well, whereby the total number of green (virus infected) cells was divided by the total number of cells present (blue nuclei). A sample titer was defined as the reciprocal serum dilution at which a specific percentage of the virus was neutralized: 50% or 90% of the virus (termed “Titer Determining Value”, TDV).

4.8 Statistical Analysis

There was no formal statistical hypothesis under test and no formal sample size calculation was performed. The statistical method of aggregation used for the analysis of antibody concentrations and titers is the geometric mean and the corresponding 95% confidence interval. All statistical analyses were performed using GraphPad Prism software version 8.4.2.

Antibody-binding analyses were performed at BioNTech (Data Science and Biomarker Analysis Unit) according to the Biomarker SAP.

5 RESULTS

5.1 BNT162b1 study arm

Between 23 April 2020 and 22 May 2020, 60 participants aged 18 to 55 years were vaccinated with BNT162b1 as part of the BNT162-01 clinical trial. Twelve participants per dose level group (1, 10, 30, and 50 µg) received a first priming immunization on Day 1 and a booster immunization on Day 22 (except for one individual each in the 10 and 50 µg dose-level cohort who discontinued due to reasons not related to the study drug). Twelve participants received a 60 µg priming immunization on Day 1 only.

5.1.1 Secondary endpoint - Functional antibody titer data

SARS-CoV-2 neutralizing titers were assessed at pre-immunization baseline, 7, and 21 days after the BNT162b1 priming immunization (Days 8 and 22), and 7 and 21 days after the booster immunization (Days 29 and 43).

Functional antibody titer data for younger adults aged 18 to 55 years are listed in Appendix Table 1, summarized in Appendix Table 3 and displayed in Figure 1.

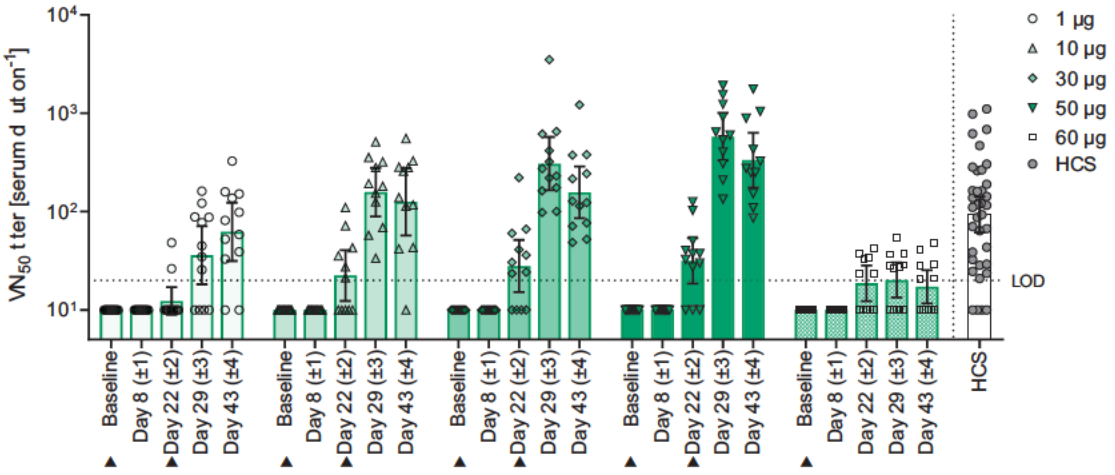

Figure 1: BNT162b1 – Functional 50% SARS-CoV-2 neutralizing antibody titers (VN_{50}) for subjects aged 18 to 55 years

VN_{50} titers with 95% confidence intervals are shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Values smaller than the limit of detection (LOD) are plotted as 0.5*LOD. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group. The dotted horizontal line represents the LOD. VN_{50} 50% SARS-CoV-2 neutralizing antibody titers; HCS human COVID-19 convalescent serum

Participants dosed with BNT162b1 showed a strong dose-dependent antibody response. On Day 22, at 21 days after dose 1, virus neutralizing antibody geometric mean titers (neutralizing GMTs) had increased in a dose-dependent manner for the 1,

10, 30, and 50 µg dose groups. At 7 days after the dose 2 (Day 29), virus neutralizing GMTs showed a strong, dose level dependent booster response. In the 60 µg dose group, which was only dosed once, neutralizing GMTs remained at a lower level, indicating that a booster dose is necessary to increase functional antibody titers.

On Day 43 (21 days after the dose 2 of BNT162b1), neutralizing GMTs decreased (with exception of the 1 µg dose level). Day 43 virus neutralizing GMTs were 0.7-fold (1 µg) to 3.6-fold (50 µg) those of a COVID-19 HCS panel.

Fold increase from baseline in functional antibody titer data for younger adults aged 18 to 55 years is summarized in Appendix Table 4 and displayed in Figure 2.

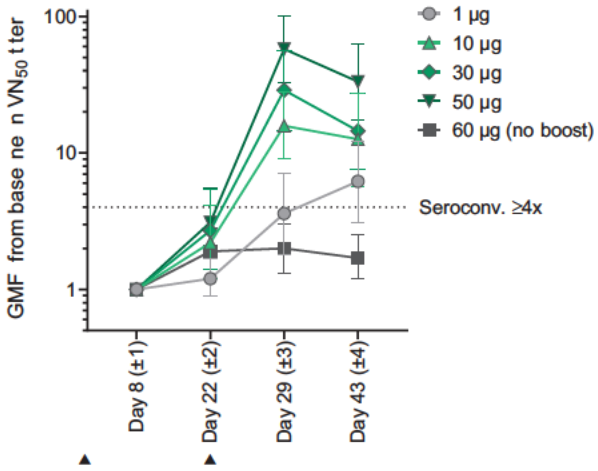

Figure 2: BNT162b1 – Fold increase from baseline in functional 50% SARS-CoV-2 neutralizing antibody titers (VN_{50}) for subjects aged 18 to 55 years

Geometric means fold increase (GMFI) from baseline in VN_{50} titer with 95% confidence intervals are shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group. The dotted horizontal line represents the threshold for seroconversion (fold increase ≥4). VN_{50} 50% SARS-CoV-2 neutralizing antibody titers.

The frequency of younger adults aged 18 to 55 years with seroconversion is summarized in Appendix Table 5 and displayed in Figure 3. All participants dosed with the first dose ≥30 µg BNT162b1 seroconverted by 7 days after the second dose (Day 29).

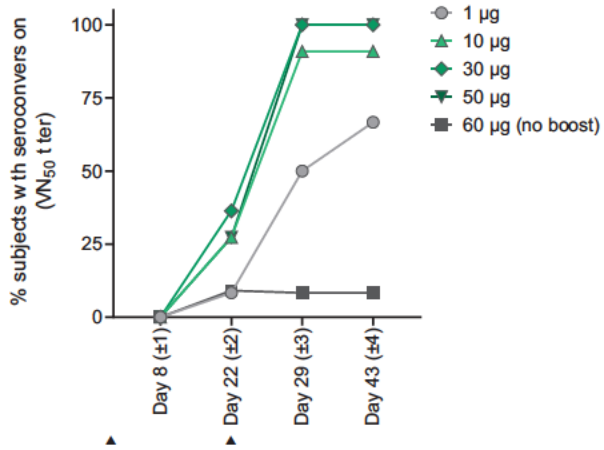

Figure 3: BNT162b1 – Frequency of subjects aged 18 to 55 years with SARS-CoV-2 GMT seroconversion

Seroconversion with regard to 50% SARS-CoV-2 neutralizing antibody titers (VN_{50}) is shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Seroconversion is defined as a minimum of a 4-fold increase of functional antibody titers compared to baseline. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group.

5.1.2 Exploratory endpoint - Binding antibody concentrations

SARS-CoV-2 S1- and RBD-binding IgG concentrations were assessed at pre-immunization baseline, 7, and 21 days after the BNT162b1 priming immunization (Days 8 and 22), and 7 and 21 days after the booster immunization (Days 29 and 43).

Binding antibody concentration data for younger adults aged 18 to 55 years are summarized in Appendix Table 9 and Appendix Table 12 and displayed in Figure 4 (S1-binding IgG) and Figure 5 (RBD-binding IgG).

Participants dosed with BNT162b1 showed a strong dose-dependent antibody response against the SARS-CoV-2 S1 subunit and RBD at 21 days after the first dose (Day 22). At 7 days after the second dose (Day 29), S1- and RBD-binding IgG geometric mean concentrations (GMCs) showed a strong, dose-dependent booster response. In the 60 µg dose group, which was only dosed once, S1- and RBD-binding IgG GMCs remained at a lower level, indicating that a booster dose is necessary to increase antibody concentrations.

At 21 days after the second BNT162b1 dose (Day 43), S1- and RBD-binding IgG GMCs decreased (with exception of the 1 µg dose group), but were clearly above those of a COVID-19 HCS panel for all doses tested.

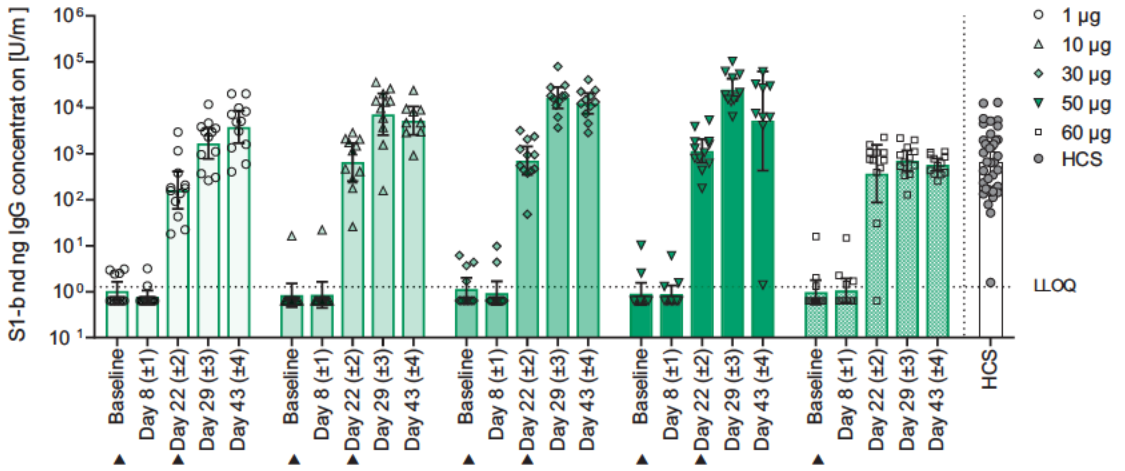

Figure 4: BNT162b1 – S1-binding antibody concentrations [U/mL] for subjects aged 18 to 55 years

S1-binding antibody concentrations with 95% confidence intervals are shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Values smaller than the lower limit of quantification (LLOQ) are plotted as 0.5*LLOQ. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group. The dotted horizontal line represents the LLOQ. HCS human COVID-19 convalescent serum

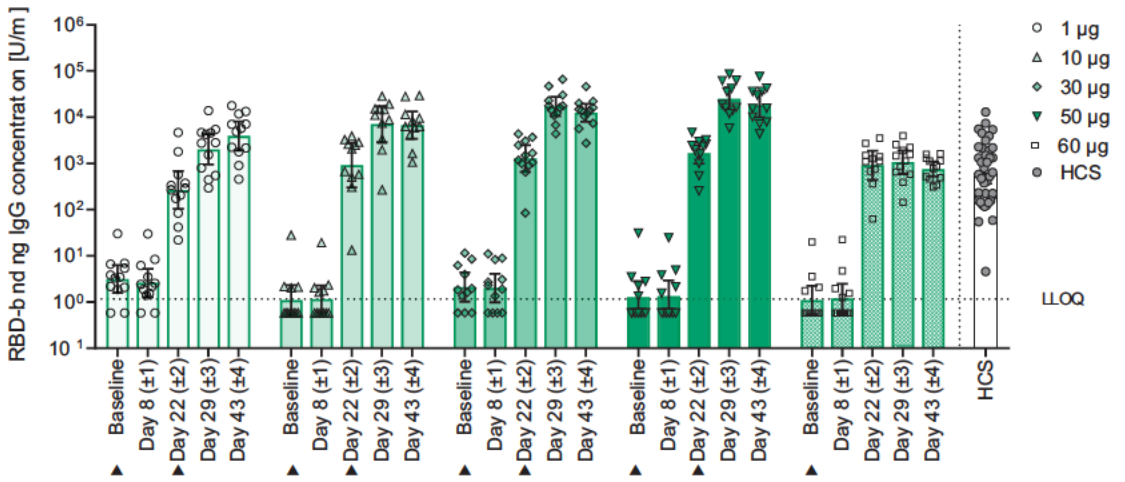

Figure 5: BNT162b1 – RBD-binding antibody concentrations [U/mL] for subjects aged 18 to 55 years

RBD-binding antibody concentrations with 95% confidence intervals are shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Values smaller than the lower limit of quantification (LLOQ) are plotted as 0.5*LLOQ. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group. The dotted horizontal line represents the LLOQ. HCS human convalescent COVID-19 serum

The fold increase from baseline in binding antibody concentrations for younger adults aged 18 to 55 years is summarized in Appendix Table 10 and Appendix Table 13 and displayed in Figure 6.

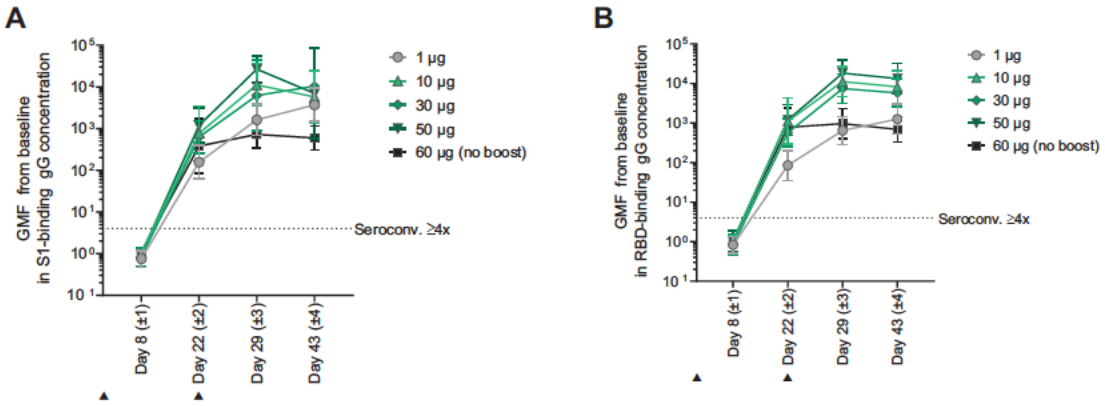

Figure 6: BNT162b1 – Fold increase from baseline in S1- and RBD-binding antibody concentrations for subjects aged 18 to 55 years

Geometric means fold increase (GMFI) from baseline in (**A**) S1- and (**B**) RBD-binding antibody concentrations with 95% confidence intervals are shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group. The dotted horizontal line represents the threshold for seroconversion (fold increase ≥4).

The frequency of younger adults aged 18 to 55 years with seroconversion is summarized in Appendix Table 11 and Appendix Table 14 and is displayed in Figure 7.

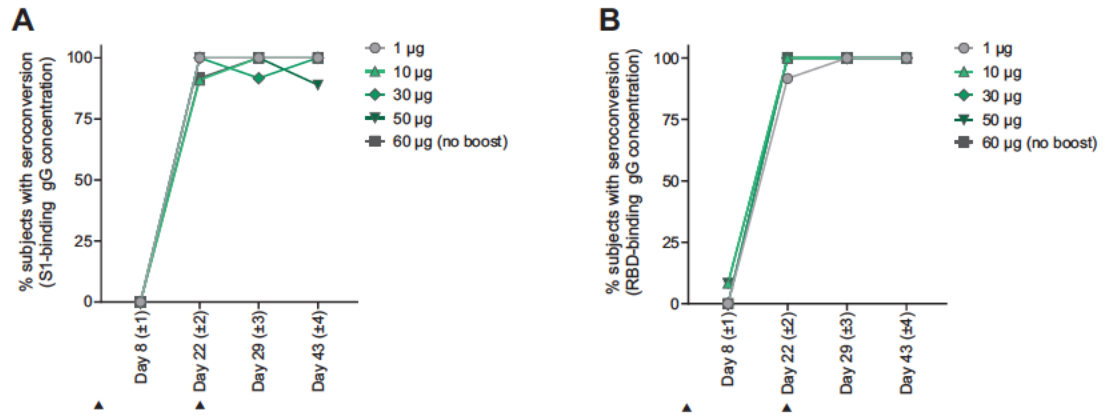

Figure 7: BNT162b1 – Frequency of subjects aged 18 to 55 years with S1- and RBD-binding antibody GMC seroconversion

Seroconversion with regard to (**A**) S1- and (**B**) RBD-binding antibody GMC is shown for dose levels 1, 10, 30, 50, and 60 µg BNT162b1. Seroconversion is defined as a minimum of a 4-fold increase of binding antibody concentrations compared to baseline. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). Dose 2 was not performed in the 60 µg dose group.

Almost all BNT162b1-immunized participants seroconverted with regard to the S1- and RBD-binding antibody response as early as 21 days after the priming dose (Day 22).

All participants were seropositive at least one time-point after booster immunization (≥Day 29) with regard to S1-specific IgG. All participants seroconverted by 7 days after the booster dose (Day 29) with regard to RBD-specific IgG.

5.2 BNT162b2 study arm

Between 15 June 2020 and 01 September 2020, 60 participants aged 18 to 55 years and 12 participants aged 56 to 85 years (that were evaluable) were vaccinated with BNT162b2 as part of the BNT162-01 clinical trial. Twelve younger adults per 1 µg, 3 µg, 10 µg, 20 µg, and 30 µg dose level group and twelve older adults per 20 µg dose level group received a first priming immunization on Day 1 and a booster immunization on Day 22 (except for two participants, who discontinued prior to the booster dose due to a study drug-unrelated withdrawal [1 µg dose] and an adverse event [10 µg] [common cold]).

5.2.1 Secondary endpoint - Functional antibody titer data

SARS-CoV-2 neutralizing titers were assessed at pre-immunization baseline, 7, and 21 days after the BNT162b2 priming immunization (Days 8 and 22), and 7, 21, 28, and 63 days after the booster immunization (Days 29, 43, 50, and 85). At the cut-off date for this report, Day 85 data were only available for participants aged 18 to 55 years in dose groups 10 µg, 20 µg, and 30 µg. For participants aged 56 to 85 years in dose group 20 µg data was available up to Day 29.

Functional antibody titer data are listed in Appendix Table 2, summarized in Appendix Table 6 and displayed in Figure 8.

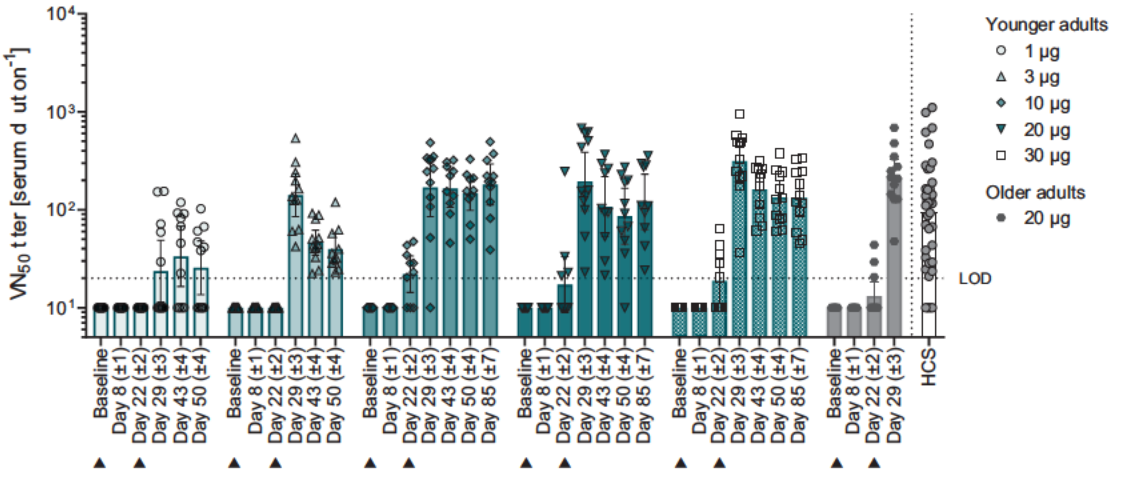

Figure 8: BNT162b2 – Functional 50% SARS-CoV-2 neutralizing antibody titers (VN_{50})

VN_{50} titers with 95% confidence intervals are shown for younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2, and older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Values smaller than the limit of detection (LOD) are plotted as 0.5*LOD. Arrowheads indicate pre-immunization baseline

(dose 1, Day 1) and dose 2 (Day 22). The dotted horizontal line represents the LOD. VN_{50} 50% SARS-CoV-2 neutralizing antibody titers; HCS human COVID-19 convalescent serum

Participants dosed with BNT162b2 showed a strong IMP-induced antibody response. Virus neutralizing GMTs were detected at 21 days after dose 1 (Day 22) and had increased substantially in younger participants (aged 18 to 55 years) immunized with ≥3 µg BNT162b2, and older participants (aged 56 to 85 years) immunized with 20 µg BNT162b2 by 7 days after dose 2 (Day 29). Day 29 neutralizing GMTs were comparable between the younger and older adult 20 µg dose level cohorts. The lowest tested dose of 1 µg BNT162b2 elicited only a minimal neutralizing response in participants aged 18 to 55 years.

On Day 43 (21 days after the second dose of BNT162b2), virus neutralizing GMTs in the younger adult cohorts decreased for the 3, 20, and 30 µg dose levels. Thereafter, GMTs remained stable up to Day 85 (63 days after dose 2) for younger adult dose groups 10, 20, and 30 µg and were 1.3- to 1.9-fold those of a COVID-19 HCS panel.

Fold increase from baseline in functional antibody titer data is summarized in Appendix Table 7 and displayed in Figure 9.

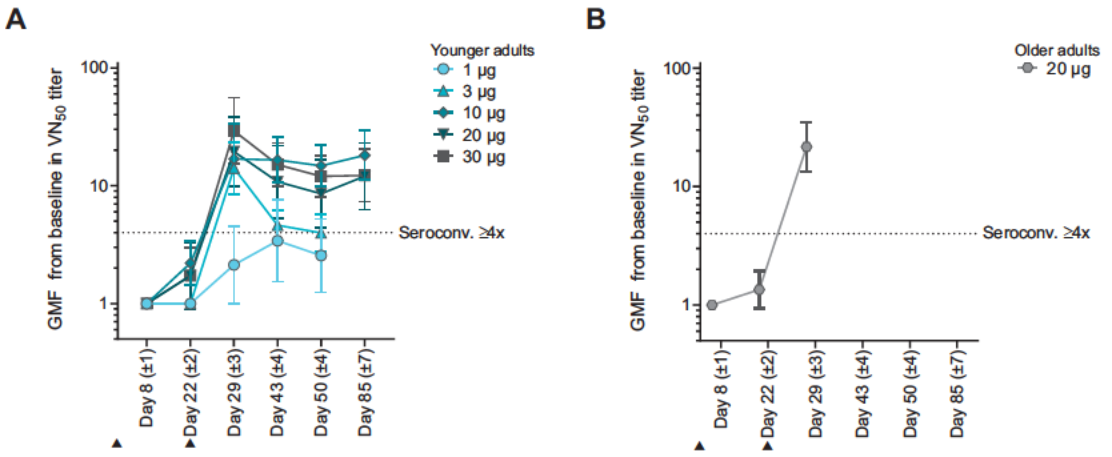

Figure 9: BNT162b2 – Fold increase from baseline in functional 50% SARS-CoV-2 neutralizing antibody titers (VN_{50})

Geometric means fold increase (GMFI) from baseline in VN_{50} titers with 95% confidence intervals are shown for (**A**) younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2, and (**B**) older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). The dotted horizontal line represents the threshold for seroconversion (fold increase ≥4). VN_{50} 50% SARS-CoV-2 neutralizing antibody titers.

The frequency of subjects with seroconversion is summarized in Appendix Table 8 and displayed in Figure 10. All participants immunized with 30 µg BNT162b2 seroconverted by 21 days after the second dose (Day 43) and remained seropositive throughout the follow-up until Day 85.

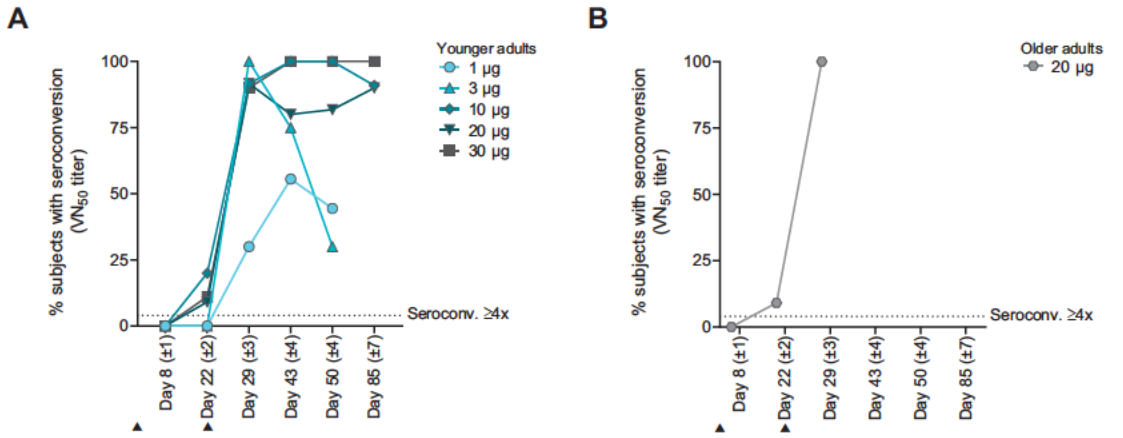

Figure 10: BNT162b2 – Frequency of subjects with SARS-CoV-2 GMT seroconversion

Seroconversion with regard to 50% SARS-CoV-2 neutralizing antibody titers (VN_{50}) is shown for (**A**) younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2, and (**B**) older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Seroconversion is defined as a minimum of 4-fold increase of functional antibody titers as compared to baseline. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22).

5.2.2 Exploratory endpoint - Binding antibody concentrations

SARS-CoV-2 S1- and RBD-binding IgG concentrations were assessed at pre-immunization baseline, 7, and 21 days after the BNT162b2 priming immunization (Days 8 and 22), and 7 and 21 days after the booster immunization (Days 29 and 43).

Binding antibody concentration data are summarized in Appendix Table 15 and Appendix Table 18 and displayed in Figure 11 (S1-binding IgG) and Figure 12 (RBD-binding IgG).

BNT162b2 dosed participants showed a strong BNT162b2-induced S1- and RBD-binding IgG response at 21 days after the first dose (Day 22) with evidence of a dose-dependent response only between the 1 µg and 10 µg dose levels. S1- and RBD-binding IgG GMCs showed a substantial booster response by 7 days after the second dose (Day 29). Day 29 S1- and RBD-binding IgG GMCs were comparable between the younger and older adult 20 µg dose level cohorts.

Across all dose-level cohorts, antibody levels decreased over time, but with S1- and RBD-binding antibody GMCs well above that observed in a COVID-19 HCS panel at Day 85 (63 days after the second dose; 10 µg 30 µg dose level).

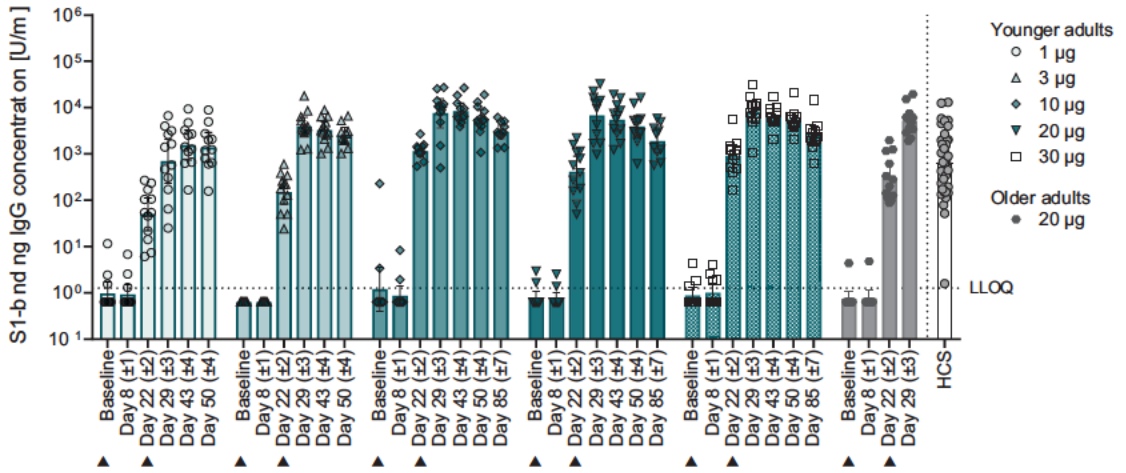

Figure 11: BNT162b2 – S1-binding antibody concentrations [U/mL]

S1-binding antibody concentrations with 95% confidence intervals are shown for younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2, and older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Values smaller than the lower limit of quantification (LLOQ) are plotted as 0.5*LLOQ. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). The dotted horizontal line represents the LLOQ. HCS human COVID-19 convalescent serum

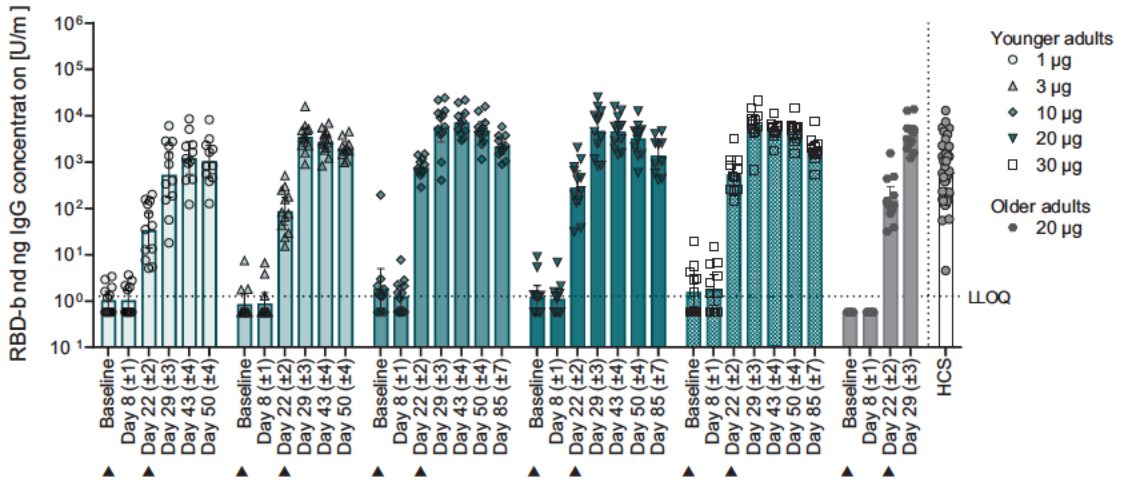

Figure 12: BNT162b2 – RBD-binding antibody concentrations [U/mL]

RBD-binding antibody concentrations with 95% confidence intervals are shown for younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2, and older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Values smaller than the lower limit of quantification (LLOQ) are plotted as 0.5*LLOQ. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). The dotted horizontal line represents the LLOQ. HCS human COVID-19 convalescent serum

The fold increase from baseline in binding antibody concentrations is summarized in Appendix Table 16 and Appendix Table 19 and displayed in Figure 13 and Figure 14.

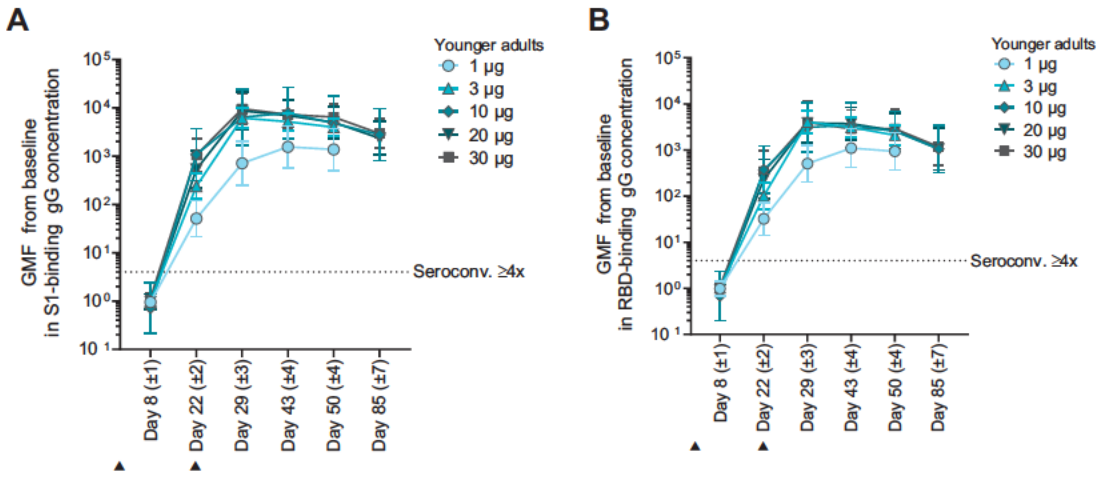

Figure 13: BNT162b2 – Fold increase from baseline in S1- and RBD-binding antibody concentrations for subjects aged 18 to 55 years

Geometric means fold increase (GMFI) from baseline in (**A**) S1- and (**B**) RBD-binding antibody concentrations with 95% confidence intervals are shown for younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). The dotted horizontal line represents the threshold for seroconversion (fold increase ≥4).

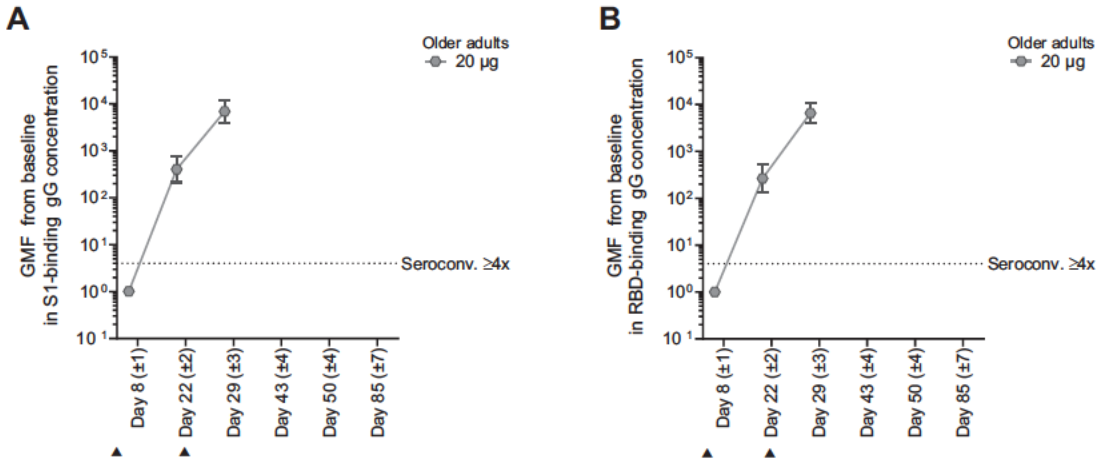

Figure 14: BNT162b2 – Fold increase from baseline in S1- and RBD-binding antibody concentrations for subjects aged 56 to 85 years

Geometric means fold increase (GMFI) from baseline in (**A**) S1- and (**B**) RBD-binding antibody concentrations with 95% confidence intervals are shown for older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22). The dotted horizontal line represents the threshold for seroconversion (fold increase ≥4).

The frequency of subjects with seroconversion is summarized in Appendix Table 17 and Appendix Table 20 and displayed in Figure 15 and Figure 16.

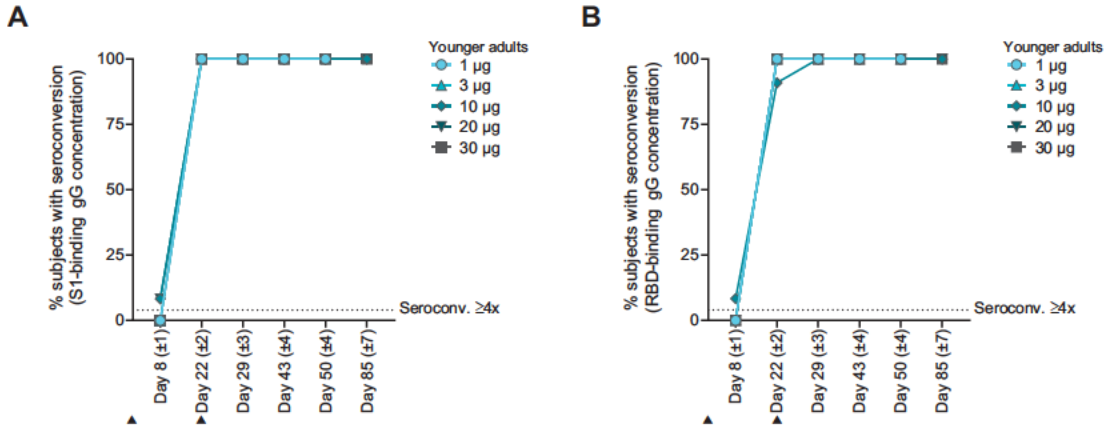

Figure 15: BNT162b2 – Frequency of subjects aged 18 to 55 years with S1- and RBD-binding antibody GMC seroconversion

Seroconversion with regard to (**A**) S1- and (**B**) RBD-binding antibody GMC is shown for younger adults (aged 18 to 55 years) immunized with 1, 3, 10, 20, or 30 µg BNT162b2. Seroconversion is defined as a minimum of a 4-fold increase of binding antibody concentrations as compared to baseline. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22).

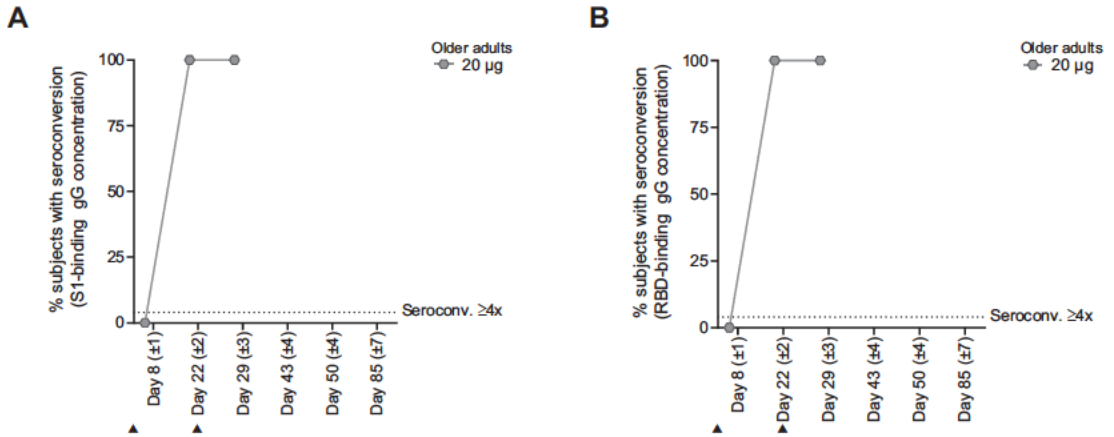

Figure 16: BNT162b2 – Frequency of subjects aged 56 to 85 years with S1- and RBD-binding antibody GMC seroconversion

Seroconversion with regard to (**A**) S1- and (**B**) RBD-binding antibody GMC is shown for older adults (aged 56 to 85 years) immunized with 20 µg BNT162b2. Seroconversion is defined as a minimum of a 4-fold increase of binding antibody concentrations as compared to baseline. Arrowheads indicate pre-immunization baseline (dose 1, Day 1) and dose 2 (Day 22).

Independent of age and dose level cohort, all BNT162b2-immunized participants seroconverted with regard to the S1- and RBD-binding antibody response as early as 21 days after the priming dose (Day 22), except for one subject in the younger adult 10 µg dose group (RBD-binding IgG data). As of Day 29 (7 days after the booster dose) all participants were seropositive.

6 CONCLUSION

Both RNA-based SARS-CoV-2 vaccine candidates BNT162b1 and BNT162b2 elicited robust S1- and RBD-specific IgG responses with neutralizing capacity in live-virus microneutralization assays.

Secondary endpoint - Functional antibody titer data

Participants dosed with **BNT162b1** showed a strong dose-dependent antibody response:

- Virus neutralizing GMTs increased in a dose-dependent manner for the 1, 10, 30, and 50 µg dose groups after the first dose with a further strong, dose level dependent booster response.
- In the 60 µg dose group, which was only dosed once, virus neutralizing GMTs remained at a lower level, indicating that a booster dose is necessary to increase functional antibody titers.
- Day 43 virus neutralizing GMTs were 0.7-fold (1 µg) to 3.6-fold (50 µg) those of a COVID-19 human convalescent serum (HCS) panel.

Participants dosed with **BNT162b2** showed a strong IMP-induced antibody response.

- Virus neutralizing GMTs were detected after the first dose and showed a substantial booster response after the second dose for dose level groups ≥3 µg.
- Day 29 virus neutralizing GMTs were comparable between the younger and older adult 20 µg dose level cohorts.
- On Day 43, neutralizing GMTs in the younger adult cohorts decreased for the 3, 20, and 30 µg dose levels. Thereafter, GMTs remained stable up to Day 85 (63 days after dose 2) for younger adult dose groups 10, 20, and 30 µg and were 1.3- to 1.9-fold those of a COVID 19 HCS panel.

All participants dosed with dose 1 at ≥30 µg BNT162b1 or BNT162b2 seroconverted either by 7 days or 21 days after the second dose (Day 29 or Day 43). All participants immunized with 30 µg BNT162b2 remained seropositive throughout the follow-up until Day 85.

Exploratory endpoint - Binding antibody concentrations

Participants dosed with **BNT162b1** showed a strong dose-dependent antibody response against the SARS-CoV-2 spike (S) protein S1 subunit and receptor-binding domain (RBD) at 21 days after the first dose (Day 22).

- S1- and RBD-binding IgG GMCs showed a strong, dose-dependent booster response 7 days after the second dose (Day 29).

- In the 60 µg dose group, which was only dosed once, S1- and RBD-binding IgG GMCs remained at a lower level, indicating that a booster dose is necessary to increase antibody concentrations.
- At 21 days after the second BNT162b1 dose (Day 43), S1- and RBD-binding IgG GMCs decreased (with exception of the 1 µg dose group), but were clearly above those of a COVID-19 HCS panel for all doses tested.

BNT162b2 dosed participants showed a strong BNT162b2-induced S1- and RBD-binding IgG response at 21 days after the first dose (Day 22) with evidence of a dose-dependent response only between the 1 µg and 10 µg dose levels.

- S1- and RBD-binding IgG GMCs showed a substantial booster response by 7 days after the second dose (Day 29).
- Day 29 S1-binding IgG GMCs were comparable between the younger and older adult 20 µg dose level cohorts.
- Across all dose-level cohorts, antibody levels decreased over time, but with S1- and RBD-binding antibody GMCs well above that observed in a COVID-19 HCS panel at Day 85 (63 days after the second dose; 10 µg 30 µg dose level).

Independent of age, all participants dosed with the first dose with ≥20 µg BNT162b1 or BNT162b2 seroconverted either by 7 days or 21 days after the second dose (Day 29 or Day 43).

7 DOCUMENT HISTORY

Second version minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section	Version 01	Version 02	Reason for change
1	-	Summary updated	Update of this report with available data for younger and older adult cohorts vaccinated with BNT162b2
3.2	-	Objective updated	Inclusion of extended follow-up time-points
3.3	-	Study Design updated	Inclusion of additional dose level group (3 µg) and extended follow-up time-points for younger adults vaccinated with BNT162b2; Inclusion of older adult cohort vaccinated with BNT162b2
4.1	-	Table 2 updated Table 3 added	Inclusion of additional test items for younger adult and older adult cohorts vaccinated with BNT162b2
5.2	-	Results and Figures updated, Figures 9b, 10b, 14, and 16 added	Inclusion of additional dose level group (3 µg) and extended follow-up data for younger adult cohorts; Inclusion of data for older adult cohort (n=12)
6	-	Conclusion updated	Update of this report with available data for younger and older adult cohorts vaccinated with BNT162b2
Appendix	-	Appendices updated	Inclusion of additional dose level group (3 µg) and extended follow-up data for younger adult cohorts; Inclusion of data for older adult cohort

8 REFERENCES

BNT162-01 BIOMARKER STATISTICAL ANALYSIS PLAN. BNT162-01. Protocol Title: A Multi-site, Phase I/II, 2-Part, Dose-Escalation Trial Investigating the Safety and Immunogenicity of four Prophylactic SARS-CoV-2 RNA Vaccines Against COVID-2019 Using Different Dosing Regimens in Healthy Adults. Date: 25SEP2020.

9 APPENDIX

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10015 1 µg Younger	Day 1	1	29APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	06MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	25.7	2.6				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	52.5	5.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10018 1 µg Younger	Day 1	1	29APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10018 1 µg Younger	Day 1	1	29APR2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	06MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	87.4	8.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	44.5	4.5	Yes			
	Day 43	43	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	151.3	15.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	69.3	6.9	Yes			
10023 1 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
Program: Limm_tit.sas (Page 2 of 54)										

Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10023 1 µg Younger	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	26.2	2.6				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	161.3	16.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	86.5	8.7	Yes			
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	158.7	15.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	77.3	7.7	Yes			
10025 1 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10025 1 µg Younger	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	39.0	3.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10033 1 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
Program: Limm_tit.sas (Page 4 of 54)										

Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10033 1 µg Younger	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	88.3	8.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	40.7	4.1	Yes			
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	326.0	32.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	163.6	16.4	Yes			
10036 1 µg Younger	Day 1	1	08MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	48.2	4.8	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10036 1 µg Younger	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	77.2	7.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	35.7	3.6				
	Day 43	43	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	58.5	5.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.9	2.3				
10040 1 µg Younger	Day 1	1	08MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10040 1 µg Younger	Day 29	28	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10041 1 µg Younger	Day 1	1	08MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	122.0	12.2	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10041 1 µg Younger	Day 29	28	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	53.9	5.4	Yes			
	Day 43	43	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	136.7	13.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	69.6	7.0	Yes			
10042 1 µg Younger	Day 1	1	08MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	44.8	4.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	23.7	2.4				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10042 1 µg Younger	Day 43	43	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	81.4	8.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	37.4	3.7				
10045 1 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	13MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	34.7	3.5				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	33.0	3.3				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10045 1 µg Younger	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10048 1 µg Younger	Day 1	1	08MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10001 10 µg Younger	Day 1	1	24APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
10052 1 µg Younger	Day 1	1	08MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	27	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	98.5	9.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	47.4	4.7	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10001 10 µg Younger	Day 1	1	24APR2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	33.6	3.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	42	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10003 10 µg Younger	Day 1	1	28APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10003 10 µg Younger	Day 8	8	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	71.8	7.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	33.2	3.3				
	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	280.1	28.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	161.5	16.2	Yes			
	Day 43	43	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	280.5	28.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	118.4	11.8	Yes			
10004 10 µg Younger	Day 1	1	24APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10004 10 µg Younger	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	43.0	4.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.2	2.7				
	Day 29	29	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	321.6	32.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	176.2	17.6	Yes			
	Day 43	42	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	283.2	28.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	104.6	10.5	Yes			
10005 10 µg Younger	Day 1	1	24APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10005 10 µg Younger	Day 22	22	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	192.9	19.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	82.9	8.3	Yes			
	Day 43	42	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	139.1	13.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	41.2	4.1	Yes			
10006 10 µg Younger	Day 1	1	28APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	35.5	3.6				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10006 10 µg Younger	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	181.7	18.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	112.4	11.2	Yes			
	Day 43	43	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	328.1	32.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	151.3	15.1	Yes			
10007 10 µg Younger	Day 1	1	23APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10007 10 µg Younger	Day 29	33	25MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	126.4	12.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	78.1	7.8	Yes			
	Day 43	43	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	113.6	11.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	42.3	4.2	Yes			
10008 10 µg Younger	Day 1	1	28APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	110.3	11.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	46.1	4.6	Yes			
	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	513.0	51.3	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10008 10 µg Younger	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	299.6	30.0	Yes			
	Day 43	43	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	555.1	55.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	224.0	22.4	Yes			
10009 10 µg Younger	Day 1	1	28APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	57.5	5.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	28.1	2.8				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10009 10 µg Younger	Day 43	43	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	41.9	4.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10010 10 µg Younger	Day 1	1	24APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Unscheduled 1 Day 50	26	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10011 10 µg Younger	Day 1	1	24APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10011 10 µg Younger	Day 8	7	30APR2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	68.9	6.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.1	3.8				
	Day 43	42	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	43.1	4.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10017 10 µg Younger	Day 1	1	28APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10017 10 µg Younger	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	21.2	2.1				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	354.8	35.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	175.0	17.5	Yes			
	Day 43	43	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	258.4	25.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	118.6	11.9	Yes			
10019 10 µg Younger	Day 1	1	28APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	27.5	2.7				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10016 30 µg Younger	Day 1	1	29APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	06MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	222.0	22.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	123.8	12.4	Yes			
10019 10 µg Younger	Day 22	22	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	154.4	15.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	72.5	7.3	Yes			
	Day 43	43	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	117.0	11.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	60.2	6.0	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10016 30 µg Younger	Day 29	29	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	3508.2	350.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	1076.8	107.7	Yes			
	Day 43	43	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	1218.0	121.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	579.9	58.0	Yes			
10020 30 µg Younger	Day 1	1	29APR2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	06MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	100.2	10.0	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10020 30 µg Younger	Day 29	29	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	53.3	5.3	Yes			
	Day 43	43	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	48.6	4.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.2	2.7				
10021 30 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.5	2.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	417.2	41.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	200.2	20.0	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10021 30 µg Younger	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	215.5	21.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	100.9	10.1	Yes			
10028 30 µg Younger	Day 1	1	07MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	273.6	27.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	156.9	15.7	Yes			
	Day 43	43	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	128.0	12.8	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10028 30 µg Younger	Day 43	43	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	47.3	4.7	Yes			
10031 30 µg Younger	Day 8	8	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	36.1					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 29	29	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	613.2					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	305.0					
	Day 43	45	20JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	375.7					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	149.4					
10032 30 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10032 30 µg Younger	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	60.2	6.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	30.7	3.1				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	651.5	65.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	305.8	30.6	Yes			
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	379.4	37.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	154.1	15.4	Yes			
10034 30 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10034 30 µg Younger	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	66.2	6.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	28.0	2.8				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	97.8	9.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	49.3	4.9	Yes			
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	52.2	5.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	26.6	2.7				
10037 30 µg Younger	Day 1	1	05MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10037 30 µg Younger	Day 22	22	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	41.2	4.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	320.9	32.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	182.1	18.2	Yes			
	Day 43	43	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	243.1	24.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	104.7	10.5	Yes			
10038 30 µg Younger	Day 1	1	07MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	30.5	3.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10038 30 µg Younger	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	230.2	23.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	138.2	13.8	Yes			
	Day 43	43	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	123.2	12.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	66.6	6.7	Yes			
10039 30 µg Younger	Day 1	1	07MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	24.3	2.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10039 30 µg Younger	Day 29	29	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	220.0	22.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	105.1	10.5	Yes			
	Day 43	43	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	114.1	11.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	55.3	5.5	Yes			
10043 30 µg Younger	Day 1	1	07MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	162.4	16.2	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10043 30 µg Younger	Day 29	28	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	103.1	10.3	Yes			
	Day 43	43	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	71.3	7.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.6	2.8				
10047 30 µg Younger	Day 1	1	07MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	14MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	28MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	04JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	174.8	17.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	93.7	9.4	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10047 30 µg Younger	Day 43	43	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	76.5	7.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	39.3	3.9				
10049 50 µg Younger	Day 1	1	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	50.6	5.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	1544.9	154.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	550.1	55.0	Yes			
	Day 43	43	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	325.1	32.5	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10049 50 µg Younger	Day 43	43	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	170.0	17.0	Yes			
10050 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Unscheduled 1 Day 50	20	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	40.5	4.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10053 50 µg Younger	Day 1	1	12MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10053 50 µg Younger	Day 22	22	02JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	307.3	30.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	122.9	12.3	Yes			
	Day 43	43	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	86.0	8.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.5	3.8				
10055 50 µg Younger	Day 1	1	13MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	37.2	3.7				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10055 50 µg Younger	Day 22	22	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	23.2	2.3				
	Day 29	28	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	209.3	20.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	109.1	10.9	Yes			
	Day 43	42	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	249.2	24.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	139.4	13.9	Yes			
10056 50 µg Younger	Day 1	1	13MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10056 50 µg Younger	Day 29	28	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	536.3	53.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	286.4	28.6	Yes			
	Day 43	42	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	429.0	42.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	218.2	21.8	Yes			
10057 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	05JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	37.5	3.8				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	598.8	59.9	Yes			

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10057 50 µg Younger	Day 29	29	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	367.7	36.8	Yes			
	Day 43	43	26JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	250.2	25.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	95.0	9.5	Yes			
10059 50 µg Younger	Day 1	1	13MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	1229.8	123.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	534.7	53.5	Yes			

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10059 50 µg Younger	Day 43	42	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	1045.5	104.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	493.7	49.4	Yes			
10060 50 µg Younger	Day 1	1	13MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	125.9	12.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	75.8	7.6	Yes			
	Day 29	28	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	643.9	64.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	307.7	30.8	Yes			
	Day 43	43	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	276.0	27.6	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10060 50 µg Younger	Day 43	43	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	169.3	16.9	Yes			
10067 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	05JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	30.1	3.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	403.7	40.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	209.6	21.0	Yes			
	Day 43	43	26JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	152.6	15.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	75.8	7.6	Yes			

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10068 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	05JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	102.8	10.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.4	3.8				
	Day 29	29	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	1915.3	191.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	1092.9	109.3	Yes			
	Day 43	43	26JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	1764.1	176.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	506.7	50.7	Yes			
10070 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10070 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	05JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	32.5	3.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	133.6	13.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	79.8	8.0	Yes			
	Day 43	43	26JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	109.5	11.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	45.5	4.6	Yes			
10073 50 µg Younger	Day 1	1	15MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10066 60 µg Younger	Day 1	1	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
10073 50 µg Younger	Day 8	8	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	05JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	27.3	2.7				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	914.4	91.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	442.2	44.2	Yes			
	Day 43	43	26JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	889.7	89.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	387.8	38.8	Yes			

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10066 60 µg Younger	Day 8	8	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.2	2.8				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.8	2.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10075 60 µg Younger	Day 1	1	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10075 60 µg Younger	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10076 60 µg Younger	Day 1	1	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	37.2	3.7				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	37.0	3.7				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10076 60 µg Younger	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	40.8	4.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	23.0	2.3				
10078 60 µg Younger	Day 1	1	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	42.7	4.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	54.3	5.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	26.5	2.7				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10078 60 µg Younger	Day 43	43	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	47.8	4.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10083 60 µg Younger	Day 1	1	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	42	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10083 60 µg Younger	Day 43	42	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10084 60 µg Younger	Day 1	1	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.4	2.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	27.6	2.8				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	20.5	2.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10085 60 µg Younger	Day 1	1	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	34.0	3.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	37.2	3.7				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.2	2.8				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10089 60 µg Younger	Day 1	1	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10089 60 µg Younger	Day 1	1	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	42	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10093 60 µg Younger	Day 1	1	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10093 60 µg Younger	Day 8	8	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	42	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10096 60 µg Younger	Day 1	1	19MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10096 60 µg Younger	Day 8	8	26MAY2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	09JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	17JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10103 60 µg Younger	Day 1	1	22MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10103 60 µg Younger	Day 22	22	12JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	32.7	3.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	19JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.7	2.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	20.9	2.1				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
10104 60 µg Younger	Day 1	1	20MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	27MAY2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.4	2.3				

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Appendix Table 1: Listing of functional antibody titer - BNT162b1

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
10104 60 µg Younger	Day 22	22	10JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	28	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	26.8	2.7				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	42	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20153 1 µg Younger	Day 1	1	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	59.0	5.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	24.2	2.4				
	Day 43	44	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	45.6	4.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	51	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	38.4	3.8				

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20153 1 µg Younger	Day 50	51	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	23.2	2.3				
20154 1 µg Younger	Day 1	1	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	44	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20154 1 µg Younger	Day 50	51	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20157 1 µg Younger	Day 1	1	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	154.6	15.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	24.8	2.5				
	Day 43	44	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	82.1	8.2	Yes			

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20157 1 µg Younger	Day 43	44	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.3	2.7				
	Day 50	51	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	41.6	4.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	26.3	2.6				
20158 1 µg Younger	Day 1	1	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	26	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20158 1 µg Younger	Day 43	43	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	92.5	9.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.0	2.2				
	Day 50	50	31AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	60.6	6.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20160 1 µg Younger	Day 1	1	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	32	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20160 1 µg Younger	Day 29	32	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20163 1 µg Younger	Day 8	9	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 22	22	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 29	30	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	152.7					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	74.8					
	Day 43	45	12AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	91.3					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	43.9					
	Day 50	51	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	67.1					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	34.8					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20164 1 µg Younger	Day 1	1	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	10AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	29.4	2.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	22.4	2.2				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	54	04SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20164 1 µg Younger	Day 50	54	04SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20166 1 µg Younger	Day 8	9	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 22	22	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 29	29	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 43	44	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 50	51	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20171 1 µg Younger	Day 1	1	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	46	27AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	50	31AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20171 1 µg Younger	Day 50	50	31AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20181 1 µg Younger	Day 1	1	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	71.5	7.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.1	3.8				
	Day 43	43	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	67.8	6.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.0	2.7				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20181 1 µg Younger	Day 50	50	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	47.0	4.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	24.2	2.4				
20188 1 µg Younger	Day 1	1	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	25AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	118.9	11.9	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20188 1 µg Younger	Day 43	43	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	64.3	6.4	Yes			
	Day 50	50	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	102.3	10.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	50.0	5.0	Yes			
20189 1 µg Younger	Day 1	1	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	25AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20176 3 µg Younger	Day 1	1	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	240.8	24.1	Yes			
20189 1 µg Younger	Day 43	43	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	50	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20176 3 µg Younger	Day 29	29	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	93.2	9.3	Yes			
	Day 43	43	09SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	88.3	8.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	43.6	4.4	Yes			
	Day 50	50	16SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	119.2	11.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	47.5	4.8	Yes			
20185 3 µg Younger	Day 1	1	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	05AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20185 3 µg Younger	Day 29	29	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	163.5	16.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	61.5	6.2	Yes			
	Day 43	43	09SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	44.4	4.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.0	2.7				
	Day 50	50	16SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	35.9	3.6				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.7	2.8				
20191 3 µg Younger	Day 1	1	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20191 3 µg Younger	Day 22	21	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	03SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	136.6	13.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	64.0	6.4	Yes			
	Day 43	43	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	40.3	4.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	37.0	3.7				
20192 3 µg Younger	Day 1	1	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20192 3 µg Younger	Day 29	29	25AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	196.3	19.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	76.4	7.6	Yes			
	Day 43	43	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	80.9	8.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	39.7	4.0				
	Day 50	50	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	39.7	4.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	25.1	2.5				
20193 3 µg Younger	Day 1	1	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 43	43	09SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	24.0	2.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	50	16SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.6	2.9				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20193 3 µg Younger	Day 50	50	16SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20194 3 µg Younger	Day 1	1	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	27	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	60.2	6.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	23.2	2.3				
	Day 43	43	09SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	50.5	5.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	24.8	2.5				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20194 3 µg Younger	Day 50	50	16SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	32.2	3.2				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20195 3 µg Younger	Day 1	1	31JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	20	19AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	28AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	125.9	12.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	56.8	5.7	Yes			
	Day 43	43	11SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	43.4	4.3	Yes			

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20195 3 µg Younger	Day 43	43	11SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.2	3.8				
	Day 50	50	18SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	57.3	5.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	35.5	3.6				
20197 3 µg Younger	Day 1	1	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	25AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	62.9	6.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20197 3 µg Younger	Day 43	43	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	32.6	3.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	50	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.1	2.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20200 3 µg Younger	Day 1	1	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	19AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	30	28AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	538.1	53.8	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20200 3 µg Younger	Day 29	30	28AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	65.5	6.5	Yes			
	Day 43	44	11SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	51.5	5.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	36.3	3.6				
	Day 50	51	18SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	62.3	6.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	39.4	3.9				
20201 3 µg Younger	Day 1	1	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	12AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20201 3 µg Younger	Day 29	29	03SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	305.5	30.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	62.6	6.3	Yes			
	Day 43	43	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	91.7	9.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	45.9	4.6	Yes			
20203 3 µg Younger	Day 1	1	31JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	21AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	28AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	42.1	4.2	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20203 3 µg Younger	Day 29	29	28AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	11SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	22.3	2.2				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	50	18SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	24.6	2.5				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20204 3 µg Younger	Day 1	1	31JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	20	19AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20101 10 µg Younger	Day 1	1	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	244.7	24.5	Yes			
20204 3 µg Younger	Day 29	29	28AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	124.2	12.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	45.0	4.5	Yes			
	Day 43	43	11SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	41.3	4.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	29.2	2.9				
	Day 50	50	18SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	31.2	3.1				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20101 10 µg Younger	Day 29	29	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	115.1	11.5	Yes			
	Day 43	43	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	116.8	11.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	50.7	5.1	Yes			
	Day 50	50	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	129.4	12.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	49.9	5.0	Yes			
	Day 85	85	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	220.7	22.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	36.9	3.7				
20102 10 µg Younger	Day 1	1	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20102 10 µg Younger	Day 22	22	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	43.4	4.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.0	2.2				
	Day 29	29	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	337.5	33.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	131.5	13.2	Yes			
	Day 43	43	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	139.2	13.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	43.8	4.4	Yes			
	Day 50	50	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	203.5	20.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	64.1	6.4	Yes			
	Day 85	85	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	194.1	19.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	33.0	3.3				
20103 10 µg Younger	Day 1	1	15JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20103 10 µg Younger	Day 1	1	15JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	34.4	3.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	325.4	32.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	295.7	29.6	Yes			
	Day 43	43	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	306.4	30.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	124.4	12.4	Yes			
	Day 50	50	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	210.2	21.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	98.7	9.9	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20103 10 µg Younger	Day 85	85	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	170.6	17.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	53.1	5.3	Yes			
20104 10 µg Younger	Day 1	1	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.5	2.8				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	189.5	19.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	81.4	8.1	Yes			
	Day 43	43	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	153.8	15.4	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20104 10 µg Younger	Day 43	43	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	50.1	5.0	Yes			
	Day 50	50	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	155.3	15.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	43.8	4.4	Yes			
	Day 85	91	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	220.2	22.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	36.3	3.6				
20105 10 µg Younger	Day 1	1	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20105 10 µg Younger	Day 29	29	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	484.3	48.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	238.6	23.9	Yes			
	Day 43	43	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	321.2	32.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	157.3	15.7	Yes			
	Day 50	50	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	328.3	32.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	140.3	14.0	Yes			
	Day 85	85	08SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	320.1	32.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	49.7	5.0	Yes			
20110 10 µg Younger	Day 1	1	16JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20110 10 µg Younger	Day 8	7	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	07JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.5	2.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	264.0	26.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	109.7	11.0	Yes			
	Day 43	39	24JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	245.9	24.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	97.7	9.8	Yes			
	Day 50	53	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	139.9	14.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	58.4	5.8	Yes			
	Day 85	87	10SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	190.8	19.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	32.3	3.2				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20111 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Unscheduled 1 Day 8	22	09JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	28	15JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	36	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	107.7	10.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	44.1	4.4	Yes			
	Day 50	50	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	69.5	6.9	Yes			

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20111 10 µg Younger	Day 50	50	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.6	2.3				
	Day 85	79	04SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	81.7	8.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20114 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	09JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	20.5	2.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	16JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	134.2	13.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	78.0	7.8	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20114 10 µg Younger	Day 43	41	28JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	90.8	9.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	49.3	4.9	Yes			
	Day 85	85	10SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	120.5	12.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	61.8	6.2	Yes			
20116 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	16JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	51.8	5.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20117 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20117 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	09JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	26	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	45.8	4.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.8	2.3				
	Day 50	50	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	50.0	5.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.3	2.2				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20117 10 µg Younger	Day 85	85	10SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	39.0	3.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20118 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	09JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	47.3	4.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	16JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	322.6	32.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	108.1	10.8	Yes			
	Day 43	43	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	222.9	22.3	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20118 10 µg Younger	Day 43	43	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	88.1	8.8	Yes			
	Day 50	50	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	157.3	15.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	77.9	7.8	Yes			
	Day 85	85	10SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	494.9	49.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	78.9	7.9	Yes			
20121 10 µg Younger	Day 1	1	18JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	24JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	09JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.1	2.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20121 10 µg Younger	Day 29	29	16JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	349.5	34.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	148.7	14.9	Yes			
	Day 43	43	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	275.7	27.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	122.5	12.2	Yes			
	Day 50	50	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	227.0	22.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	102.8	10.3	Yes			
	Day 85	85	10SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	372.9	37.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	64.6	6.5	Yes			
20156 20 µg Younger	Day 1	1	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	08JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20156 20 µg Younger	Day 8	7	08JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	244.8	24.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	37.3	3.7				
	Day 29	29	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	435.8	43.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	131.0	13.1	Yes			
	Day 43	43	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	236.4	23.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	72.3	7.2	Yes			
	Day 50	50	20AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	189.8	19.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	83.2	8.3	Yes			
	Day 85	85	24SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	298.1	29.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	50.5	5.0	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20159 20 µg Younger	Day 1	1	01JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	08JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	157.9	15.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	80.4	8.0	Yes			
	Day 43	38	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	93.9	9.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	57.9	5.8	Yes			
	Day 50	50	19AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	60.5	6.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.8	3.9				
	Day 85	85	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	93.4	9.3	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20159 20 µg Younger	Day 85	85	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	39.4	3.9				
20168 20 µg Younger	Day 1	1	01JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	08JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	22JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	123.4	12.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	31.1	3.1				
	Day 43	43	12AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	30.1	3.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20168 20 µg Younger	Day 50	50	19AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	36.0	3.6				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 85	85	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	42.8	4.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20172 20 µg Younger	Day 1	1	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	08JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	26	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.1	2.3				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20172 20 µg Younger	Day 29	26	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	102.9	10.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	53.9	5.4	Yes			
	Day 50	50	20AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	67.4	6.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	44.7	4.5	Yes			
	Day 85	85	24SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	65.6	6.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	30.8	3.1				
20173 20 µg Younger	Day 1	1	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	08JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20173 20 µg Younger	Day 22	22	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	30JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	100.6	10.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	37.3	3.7				
	Day 43	43	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	53.1	5.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	30.2	3.0				
	Day 50	50	20AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	48.7	4.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	26.2	2.6				
	Day 85	85	24SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	110.6	11.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20174 20 µg Younger	Day 1	1	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20174 20 µg Younger	Day 1	1	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	32	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	53.5	5.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	24.9	2.5				
	Day 43	43	17AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	21.6	2.2				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 50	50	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20174 20 µg Younger	Day 85	85	28SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	24.2	2.4				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20175 20 µg Younger	Day 1	1	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	21.1	2.1				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	31	05AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	626.1	62.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	112.2	11.2	Yes			
	Day 43	43	17AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	263.7	26.4	Yes			

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20175 20 µg Younger	Day 43	43	17AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	111.4	11.1	Yes			
	Day 50	50	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	201.0	20.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	83.6	8.4	Yes			
	Day 85	85	28SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	271.8	27.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	60.6	6.1	Yes			
20177 20 µg Younger	Day 1	1	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	33.3	3.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20177 20 µg Younger	Day 29	31	05AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	681.5	68.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	162.9	16.3	Yes			
	Day 43	44	18AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	295.8	29.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	155.7	15.6	Yes			
	Day 50	50	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	228.7	22.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	119.1	11.9	Yes			
	Day 85	85	28SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	285.8	28.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	57.2	5.7	Yes			
20178 20 µg Younger	Day 1	1	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20178 20 µg Younger	Day 8	8	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	27JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	31	05AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	139.1	13.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	56.4	5.6	Yes			
	Day 43	43	17AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	93.2	9.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	39.8	4.0				
	Day 50	50	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	116.1	11.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	41.2	4.1	Yes			
	Day 85	85	28SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	110.3	11.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20179 20 µg Younger	Day 1	1	06JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	24	29JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	23.0	2.3				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	31	05AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	503.3	50.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	101.9	10.2	Yes			
	Day 43	43	17AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	366.5	36.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	130.4	13.0	Yes			
	Day 50	50	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	273.2	27.3	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20179 20 µg Younger	Day 50	50	24AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	110.1	11.0	Yes			
	Day 85	85	28SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	356.5	35.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	79.8	8.0	Yes			
20180 20 µg Younger	Day 1	1	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	10AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	606.2	60.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	156.7	15.7	Yes			

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20127 30 µg Younger	Day 1	1	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
20183 20 µg Younger	Day 1	1	13JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	10AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	155.2	15.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	94.2	9.4	Yes			
	Day 50	53	03SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	92.0	9.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	40.2	4.0	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20127 30 µg Younger	Day 1	1	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	23	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	28.1	2.8				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	489.2	48.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	82.2	8.2	Yes			
	Day 43	43	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	267.2	26.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	93.3	9.3	Yes			
	Day 50	50	10AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	128.5	12.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	66.3	6.6	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20127 30 µg Younger	Day 85	85	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	141.6	14.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	29.2	2.9				
20128 30 µg Younger	Day 1	1	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	35.4	3.5				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	21JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	958.5	95.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	231.3	23.1	Yes			
	Day 43	43	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	260.6	26.1	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20128 30 µg Younger	Day 43	43	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	92.2	9.2	Yes			
	Day 50	50	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	253.0	25.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	70.1	7.0	Yes			
	Day 85	85	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	334.3	33.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	50.0	5.0	Yes			
20134 30 µg Younger	Day 1	1	25JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	15JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	65.1	6.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20134 30 µg Younger	Day 29	29	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	545.8	54.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	206.2	20.6	Yes			
	Day 43	44	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	230.9	23.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	89.9	9.0	Yes			
	Day 50	50	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	164.7	16.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 85	89	21SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	116.6	11.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	38.0	3.8				
20137 30 µg Younger	Day 1	1	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20137 30 µg Younger	Day 8	8	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	21JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	480.3	48.0	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	137.9	13.8	Yes			
	Day 43	43	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	263.0	26.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	58.5	5.9	Yes			
	Day 50	50	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	221.1	22.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	45.0	4.5	Yes			
	Day 85	85	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	238.5	23.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	45.6	4.6	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20138 30 µg Younger	Day 1	1	25JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	9	03JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	15JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	220.5	22.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	72.1	7.2	Yes			
	Day 43	44	07AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	213.1	21.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	44.8	4.5	Yes			
	Day 50	51	14AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	60.7	6.1	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20138 30 µg Younger	Day 50	51	14AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	33.7	3.4				
	Day 85	85	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	96.7	9.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20142 30 µg Younger	Day 8	8	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 22	21	15JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	43.6					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	30.0					
	Day 29	29	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	568.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	383.2					
	Day 43	43	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	312.4					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	171.1					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20142 30 µg Younger	Day 50	49	12AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	377.7					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	230.0					
	Day 85	85	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	329.2					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	169.2					
20143 30 µg Younger	Day 1	1	25JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	176.7	17.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	46.9	4.7	Yes			
	Day 43	43	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	61.1	6.1	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20143 30 µg Younger	Day 43	43	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.5	2.7				
	Day 50	50	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	62.0	6.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.9	2.8				
	Day 85	85	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	58.4	5.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20144 30 µg Younger	Day 1	1	25JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	15JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20144 30 µg Younger	Day 29	29	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	244.3	24.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	65.0	6.5	Yes			
	Day 43	43	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	82.0	8.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	42.8	4.3	Yes			
	Day 50	50	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	81.8	8.2	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	39.0	3.9				
	Day 85	85	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	247.7	24.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	40.0	4.0	Yes			
20145 30 µg Younger	Day 1	1	25JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20145 30 µg Younger	Day 8	8	02JUL2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	15JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	485.9	48.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	157.7	15.8	Yes			
	Day 43	43	06AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	174.4	17.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	73.0	7.3	Yes			
	Day 50	50	13AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	242.9	24.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	87.1	8.7	Yes			
	Day 85	85	17SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	182.8	18.3	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	65.6	6.6	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20149 30 µg Younger	Day 1	1	22JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	29JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	23	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	20.5	2.1				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	20JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	216.8	21.7	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	96.2	9.6	Yes			
	Day 43	43	03AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	112.3	11.2	Yes			
	Day 50	52	12AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	80.7	8.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	57.4	5.7	Yes			

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Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20149 30 µg Younger	Day 85	87	16SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	45.8	4.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20150 30 µg Younger	Day 8	8	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 29	29	21JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	329.9					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	82.6					
	Day 50	50	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	133.5					
	Day 85	91	21SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	120.1					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	23.1					
20155 30 µg Younger	Day 1	1	23JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20155 30 µg Younger	Day 8	8	30JUN2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	14JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	21JUL2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	36.9	3.7				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 43	43	04AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	69.1	6.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	27.3	2.7				
	Day 50	50	11AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	88.5	8.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 85	85	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	49.0	4.9	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20155 30 µg Younger	Day 85	85	15SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20208 20 µg Older	Day 1	1	25AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	43.9	4.4	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	476.2	47.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	95.4	9.5	Yes			
20214 20 µg Older	Day 1	1	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20214 20 µg Older	Day 8	8	02SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	20	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	274.9	27.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	34.7	3.5				
20215 20 µg Older	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 22	22	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	144.3					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20215 20 µg Older	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
20216 20 µg Older	Day 1	1	25AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	21	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	29.4	2.9				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	685.8	68.6	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	209.1	20.9	Yes			
20221 20 µg Older	Day 1	1	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20221 20 µg Older	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	348.5	34.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	67.1	6.7	Yes			
20222 20 µg Older	Day 1	1	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	02SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	20	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20222 20 µg Older	Day 22	20	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	215.3	21.5	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	60.3	6.0	Yes			
20223 20 µg Older	Day 1	1	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	8	02SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	20	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	180.7	18.1	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	52.2	5.2	Yes			

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20224 20 µg Older	Day 1	1	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	47.6	4.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20225 20 µg Older	Day 1	1	26AUG2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 22	20	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	20.5	2.1				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20225 20 µg Older	Day 22	20	14SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	23SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	247.9	24.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	85.0	8.5	Yes			
20226 20 µg Older	Day 1	1	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	209.1	20.9	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	29.9	3.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20229 20 µg Older	Day 1	1	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	128.4	12.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
20233 20 µg Older	Day 1	1	01SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0					
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0					
	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				

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Appendix Table 2: Listing of functional antibody titer - BNT162b2

Immunogenicity set

Subject number/ Dose group	Visit	Study day	Date and time	Parameter	Value	Fold increase	Seroconversion	Not done?	Reason not done	Comment
20233 20 µg Older	Day 8	7	07SEP2020	SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 22	22	22SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	10.0	1.0				
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	10.0	1.0				
	Day 29	29	29SEP2020	SARS-CoV-2 Serum Neutralizing Titer 50 [NA]	127.9	12.8	Yes			
				SARS-CoV-2 Serum Neutralizing Titer 90 [NA]	22.2	2.2				

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 1	n	12	12	11	12	12	59
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0
Day 8	n	12	12	12	12	12	60
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 22	n	12	11	12	11	11	57
	Mean (SD)	14.5 (11.6)	32.7 (32.2)	45.3 (58.9)	43.1 (37.9)	22.1 (12.8)	31.5 (36.4)
	GMT (95% CI)	12.4 (8.9-17.1)	22.4 (12.3-40.5)	28.0 (15.2-51.4)	30.9 (17.2-55.4)	18.7 (12.3-28.4)	21.3 (17.1-26.5)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	21.2	27.4	32.5	23.4	23.4
	Max	48.2	110.3	222.0	125.9	42.7	222.0
Day 29	n	12	11	12	11	12	58
	Mean (SD)	56.8 (50.4)	207.7 (146.8)	564.2 (944.8)	767.0 (575.5)	24.1 (14.5)	318.3 (566.8)
	GMT (95% CI)	36.0 (18.2-71.1)	157.6 (89.5-277.5)	307.8 (165.1-573.8)	577.6 (330.5-1009.5)	20.1 (13.4-30.4)	111.5 (74.3-167.2)
	Min	10.0	33.6	97.8	133.6	10.0	10.0
	Median	39.8	181.7	251.9	598.8	27.2	130.0
	Max	161.3	513.0	3508.2	1915.3	54.3	3508.2

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 43	n	12	11	12	11	12	58
	Mean (SD)	96.3 (89.0)	197.3 (162.2)	253.8 (325.0)	507.0 (519.9)	20.6 (13.3)	210.3 (318.9)
	GMT (95% CI)	62.3 (31.5-123.0)	125.8 (57.2-276.5)	157.1 (85.9-287.6)	333.4 (176.3-630.6)	17.2 (11.7-25.4)	90.8 (63.2-130.3)
	Min	10.0	10.0	48.6	86.0	10.0	10.0
	Median	70.0	139.1	125.6	276.0	15.2	111.6
	Max	326.0	555.1	1218.0	1764.1	47.8	1764.1

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 1	n	12	12	11	12	12	59
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0
Day 8	n	12	12	12	12	12	60
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 22	n	12	11	12	11	11	57
	Mean (SD)	10.0 (0.0)	17.0 (12.7)	22.7 (32.7)	19.8 (20.6)	10.0 (0.0)	15.9 (18.5)
	GMT (95% CI)	10.0 (10.0-10.0)	14.0 (9.4-20.9)	14.8 (8.9-24.3)	14.7 (9.1-23.6)	10.0 (10.0-10.0)	12.5 (10.8-14.5)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	46.1	123.8	75.8	10.0	123.8
Day 29	n	12	11	12	11	12	58
	Mean (SD)	28.8 (24.4)	112.2 (85.0)	230.8 (279.5)	373.0 (289.3)	11.4 (4.8)	148.1 (222.6)
	GMT (95% CI)	21.0 (12.4-35.4)	79.9 (41.4-154.1)	156.2 (91.5-266.8)	285.6 (168.0-485.7)	10.8 (9.1-13.0)	58.6 (40.1-85.7)
	Min	10.0	10.0	49.3	79.8	10.0	10.0
	Median	16.8	82.9	147.6	307.7	10.0	75.3
	Max	86.5	299.6	1076.8	1092.9	26.5	1092.9

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 43	n	12	11	12	11	12	58
	Mean (SD)	44.8 (45.7)	81.0 (68.8)	114.9 (153.3)	212.7 (172.1)	11.1 (3.8)	91.0 (125.5)
	GMT (95% CI)	28.1 (14.7-53.9)	50.3 (23.1-109.4)	72.0 (40.2-128.6)	153.0 (84.1-278.1)	10.7 (9.2-12.5)	43.1 (31.0-59.8)
	Min	10.0	10.0	26.6	38.5	10.0	10.0
	Median	30.2	60.2	60.9	169.3	10.0	43.9
	Max	163.6	224.0	579.9	506.7	23.0	579.9

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

Visit		Total (N 60)
Day 1	n	59
	Mean (SD)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)
	Min	10.0
	Median	10.0
	Max	10.0
Day 8	n	60
	Mean (SD)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)
	Min	10.0
	Median	10.0
	Max	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

Visit		Total (N 60)
Day 22	n	57
	Mean (SD)	31.5 (36.4)
	GMT (95% CI)	21.3 (17.1-26.5)
	Min	10.0
	Median	23.4
	Max	222.0
Day 29	n	58
	Mean (SD)	318.3 (566.8)
	GMT (95% CI)	111.5 (74.3-167.2)
	Min	10.0
	Median	130.0
	Max	3508.2

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

Visit		Total (N 60)
Day 43	n	58
	Mean (SD)	210.3 (318.9)
	GMT (95% CI)	90.8 (63.2-130.3)
	Min	10.0
	Median	111.6
	Max	1764.1

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

Visit		Total (N 60)
Day 1	n	59
	Mean (SD)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)
	Min	10.0
	Median	10.0
	Max	10.0
Day 8	n	60
	Mean (SD)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)
	Min	10.0
	Median	10.0
	Max	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

Visit		Total (N 60)
Day 22	n	57
	Mean (SD)	15.9 (18.5)
	GMT (95% CI)	12.5 (10.8-14.5)
	Min	10.0
	Median	10.0
	Max	123.8
Day 29	n	58
	Mean (SD)	148.1 (222.6)
	GMT (95% CI)	58.6 (40.1-85.7)
	Min	10.0
	Median	75.3
	Max	1092.9

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 3: Descriptive statistics of functional antibody titer - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

Visit		Total (N 60)
Day 43	n	58
	Mean (SD)	91.0 (125.5)
	GMT (95% CI)	43.1 (31.0-59.8)
	Min	10.0
	Median	43.9
	Max	579.9

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 8	n	12	12	11	12	12	59
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.0	1.0	1.0	1.0	1.0	1.0
Day 22	n	12	11	11	11	11	56
	Mean (SD)	1.5 (1.2)	3.3 (3.2)	4.6 (6.2)	4.3 (3.8)	2.2 (1.3)	3.1 (3.7)
	GMFR (95% CI)	1.2 (0.9-1.7)	2.2 (1.2-4.1)	2.7 (1.4-5.4)	3.1 (1.7-5.5)	1.9 (1.2-2.8)	2.1 (1.7-2.6)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	2.1	2.4	3.3	2.3	2.2
	Max	4.8	11.0	22.2	12.6	4.3	22.2

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 29	n	12	11	11	11	12	57
	Mean (SD)	5.7 (5.0)	20.8 (14.7)	56.0 (99.1)	76.7 (57.5)	2.4 (1.4)	31.3 (57.0)
	GMFR (95% CI)	3.6 (1.8-7.1)	15.8 (9.0-27.8)	28.9 (14.7-56.7)	57.8 (33.1-100.9)	2.0 (1.3-3.0)	10.8 (7.2-16.3)
	Min	1.0	3.4	9.8	13.4	1.0	1.0
	Median	4.0	18.2	23.0	59.9	2.7	12.6
	Max	16.1	51.3	350.8	191.5	5.4	350.8
Day 43	n	12	11	11	11	12	57
	Mean (SD)	9.6 (8.9)	19.7 (16.2)	24.3 (33.8)	50.7 (52.0)	2.1 (1.3)	20.7 (32.1)
	GMFR (95% CI)	6.2 (3.1-12.3)	12.6 (5.7-27.6)	14.5 (7.6-27.6)	33.3 (17.6-63.1)	1.7 (1.2-2.5)	8.9 (6.2-12.8)
	Min	1.0	1.0	4.9	8.6	1.0	1.0
	Median	7.0	13.9	12.3	27.6	1.5	11.0
	Max	32.6	55.5	121.8	176.4	4.8	176.4

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 8	n	12	12	11	12	12	59
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.0	1.0	1.0	1.0	1.0	1.0
Day 22	n	12	11	11	11	11	56
	Mean (SD)	1.0 (0.0)	1.7 (1.3)	2.4 (3.4)	2.0 (2.1)	1.0 (0.0)	1.6 (1.9)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.4 (0.9-2.1)	1.5 (0.9-2.6)	1.5 (0.9-2.4)	1.0 (1.0-1.0)	1.3 (1.1-1.5)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.0	4.6	12.4	7.6	1.0	12.4

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 29	n	12	11	11	11	12	57
	Mean (SD)	2.9 (2.4)	11.2 (8.5)	22.4 (29.2)	37.3 (28.9)	1.1 (0.5)	14.5 (22.4)
	GMFR (95% CI)	2.1 (1.2-3.5)	8.0 (4.1-15.4)	14.7 (8.3-26.1)	28.6 (16.8-48.6)	1.1 (0.9-1.3)	5.7 (3.9-8.3)
	Min	1.0	1.0	4.9	8.0	1.0	1.0
	Median	1.7	8.3	13.8	30.8	1.0	7.3
	Max	8.7	30.0	107.7	109.3	2.7	109.3
Day 43	n	12	11	11	11	12	57
	Mean (SD)	4.5 (4.6)	8.1 (6.9)	11.2 (16.0)	21.3 (17.2)	1.1 (0.4)	9.0 (12.6)
	GMFR (95% CI)	2.8 (1.5-5.4)	5.0 (2.3-10.9)	6.7 (3.6-12.6)	15.3 (8.4-27.8)	1.1 (0.9-1.2)	4.2 (3.0-5.9)
	Min	1.0	1.0	2.7	3.8	1.0	1.0
	Median	3.0	6.0	5.5	16.9	1.0	4.2
	Max	16.4	22.4	58.0	50.7	2.3	58.0

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

Visit		Total (N 60)
Day 8	n	59
	Mean (SD)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)
	Min	1.0
	Median	1.0
	Max	1.0
Day 22	n	56
	Mean (SD)	3.1 (3.7)
	GMFR (95% CI)	2.1 (1.7-2.6)
	Min	1.0
	Median	2.2
	Max	22.2

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

Visit		Total (N 60)
Day 29	n	57
	Mean (SD)	31.3 (57.0)
	GMFR (95% CI)	10.8 (7.2-16.3)
	Min	1.0
	Median	12.6
	Max	350.8
Day 43	n	57
	Mean (SD)	20.7 (32.1)
	GMFR (95% CI)	8.9 (6.2-12.8)
	Min	1.0
	Median	11.0
	Max	176.4

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

Visit		Total (N 60)
Day 8	n	59
	Mean (SD)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)
	Min	1.0
	Median	1.0
	Max	1.0
Day 22	n	56
	Mean (SD)	1.6 (1.9)
	GMFR (95% CI)	1.3 (1.1-1.5)
	Min	1.0
	Median	1.0
	Max	12.4

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 4: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

Visit		Total (N 60)
Day 29	n	57
	Mean (SD)	14.5 (22.4)
	GMFR (95% CI)	5.7 (3.9-8.3)
	Min	1.0
	Median	7.3
	Max	109.3
Day 43	n	57
	Mean (SD)	9.0 (12.6)
	GMFR (95% CI)	4.2 (3.0-5.9)
	Min	1.0
	Median	4.2
	Max	58.0

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 5: Frequency of subjects with seroconversion - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 8	nn	12	12	11	12	12	59
	n (% (95% CI)	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-6.1))
Day 22	nn	12	11	11	11	11	56
	n (% (95% CI)	1 (8.3 (0.2-38.5))	3 (27.3 (6.0-61.0))	4 (36.4 (10.9-69.2))	3 (27.3 (6.0-61.0))	1 (9.1 (0.2-41.3))	12 (21.4 (11.6-34.4))
Day 29	nn	12	11	11	11	12	57
	n (% (95% CI)	6 (50.0 (21.1-78.9))	10 (90.9 (58.7-99.8))	11 (100.0 (71.5-100.0))	11 (100.0 (71.5-100.0))	1 (8.3 (0.2-38.5))	39 (68.4 (54.8-80.1))
Day 43	nn	12	11	11	11	12	57
	n (% (95% CI)	8 (66.7 (34.9-90.1))	10 (90.9 (58.7-99.8))	11 (100.0 (71.5-100.0))	11 (100.0 (71.5-100.0))	2 (16.7 (2.1-48.4))	42 (73.7 (60.3-84.5))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

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Appendix Table 5: Frequency of subjects with seroconversion - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	10 µg (N 12)	30 µg (N 12)	50 µg (N 12)	60 µg (N 12)	Total (N 60)
Day 8	nn	12	12	11	12	12	59
	n (% (95% CI)	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-6.1))
Day 22	nn	12	11	11	11	11	56
	n (% (95% CI)	0 (0.0 (0.0-26.5))	1 (9.1 (0.2-41.3))	1 (9.1 (0.2-41.3))	1 (9.1 (0.2-41.3))	0 (0.0 (0.0-28.5))	3 (5.4 (1.1-14.9))
Day 29	nn	12	11	11	11	12	57
	n (% (95% CI)	4 (33.3 (9.9-65.1))	8 (72.7 (39.0-94.0))	11 (100.0 (71.5-100.0))	11 (100.0 (71.5-100.0))	0 (0.0 (0.0-26.5))	34 (59.6 (45.8-72.4))
Day 43	nn	12	11	11	11	12	57
	n (% (95% CI)	5 (41.7 (15.2-72.3))	8 (72.7 (39.0-94.0))	7 (63.6 (30.8-89.1))	10 (90.9 (58.7-99.8))	0 (0.0 (0.0-26.5))	30 (52.6 (39.0-66.0))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.

N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

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Appendix Table 5: Frequency of subjects with seroconversion - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

Visit		Total (N 60)
Day 8	nn	59
	n (% (95% CI)	0 (0.0 (0.0-6.1))
Day 22	nn	56
	n (% (95% CI)	12 (21.4 (11.6-34.4))
Day 29	nn	57
	n (% (95% CI)	39 (68.4 (54.8-80.1))
Day 43	nn	57
	n (% (95% CI)	42 (73.7 (60.3-84.5))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

Program: Timm_sero_1.sas (Page 3 of 4)

Appendix Table 5: Frequency of subjects with seroconversion - BNT162b1

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

Visit		Total (N 60)
Day 8	nn	59
	n (% (95% CI)	0 (0.0 (0.0-6.1))
Day 22	nn	56
	n (% (95% CI)	3 (5.4 (1.1-14.9))
Day 29	nn	57
	n (% (95% CI)	34 (59.6 (45.8-72.4))
Day 43	nn	57
	n (% (95% CI)	30 (52.6 (39.0-66.0))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

Program: Timm_sero_1.sas (Page 4 of 4)

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 1	n	10	12	12	12	10	56
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0
Day 8	n	12	11	12	12	12	59
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 22	n	12	11	10	11	10	54
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	25.6 (13.5)	35.7 (69.8)	24.3 (18.9)	20.8 (33.4)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	22.0 (14.3-33.9)	17.2 (8.9-33.4)	18.9 (11.2-31.9)	14.5 (12.1-17.5)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	25.8	10.0	15.3	10.0
	Max	10.0	10.0	47.3	244.8	65.1	244.8
Day 29	n	12	11	12	12	12	59
	Mean (SD)	44.8 (55.0)	181.5 (142.5)	235.1 (139.9)	300.5 (248.8)	396.1 (244.9)	232.4 (212.6)
	GMT (95% CI)	23.6 (11.4-48.6)	140.9 (84.9-233.6)	169.2 (84.9-337.2)	194.7 (98.0-386.8)	312.0 (183.3-531.2)	127.6 (90.5-179.8)
	Min	10.0	42.1	10.0	23.1	36.9	10.0
	Median	10.0	136.6	254.4	156.6	405.1	157.9
	Max	154.6	538.1	484.3	681.5	958.5	958.5

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 43	n	11	12	10	10	11	54
	Mean (SD)	51.0 (41.0)	50.9 (23.6)	191.9 (95.6)	155.7 (123.4)	186.0 (90.8)	124.0 (101.5)
	GMT (95% CI)	33.4 (16.5-67.6)	46.2 (34.5-62.0)	165.6 (106.0-258.5)	107.7 (53.3-217.5)	161.2 (107.6-241.5)	82.6 (62.9-108.5)
	Min	10.0	22.3	45.8	21.6	61.1	10.0
	Median	45.6	43.9	188.3	98.4	213.1	91.1
	Max	118.9	91.7	321.2	366.5	312.4	366.5
Day 50	n	11	10	10	11	12	54
	Mean (SD)	37.0 (30.8)	45.4 (29.0)	167.0 (80.6)	120.3 (88.4)	157.9 (97.9)	106.5 (89.0)
	GMT (95% CI)	25.6 (13.7-48.1)	39.8 (27.7-57.0)	147.6 (98.9-220.2)	85.7 (44.3-165.6)	133.4 (90.9-195.9)	70.9 (54.0-93.1)
	Min	10.0	23.1	50.0	10.0	60.7	10.0
	Median	38.4	34.0	156.3	92.0	131.0	68.5
	Max	102.3	119.2	328.3	273.2	377.7	377.7

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 85	n	0	0	11	10	12	33
	Mean (SD)	- (-)	- (-)	220.5 (132.2)	165.9 (123.0)	163.4 (103.0)	183.2 (118.7)
	GMT (95% CI)	-	-	181.3 (112.2-293.0)	120.4 (62.7-231.3)	132.7 (84.9-207.5)	143.0 (108.8-187.9)
	Min	-	-	39.0	24.2	45.8	24.2
	Median	-	-	194.1	110.5	130.8	170.6
	Max	-	-	494.9	356.5	334.3	494.9

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 1	n	10	12	12	12	10	56
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0
Day 8	n	12	11	12	12	12	59
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	10.0	10.0	10.0	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 22	n	12	11	10	11	10	54
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	11.2 (3.8)	12.5 (8.2)	12.0 (6.3)	11.1 (4.8)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.8 (9.1-12.9)	11.3 (8.6-14.7)	11.2 (8.7-14.3)	10.6 (9.9-11.4)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	10.0	10.0	10.0	10.0	10.0
	Max	10.0	10.0	22.0	37.3	30.0	37.3
Day 29	n	12	11	12	12	12	59
	Mean (SD)	20.2 (19.5)	51.7 (26.9)	114.2 (84.7)	83.2 (51.9)	130.9 (102.5)	80.5 (75.7)
	GMT (95% CI)	15.4 (9.9-23.8)	41.8 (24.6-71.1)	78.3 (39.4-155.5)	64.0 (37.1-110.3)	95.4 (52.8-172.5)	50.0 (37.7-66.1)
	Min	10.0	10.0	10.0	10.0	10.0	10.0
	Median	10.0	61.5	108.9	87.3	89.4	65.0
	Max	74.8	93.2	295.7	162.9	383.2	383.2

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 43	n	11	12	10	10	10	53
	Mean (SD)	22.2 (17.8)	29.3 (13.2)	80.7 (44.0)	67.1 (50.3)	72.0 (43.2)	52.7 (42.2)
	GMT (95% CI)	17.5 (10.9-27.9)	25.6 (17.5-37.4)	69.4 (45.0-106.9)	47.7 (23.8-95.5)	61.8 (40.6-94.1)	37.9 (29.9-48.1)
	Min	10.0	10.0	22.8	10.0	27.3	10.0
	Median	10.0	32.8	69.4	55.9	65.8	42.8
	Max	64.3	45.9	157.3	155.7	171.1	171.1
Day 50	n	11	10	10	11	11	53
	Mean (SD)	19.9 (13.4)	22.5 (14.5)	68.1 (37.5)	55.2 (38.0)	61.5 (60.9)	45.4 (41.4)
	GMT (95% CI)	16.6 (11.0-25.0)	18.5 (11.4-29.8)	58.4 (37.6-90.5)	41.8 (23.5-74.3)	42.8 (23.2-79.0)	31.6 (24.9-40.3)
	Min	10.0	10.0	22.3	10.0	10.0	10.0
	Median	10.0	17.6	61.3	41.2	45.0	35.5
	Max	50.0	47.5	140.3	119.1	230.0	230.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 85	n	0	0	11	10	12	33
	Mean (SD)	- (-)	- (-)	42.4 (21.7)	35.8 (25.7)	41.7 (44.2)	40.2 (31.8)
	GMT (95% CI)	-	-	35.7 (22.4-56.8)	26.5 (14.2-49.5)	28.3 (15.9-50.3)	29.9 (22.4-40.0)
	Min	-	-	10.0	10.0	10.0	10.0
	Median	-	-	36.9	35.1	33.6	36.9
	Max	-	-	78.9	79.8	169.2	169.2

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 1	n	11	11	67
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0
	Median	10.0	10.0	10.0
	Max	10.0	10.0	10.0
Day 8	n	11	11	70
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0
	Median	10.0	10.0	10.0
	Max	10.0	10.0	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 22	n	12	12	66
	Mean (SD)	15.3 (10.8)	15.3 (10.8)	19.8 (30.5)
	GMT (95% CI)	13.1 (9.4-18.3)	13.1 (9.4-18.3)	14.3 (12.2-16.7)
	Min	10.0	10.0	10.0
	Median	10.0	10.0	10.0
	Max	43.9	43.9	244.8
Day 29	n	12	12	71
	Mean (SD)	257.2 (175.9)	257.2 (175.9)	236.6 (205.9)
	GMT (95% CI)	209.4 (134.9-325.3)	209.4 (134.9-325.3)	138.8 (103.4-186.2)
	Min	47.6	47.6	10.0
	Median	212.2	212.2	176.7
	Max	685.8	685.8	958.5

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 43	n	0	0	54
	Mean (SD)	- (-)	- (-)	124.0 (101.5)
	GMT (95% CI)	-	-	82.6 (62.9-108.5)
	Min	-	-	10.0
	Median	-	-	91.1
	Max	-	-	366.5
Day 50	n	0	0	54
	Mean (SD)	- (-)	- (-)	106.5 (89.0)
	GMT (95% CI)	-	-	70.9 (54.0-93.1)
	Min	-	-	10.0
	Median	-	-	68.5
	Max	-	-	377.7

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 85	n	0	0	33
	Mean (SD)	- (-)	- (-)	183.2 (118.7)
	GMT (95% CI)	-	-	143.0 (108.8-187.9)
	Min	-	-	24.2
	Median	-	-	170.6
	Max	-	-	494.9

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 1	n	11	11	67
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0
	Median	10.0	10.0	10.0
	Max	10.0	10.0	10.0
Day 8	n	11	11	70
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.0 (0.0)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.0 (10.0-10.0)
	Min	10.0	10.0	10.0
	Median	10.0	10.0	10.0
	Max	10.0	10.0	10.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 22	n	12	12	66
	Mean (SD)	10.0 (0.0)	10.0 (0.0)	10.9 (4.4)
	GMT (95% CI)	10.0 (10.0-10.0)	10.0 (10.0-10.0)	10.5 (9.9-11.1)
	Min	10.0	10.0	10.0
	Median	10.0	10.0	10.0
	Max	10.0	10.0	37.3
Day 29	n	12	12	71
	Mean (SD)	57.2 (56.1)	57.2 (56.1)	76.6 (73.0)
	GMT (95% CI)	37.7 (20.1-70.6)	37.7 (20.1-70.6)	47.6 (37.1-61.2)
	Min	10.0	10.0	10.0
	Median	43.5	43.5	62.6
	Max	209.1	209.1	383.2

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 43	n	0	0	53
	Mean (SD)	- (-)	- (-)	52.7 (42.2)
	GMT (95% CI)	-	-	37.9 (29.9-48.1)
	Min	-	-	10.0
	Median	-	-	42.8
	Max	-	-	171.1
Day 50	n	0	0	53
	Mean (SD)	- (-)	- (-)	45.4 (41.4)
	GMT (95% CI)	-	-	31.6 (24.9-40.3)
	Min	-	-	10.0
	Median	-	-	35.5
	Max	-	-	230.0

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 6: Descriptive statistics of functional antibody titer - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 85	n	0	0	33
	Mean (SD)	- (-)	- (-)	40.2 (31.8)
	GMT (95% CI)	-	-	29.9 (22.4-40.0)
	Min	-	-	10.0
	Median	-	-	36.9
	Max	-	-	169.2

Geometric mean titer (GMT) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 8	n	10	11	12	12	10	55
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.0	1.0	1.0	1.0	1.0	1.0
Day 22	n	10	11	10	11	9	51
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	2.6 (1.4)	3.6 (7.0)	2.2 (1.9)	2.1 (3.4)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	2.2 (1.4-3.4)	1.7 (0.9-3.3)	1.7 (1.0-3.0)	1.4 (1.2-1.7)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	2.6	1.0	1.0	1.0
	Max	1.0	1.0	4.7	24.5	6.5	24.5

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 29	n	10	11	12	12	10	55
	Mean (SD)	3.7 (4.7)	18.1 (14.3)	23.5 (14.0)	30.0 (24.9)	38.5 (26.3)	23.0 (21.3)
	GMFR (95% CI)	2.1 (1.0-4.5)	14.1 (8.5-23.4)	16.9 (8.5-33.7)	19.5 (9.8-38.7)	29.2 (15.3-55.7)	12.7 (9.0-18.1)
	Min	1.0	4.2	1.0	2.3	3.7	1.0
	Median	1.0	13.7	25.4	15.7	36.2	15.8
	Max	15.5	53.8	48.4	68.2	95.9	95.9
Day 43	n	9	12	10	10	10	51
	Mean (SD)	5.1 (4.1)	5.1 (2.4)	19.2 (9.6)	15.6 (12.3)	17.3 (8.5)	12.3 (10.0)
	GMFR (95% CI)	3.4 (1.5-7.6)	4.6 (3.4-6.2)	16.6 (10.6-25.9)	10.8 (5.3-21.8)	15.1 (9.9-23.0)	8.4 (6.4-11.0)
	Min	1.0	2.2	4.6	2.2	6.1	1.0
	Median	4.6	4.4	18.8	9.8	19.4	9.1
	Max	11.9	9.2	32.1	36.7	26.7	36.7

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 50	n	9	10	10	11	10	50
	Mean (SD)	3.7 (3.1)	4.5 (2.9)	16.7 (8.1)	12.0 (8.8)	13.8 (7.6)	10.3 (8.3)
	GMFR (95% CI)	2.6 (1.2-5.2)	4.0 (2.8-5.7)	14.8 (9.9-22.0)	8.6 (4.4-16.6)	12.0 (8.0-18.0)	7.1 (5.4-9.3)
	Min	1.0	2.3	5.0	1.0	6.1	1.0
	Median	3.8	3.4	15.6	9.2	10.8	6.8
	Max	10.2	11.9	32.8	27.3	25.3	32.8
Day 85	n	0	0	11	10	10	31
	Mean (SD)	- (-)	- (-)	22.0 (13.2)	16.6 (12.3)	15.1 (9.8)	18.1 (11.9)
	GMFR (95% CI)	-	-	18.1 (11.2-29.3)	12.0 (6.3-23.1)	12.2 (7.4-20.3)	14.0 (10.5-18.6)
	Min	-	-	3.9	2.4	4.6	2.4
	Median	-	-	19.4	11.0	12.9	17.1
	Max	-	-	49.5	35.6	33.4	49.5

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

Program: Timm_FItit_1.sas (Page 3 of 12)

Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 8	n	10	11	12	12	10	55
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.0	1.0	1.0	1.0	1.0	1.0
Day 22	n	10	11	10	11	9	51
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.1 (0.4)	1.2 (0.8)	1.0 (0.0)	1.1 (0.4)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.1 (0.9-1.3)	1.1 (0.9-1.5)	1.0 (1.0-1.0)	1.0 (1.0-1.1)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.0	1.0	2.2	3.7	1.0	3.7

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 29	n	10	11	12	12	10	55
	Mean (SD)	1.6 (1.0)	5.2 (2.7)	11.4 (8.5)	8.3 (5.2)	11.1 (7.1)	7.6 (6.6)
	GMFR (95% CI)	1.4 (0.9-2.0)	4.2 (2.5-7.1)	7.8 (3.9-15.6)	6.4 (3.7-11.0)	8.4 (4.4-16.2)	4.9 (3.7-6.5)
	Min	1.0	1.0	1.0	1.0	1.0	1.0
	Median	1.0	6.2	10.9	8.7	8.9	6.4
	Max	3.8	9.3	29.6	16.3	23.1	29.6
Day 43	n	9	12	10	10	9	50
	Mean (SD)	2.1 (1.8)	2.9 (1.3)	8.1 (4.4)	6.7 (5.0)	6.1 (2.7)	5.1 (3.9)
	GMFR (95% CI)	1.7 (1.0-2.8)	2.6 (1.8-3.7)	6.9 (4.5-10.7)	4.8 (2.4-9.6)	5.5 (3.8-8.1)	3.8 (3.0-4.8)
	Min	1.0	1.0	2.3	1.0	2.7	1.0
	Median	1.0	3.3	6.9	5.6	5.9	4.1
	Max	6.4	4.6	15.7	15.6	9.3	15.7

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 50	n	9	10	10	11	10	50
	Mean (SD)	1.9 (1.4)	2.3 (1.5)	6.8 (3.7)	5.5 (3.8)	4.5 (2.6)	4.3 (3.3)
	GMFR (95% CI)	1.6 (1.0-2.6)	1.8 (1.1-3.0)	5.8 (3.8-9.1)	4.2 (2.4-7.4)	3.6 (2.1-6.2)	3.1 (2.4-3.9)
	Min	1.0	1.0	2.2	1.0	1.0	1.0
	Median	1.0	1.8	6.1	4.1	4.2	3.7
	Max	5.0	4.8	14.0	11.9	8.7	14.0
Day 85	n	0	0	11	10	10	31
	Mean (SD)	- (-)	- (-)	4.2 (2.2)	3.6 (2.6)	3.1 (2.0)	3.7 (2.2)
	GMFR (95% CI)	-	-	3.6 (2.2-5.7)	2.6 (1.4-5.0)	2.4 (1.4-4.2)	2.9 (2.1-3.8)
	Min	-	-	1.0	1.0	1.0	1.0
	Median	-	-	3.7	3.5	3.4	3.7
	Max	-	-	7.9	8.0	6.6	8.0

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 8	n	10	10	65
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
	Min	1.0	1.0	1.0
	Median	1.0	1.0	1.0
	Max	1.0	1.0	1.0
Day 22	n	11	11	62
	Mean (SD)	1.6 (1.1)	1.6 (1.1)	2.0 (3.1)
	GMFR (95% CI)	1.3 (0.9-1.9)	1.3 (0.9-1.9)	1.4 (1.2-1.7)
	Min	1.0	1.0	1.0
	Median	1.0	1.0	1.0
	Max	4.4	4.4	24.5

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 29	n	11	11	66
	Mean (SD)	26.7 (18.1)	26.7 (18.1)	23.6 (20.7)
	GMFR (95% CI)	21.7 (13.4-35.1)	21.7 (13.4-35.1)	13.9 (10.3-18.8)
	Min	4.8	4.8	1.0
	Median	21.5	21.5	17.9
	Max	68.6	68.6	95.9
Day 43	n	0	0	51
	Mean (SD)	- (-)	- (-)	12.3 (10.0)
	GMFR (95% CI)	-	-	8.4 (6.4-11.0)
	Min	-	-	1.0
	Median	-	-	9.1
	Max	-	-	36.7

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 50	n	0	0	50
	Mean (SD)	- (-)	- (-)	10.3 (8.3)
	GMFR (95% CI)	-	-	7.1 (5.4-9.3)
	Min	-	-	1.0
	Median	-	-	6.8
	Max	-	-	32.8
Day 85	n	0	0	31
	Mean (SD)	- (-)	- (-)	18.1 (11.9)
	GMFR (95% CI)	-	-	14.0 (10.5-18.6)
	Min	-	-	2.4
	Median	-	-	17.1
	Max	-	-	49.5

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 8	n	10	10	65
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.0 (0.0)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
	Min	1.0	1.0	1.0
	Median	1.0	1.0	1.0
	Max	1.0	1.0	1.0
Day 22	n	11	11	62
	Mean (SD)	1.0 (0.0)	1.0 (0.0)	1.1 (0.4)
	GMFR (95% CI)	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.1)
	Min	1.0	1.0	1.0
	Median	1.0	1.0	1.0
	Max	1.0	1.0	3.7

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 29	n	11	11	66
	Mean (SD)	6.1 (5.7)	6.1 (5.7)	7.4 (6.4)
	GMFR (95% CI)	4.3 (2.3-8.0)	4.3 (2.3-8.0)	4.8 (3.7-6.1)
	Min	1.0	1.0	1.0
	Median	5.2	5.2	6.2
	Max	20.9	20.9	29.6
Day 43	n	0	0	50
	Mean (SD)	- (-)	- (-)	5.1 (3.9)
	GMFR (95% CI)	-	-	3.8 (3.0-4.8)
	Min	-	-	1.0
	Median	-	-	4.1
	Max	-	-	15.7

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 7: Descriptive statistics of fold increase from baseline in functional antibody titers - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 50	n	0	0	50
	Mean (SD)	- (-)	- (-)	4.3 (3.3)
	GMFR (95% CI)	-	-	3.1 (2.4-3.9)
	Min	-	-	1.0
	Median	-	-	3.7
	Max	-	-	14.0
Day 85	n	0	0	31
	Mean (SD)	- (-)	- (-)	3.7 (2.2)
	GMFR (95% CI)	-	-	2.9 (2.1-3.8)
	Min	-	-	1.0
	Median	-	-	3.7
	Max	-	-	8.0

Geometric mean fold rise from baseline (GMFR) with associated 95% confidence interval (CI) are shown. SD and CIs are only calculated if values of at least 3 subjects are available.
N number of subjects in the analysis set; n number of subjects with data available; SD standard deviation; - not estimable.

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Appendix Table 8: Frequency of subjects with seroconversion - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 8	nn	10	11	12	12	10	55
	n (% (95% CI)	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-6.5))
Day 22	nn	10	11	10	11	9	51
	n (% (95% CI)	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-28.5))	2 (20.0 (2.5-55.6))	1 (9.1 (0.2-41.3))	1 (11.1 (0.3-48.2))	4 (7.8 (2.2-18.9))
Day 29	nn	10	11	12	12	10	55
	n (% (95% CI)	3 (30.0 (6.7-65.2))	11 (100.0 (71.5-100.0))	11 (91.7 (61.5-99.8))	11 (91.7 (61.5-99.8))	9 (90.0 (55.5-99.7))	45 (81.8 (69.1-90.9))
Day 43	nn	9	12	10	10	10	51
	n (% (95% CI)	5 (55.6 (21.2-86.3))	9 (75.0 (42.8-94.5))	10 (100.0 (69.2-100.0))	8 (80.0 (44.4-97.5))	10 (100.0 (69.2-100.0))	42 (82.4 (69.1-91.6))
Day 50	nn	9	10	10	11	10	50
	n (% (95% CI)	4 (44.4 (13.7-78.8))	3 (30.0 (6.7-65.2))	10 (100.0 (69.2-100.0))	9 (81.8 (48.2-97.7))	10 (100.0 (69.2-100.0))	36 (72.0 (57.5-83.8))
Day 85	nn	0	0	11	10	10	31
	n (% (95% CI)	0 (- (-))	0 (- (-))	10 (90.9 (58.7-99.8))	9 (90.0 (55.5-99.7))	10 (100.0 (69.2-100.0))	29 (93.5 (78.6-99.2))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

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Staburo GmbH. Based on clean SDTM data received on 03NOV2020. Data cut-off: 23OCT2020.

Appendix Table 8: Frequency of subjects with seroconversion - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Younger dose ranging cohorts					
Visit		1 µg (N 12)	3 µg (N 12)	10 µg (N 12)	20 µg (N 12)	30 µg (N 12)	Total (N 60)
Day 8	nn	10	11	12	12	10	55
	n (% (95% CI)	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-26.5))	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-6.5))
Day 22	nn	10	11	10	11	9	51
	n (% (95% CI)	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-33.6))	0 (0.0 (0.0-7.0))
Day 29	nn	10	11	12	12	10	55
	n (% (95% CI)	0 (0.0 (0.0-30.8))	8 (72.7 (39.0-94.0))	10 (83.3 (51.6-97.9))	8 (66.7 (34.9-90.1))	9 (90.0 (55.5-99.7))	35 (63.6 (49.6-76.2))
Day 43	nn	9	12	10	10	9	50
	n (% (95% CI)	1 (11.1 (0.3-48.2))	2 (16.7 (2.1-48.4))	9 (90.0 (55.5-99.7))	6 (60.0 (26.2-87.8))	7 (77.8 (40.0-97.2))	25 (50.0 (35.5-64.5))
Day 50	nn	9	10	10	11	10	50
	n (% (95% CI)	1 (11.1 (0.3-48.2))	1 (10.0 (0.3-44.5))	8 (80.0 (44.4-97.5))	7 (63.6 (30.8-89.1))	5 (50.0 (18.7-81.3))	22 (44.0 (30.0-58.7))
Day 85	nn	0	0	11	10	10	31
	n (% (95% CI)	0 (- (-))	0 (- (-))	5 (45.5 (16.7-76.6))	4 (40.0 (12.2-73.8))	4 (40.0 (12.2-73.8))	13 (41.9 (24.5-60.9))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

Program: Timm_sero_1.sas (Page 2 of 4)

Appendix Table 8: Frequency of subjects with seroconversion - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 50 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 8	nn	10	10	65
	n (% (95% CI)	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-5.5))
Day 22	nn	11	11	62
	n (% (95% CI)	1 (9.1 (0.2-41.3))	1 (9.1 (0.2-41.3))	5 (8.1 (2.7-17.8))
Day 29	nn	11	11	66
	n (% (95% CI)	11 (100.0 (71.5-100.0))	11 (100.0 (71.5-100.0))	56 (84.8 (73.9-92.5))
Day 43	nn	0	0	51
	n (% (95% CI)	0 (- (-))	0 (- (-))	42 (82.4 (69.1-91.6))
Day 50	nn	0	0	50
	n (% (95% CI)	0 (- (-))	0 (- (-))	36 (72.0 (57.5-83.8))
Day 85	nn	0	0	31
	n (% (95% CI)	0 (- (-))	0 (- (-))	29 (93.5 (78.6-99.2))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

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Appendix Table 8: Frequency of subjects with seroconversion - BNT162b2

Immunogenicity set

SARS-CoV-2 Serum Neutralizing Titer 90 [NA]

		Older dose ranging cohorts		
Visit		20 µg (N 12)	Total (N 12)	Total (N 72)
Day 8	nn	10	10	65
	n (% (95% CI)	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-30.8))	0 (0.0 (0.0-5.5))
Day 22	nn	11	11	62
	n (% (95% CI)	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-28.5))	0 (0.0 (0.0-5.8))
Day 29	nn	11	11	66
	n (% (95% CI)	6 (54.5 (23.4-83.3))	6 (54.5 (23.4-83.3))	41 (62.1 (49.3-73.8))
Day 43	nn	0	0	50
	n (% (95% CI)	0 (- (-))	0 (- (-))	25 (50.0 (35.5-64.5))
Day 50	nn	0	0	50
	n (% (95% CI)	0 (- (-))	0 (- (-))	22 (44.0 (30.0-58.7))
Day 85	nn	0	0	31
	n (% (95% CI)	0 (- (-))	0 (- (-))	13 (41.9 (24.5-60.9))

Seroconversion is defined as a minimum of 4-fold increase of functional antibody response as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is nn. SD and CIs are only calculated if values of at least 3 subjects are available.
N Number of subjects in the analysis set; nn number of subjects with data available; n number of subjects with seroconversion; - not estimable.

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Appendix Table 9: Descriptive statistics of S1 antibody concentrations [U/mL] for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
Day 1	n	12	12	12	12	12	60
	Mean (SD)	1.3 (1.1)	1.9 (4.5)	1.7 (1.9)	1.6 (2.8)	2.1 (4.4)	1.7 (3.1)
	GM (95% CI)	1.0 (0.7–1.6)	0.8 (0.5–1.5)	1.1 (0.6–2.0)	0.9 (0.5–1.6)	1.0 (0.5–1.8)	1.0 (0.8–1.2)
	Min	0.6	0.6	0.6	0.6	0.6	0.6
	Median	0.6	0.6	0.6	0.6	0.6	0.6
	Max	3.1	16.4	6.1	10.2	15.9	16.4
Day 8	n	12	12	12	12	12	60
	Mean (SD)	0.9 (0.7)	2.4 (6.2)	1.7 (2.7)	1.2 (1.6)	2.1 (4.0)	1.7 (3.5)
	GM (95% CI)	0.8 (0.6–1.1)	0.9 (0.4–1.6)	0.9 (0.5–1.7)	0.9 (0.6–1.4)	1.1 (0.6–1.9)	0.9 (0.7–1.1)
	Min	0.6	0.6	0.6	0.6	0.6	0.6
	Median	0.6	0.6	0.6	0.6	0.6	0.6
	Max	3.2	22.1	9.7	6.1	14.7	22.1
Day 22	n	12	11	12	11	12	58
	Mean (SD)	461.8 (846.5)	1165.6 (960.7)	1088.2 (961.1)	1652.3 (1607.9)	849.2 (642.4)	1030.8 (1079.6)
	GM (95% CI)	160.7 (62.8–411.2)	654.4 (252.8–1693.8)	705.5 (347.6–1431.9)	1104.4 (575.0–2121.5)	369.5 (86.9–1571.2)	487.7 (318.4–747.1)
	Min	17.9	25.9	48.5	176.7	0.6	0.6
	Median	166.8	1156.2	740.0	1051.7	741.4	720.0
	Max	2964.6	2885.3	3181.1	5393.3	2295.4	5393.3
Day 29	n	12	11	12	11	12	58
	Mean (SD)	2936.1 (3206.6)	13478.0 (10575.6)	20258.0 (20461.0)	33818.1 (29482.2)	916.0 (653.9)	13958.3 (20021.8)
	GM (95% CI)	1673.2 (776.4–3605.5)	9548.4 (5033.6–18112.5)	7052.8 (1026.7–48447.2)	24732.3 (14219.2–43018.4)	704.6 (421.1–1179.0)	4369.2 (2565.0–7442.3)
	Min	261.6	1569.0	0.6	6367.9	127.7	0.6
	Median	2634.4	13131.4	17012.3	18841.6	733.1	6102.2

Appendix Table 9: Descriptive statistics of S1 antibody concentrations [U/mL] for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
	Max	11917.8	35953.6	78690.8	103292.1	2197.6	103292.1
Day 43	n	12	9	11	9	12	53
	Mean (SD)	6897.7 (6925.3)	7434.9 (6882.9)	15587.6 (10724.2)	19335.4 (19771.1)	644.4 (300.7)	9488.7 (12028.6)
	GM (95% CI)	3814.6 (1692.0–8599.7)	5239.6 (2569.3–10685.0)	12343.0 (7393.7–20605.4)	5182.5 (435.1–61726.0)	579.0 (423.2–792.1)	3531.1 (2127.4–5861.0)
	Min	404.1	919.7	2856.5	1.4	254.3	1.4
	Median	4994.4	4737.5	13236.6	7514.9	582.6	4892.0
	Max	20198.8	23996.3	40796.4	60552.1	1110.0	60552.1

Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) concentrations with associated 95% confidence interval (CI) are shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution).
N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.

Appendix Table 10: Descriptive statistics of fold increase from baseline in S1 antibody concentrations for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
Day 8	n	12	12	12	12	12	60
	Mean (SD)	0.9 (0.5)	1.0 (0.1)	1.0 (0.6)	1.0 (0.5)	1.1 (0.4)	1.0 (0.4)
	GM (95% CI)	0.7 (0.5–1.2)	1.0 (1.0–1.1)	0.8 (0.5–1.4)	1.0 (0.8–1.2)	1.1 (0.9–1.3)	0.9 (0.8–1.1)
	Min	0.2	1.0	0.1	0.5	0.9	0.1
	Median	1.0	1.0	1.0	1.0	1.0	1.0
	Max	2.1	1.3	2.6	2.5	2.3	2.6
Day 22	n	12	11	12	11	12	58
	Mean (SD)	361.7 (532.0)	1837.0 (1521.8)	1284.3 (1496.8)	2421.2 (2677.6)	1151.3 (1128.7)	1386.3 (1696.3)
	GM (95% CI)	156.0 (61.6–394.7)	768.9 (169.5–3488.0)	624.9 (255.0–1531.4)	1194.5 (457.8–3116.7)	381.0 (85.5–1698.9)	497.9 (302.2–820.2)
	Min	7.4	1.6	68.9	102.8	1.0	1.0
	Median	184.5	1825.9	689.5	1276.4	876.6	694.9
	Max	1830.4	4556.3	5023.5	8516.8	3624.7	8516.8
Day 29	n	12	11	12	11	12	58
	Mean (SD)	3530.6 (5202.1)	21067.3 (16981.8)	26159.4 (34393.3)	44462.6 (48425.1)	1232.8 (1164.4)	18825.9 (30810.7)
	GM (95% CI)	1623.8 (690.1–3820.5)	11219.1 (3474.6–36225.9)	6247.2 (888.0–43947.7)	26750.2 (12882.0–55548.2)	726.6 (337.3–1565.1)	4459.8 (2490.8–7985.3)
	Min	125.5	95.9	1.0	5302.1	59.3	1.0
	Median	1627.1	20736.6	20874.3	27370.9	719.8	5754.7
	Max	18820.1	56776.4	124265.1	163114.3	3470.4	163114.3
Day 43	n	12	9	11	9	12	53
	Mean (SD)	8262.2 (11290.0)	11585.8 (11042.9)	18846.4 (18514.9)	29546.6 (32015.8)	843.4 (594.5)	12957.9 (19069.9)
	GM (95% CI)	3702.0 (1486.4–9220.0)	5764.9 (1383.0–24030.9)	10373.4 (4183.4–25722.4)	7020.0 (583.6–84446.9)	597.0 (310.5–1148.0)	3645.4 (2065.1–6435.0)
	Min	166.6	56.2	745.6	2.2	48.7	2.2

Appendix Table 10: Descriptive statistics of fold increase from baseline in S1 antibody concentrations for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
	Median	3336.0	7481.3	17129.2	9972.3	597.6	4747.6
	Max	31897.1	37893.9	64423.9	95621.2	1752.9	95621.2

Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) fold increase from baseline with associated 95% confidence interval (CI) is shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution).
N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.

Appendix Table 11: Frequency of subjects with seroconversion (S1 antibody response) for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
Day 8	n	12	12	12	12	12	60
	sc (% (95% CI)	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–6.0))
Day 22	n	12	11	12	11	12	58
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	10 (90.9 (58.7–99.8))	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	11 (91.7 (61.5–99.8))	56 (96.6 (88.1–99.6))
Day 29	n	12	11	12	11	12	58
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	11 (91.7 (61.5–99.8))	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	57 (98.3 (90.8–100.0))
Day 43	n	12	9	11	9	12	53
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	9 (100.0 (66.4–100.0))	11 (100.0 (71.5–100.0))	8 (88.9 (51.8–99.7))	12 (100.0 (73.5–100.0))	52 (98.1 (89.9–100.0))

Seroconversion is defined as a minimum of 4-fold increase of antibody reponse as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is n.

N = Number of subjects in the analysis set; n = number of subjects with data available; sc = number of subjects with seroconversion; - = not estimable.

Appendix Table 12: Descriptive statistics of RBD antibody concentrations [U/mL] for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
Day 1	n	12	12	11	12	12	59
	Mean (SD)	5.6 (8.0)	3.2 (7.8)	3.5 (3.7)	3.8 (8.7)	2.7 (5.5)	3.7 (6.9)
	GM (95% CI)	3.1 (1.6–6.2)	1.1 (0.5–2.3)	2.1 (1.0–4.3)	1.3 (0.6–2.8)	1.1 (0.5–2.2)	1.6 (1.2–2.1)
	Min	0.6	0.6	0.6	0.6	0.6	0.6
	Median	3.4	0.6	1.8	0.6	0.6	1.4
	Max	30.1	28.0	11.5	31.2	19.9	31.2
Day 8	n	12	12	12	12	12	60
	Mean (SD)	5.0 (8.1)	2.6 (5.3)	3.5 (3.7)	3.4 (6.9)	3.0 (6.2)	3.5 (6.0)
	GM (95% CI)	2.6 (1.3–5.2)	1.1 (0.6–2.3)	2.0 (1.0–4.1)	1.3 (0.6–2.9)	1.2 (0.6–2.5)	1.6 (1.2–2.1)
	Min	0.6	0.6	0.6	0.6	0.6	0.6
	Median	2.3	0.6	2.1	0.6	0.6	1.5
	Max	29.7	19.2	11.0	24.7	22.2	29.7
Day 22	n	12	11	12	11	11	57
	Mean (SD)	732.8 (1320.2)	1745.7 (1363.3)	1799.6 (1311.5)	2119.9 (1292.4)	1312.8 (1003.7)	1532.5 (1314.8)
	GM (95% CI)	265.2 (104.0–676.3)	915.0 (299.9–2792.1)	1273.3 (655.0–2475.3)	1645.9 (923.7–2932.6)	909.2 (438.1–1886.7)	845.4 (587.0–1217.6)
	Min	21.8	13.2	83.9	253.6	62.3	13.2
	Median	278.2	2054.8	1332.1	2358.8	1118.8	1118.8
	Max	4647.7	3873.1	4337.3	4680.5	3495.5	4680.5
Day 29	n	12	11	12	11	12	58
	Mean (SD)	3491.5 (3745.7)	11705.3 (7828.9)	22163.2 (17915.0)	33728.9 (26287.1)	1449.9 (1088.2)	14224.7 (18530.3)
	GM (95% CI)	2015.3 (948.1–4283.6)	9106.6 (5290.1–15676.5)	17051.0 (10534.0–27599.8)	25006.2 (14227.5–43950.5)	1057.9 (589.5–1898.5)	5887.9 (3943.1–8792.0)
	Min	293.4	1962.3	4372.4	5808.8	143.1	143.1

Appendix Table 12: Descriptive statistics of RBD antibody concentrations [U/mL] for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
	Median	2770.2	10989.4	16880.8	18813.2	1289.4	7077.7
	Max	13839.1	28473.1	66226.3	85734.8	3960.3	85734.8
Day 43	n	12	11	12	11	12	58
	Mean (SD)	6244.5 (5487.5)	10188.1 (9683.9)	15429.0 (11111.8)	25632.3 (21577.2)	874.1 (466.7)	11458.5 (14125.2)
	GM (95% CI)	3919.9 (1915.3–8022.6)	6706.5 (3382.8–13295.8)	12430.9 (7900.4–19559.3)	18289.0 (10029.5–33350.4)	754.8 (520.6–1094.3)	5248.6 (3615.3–7619.9)
	Min	453.9	1059.7	2743.4	4346.4	309.7	309.7
	Median	5281.7	6327.2	14017.0	15623.2	826.5	7027.5
	Max	17772.7	29412.4	45968.7	76314.9	1615.0	76314.9

Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) concentrations with associated 95% confidence interval (CI) are shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution).
N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.

Appendix Table 13: Descriptive statistics of fold increase from baseline in RBD antibody concentrations for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
Day 8	n	12	12	11	12	12	59
	Mean (SD)	1.1 (0.8)	1.2 (0.9)	1.0 (0.5)	1.7 (2.3)	1.1 (0.5)	1.2 (1.2)
	GM (95% CI)	0.8 (0.5–1.3)	1.0 (0.8–1.4)	0.8 (0.5–1.5)	1.0 (0.6–1.9)	1.1 (0.9–1.3)	1.0 (0.8–1.1)
	Min	0.2	0.7	0.1	0.2	0.7	0.1
	Median	0.9	1.0	1.0	1.0	1.0	1.0
	Max	2.7	4.0	1.7	8.6	2.7	8.6
Day 22	n	12	11	11	11	11	56
	Mean (SD)	160.0 (177.8)	2628.6 (2395.1)	1039.5 (1046.8)	2156.0 (1975.0)	1826.3 (1982.1)	1537.0 (1862.0)
	GM (95% CI)	85.0 (35.2–205.2)	1120.5 (293.9–4271.7)	570.5 (251.5–1293.8)	1197.7 (483.7–2965.3)	780.5 (252.5–2412.5)	532.9 (329.4–862.1)
	Min	3.2	6.6	106.3	84.5	35.9	3.2
	Median	103.7	1371.3	404.0	1345.0	1298.0	618.9
	Max	546.0	6732.9	2912.4	5589.6	6076.4	6732.9
Day 29	n	12	11	11	11	12	57
	Mean (SD)	1203.6 (1255.8)	18890.9 (15122.1)	13256.5 (12746.3)	29987.2 (30484.0)	1955.9 (2129.6)	12656.1 (18876.9)
	GM (95% CI)	645.6 (284.5–1465.0)	11151.6 (4631.3–26851.9)	7405.2 (3191.2–17184.0)	18196.7 (8386.0–39484.5)	963.2 (398.9–2325.4)	3712.3 (2275.7–6055.8)
	Min	79.2	976.3	796.3	2038.7	95.2	79.2
	Median	839.6	19103.7	7600.8	24636.4	1115.8	3870.0
	Max	4220.5	49496.9	33806.2	106937.1	6884.5	106937.1
Day 43	n	12	11	11	11	12	57
	Mean (SD)	2477.3 (2703.1)	16391.2 (17795.3)	10052.0 (9609.8)	24004.1 (24137.9)	1110.3 (960.3)	10490.7 (15939.3)
	GM (95% CI)	1255.8 (524.9–3004.5)	8212.6 (3174.3–21247.7)	5777.3 (2558.7–13044.5)	13308.6 (5579.5–31745.0)	687.2 (326.3–1447.2)	3364.7 (2142.6–5283.8)

Appendix Table 13: Descriptive statistics of fold increase from baseline in RBD antibody concentrations for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
	Min	66.1	527.2	662.5	1159.2	64.5	64.5
	Median	1073.0	10863.2	4769.0	21929.6	695.6	2842.1
	Max	8419.2	51129.7	24465.2	74384.0	2807.5	74384.0

Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) fold increase from baseline with associated 95% confidence interval (CI) is shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution).
N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.

Appendix Table 14: Frequency of subjects with seroconversion (RBD antibody response) for BNT162b1

		1 µg younger adults N=12	10 µg younger adults N=12	30 µg younger adults N=12	50 µg younger adults N=12	60 µg younger adults N=12	Total N=60
Day 8	n	12	12	11	12	12	59
	sc (% (95% CI)	0 (0.0 (0.0–26.5))	1 (8.3 (0.2–38.5))	0 (0.0 (0.0–28.5))	1 (8.3 (0.2–38.5))	0 (0.0 (0.0–26.5))	2 (3.4 (0.4–11.7))
Day 22	n	12	11	11	11	11	56
	sc (% (95% CI)	11 (91.7 (61.5–99.8))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	55 (98.2 (90.4–100.0))
Day 29	n	12	11	11	11	12	57
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	57 (100.0 (93.7–100.0))
Day 43	n	12	11	11	11	12	57
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	57 (100.0 (93.7–100.0))

Seroconversion is defined as a minimum of 4-fold increase of antibody reponse as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is n.
N = Number of subjects in the analysis set; n = number of subjects with data available; sc = number of subjects with seroconversion; - = not estimable.

Appendix Table 15: Descriptive statistics of S1 antibody concentrations [U/mL] for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Day 1	n	12	12	12	12	12	12	72
	Mean (SD)	1.8 (3.1)	0.6 (0.0)	19.9 (65.7)	0.9 (0.7)	1.1 (1.1)	0.9 (1.1)	4.2 (26.9)
	GM (95% CI)	1.0 (0.5–1.7)	0.6 (.–.)	1.2 (0.4–3.6)	0.8 (0.6–1.1)	0.9 (0.6–1.3)	0.7 (0.5–1.1)	0.8 (0.7–1.0)
	Min	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Median	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Max	11.6	0.6	228.6	3.0	4.3	4.4	228.6
Day 8	n	12	12	12	12	12	11	71
	Mean (SD)	1.4 (1.8)	0.6 (0.0)	1.4 (2.2)	0.9 (0.6)	1.3 (1.1)	1.0 (1.3)	1.1 (1.4)
	GM (95% CI)	0.9 (0.6–1.5)	0.6 (.–.)	0.9 (0.5–1.4)	0.8 (0.6–1.0)	1.0 (0.6–1.6)	0.8 (0.5–1.1)	0.8 (0.7–0.9)
	Min	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Median	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Max	6.8	0.6	8.3	2.5	4.2	4.8	8.3
Day 22	n	12	12	11	12	12	12	71
	Mean (SD)	90.6 (89.8)	213.4 (167.6)	1263.6 (571.4)	714.6 (688.0)	1315.3 (1436.5)	530.8 (607.5)	680.0 (855.9)
	GM (95% CI)	49.5 (21.8–112.2)	150.9 (82.2–277.0)	1161.4 (870.0–1550.3)	413.7 (191.9–891.8)	912.9 (524.1–1590.2)	301.4 (150.4–604.0)	309.8 (219.5–437.4)
	Min	6.1	24.1	534.5	49.8	170.9	87.2	6.1
	Median	53.9	198.8	1087.7	480.6	1098.2	241.2	341.4
	Max	269.0	601.6	2693.8	2232.9	5636.0	1964.1	5636.0
Day 29	n	12	12	12	12	12	12	72
	Mean (SD)	1759.8 (2034.7)	5069.7 (4502.0)	11172.7 (8201.7)	11056.0 (9740.5)	10662.8 (7837.8)	6596.9 (5399.4)	7719.7 (7463.3)
	GM (95% CI)	690.5 (229.9–2073.9)	3889.9 (2434.9–6214.6)	7564.2 (3670.2–15589.4)	6752.4 (3228.5–14122.8)	8278.8 (4921.2–13927.3)	5152.8 (3285.8–8080.7)	4245.1 (3077.7–5855.4)
	Min	25.2	1226.2	499.4	974.3	1093.5	1915.3	25.2

Appendix Table 15: Descriptive statistics of S1 antibody concentrations [U/mL] for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
	Median	989.6	3643.4	10521.2	11149.1	9125.4	5311.6	5471.1
	Max	6664.7	17854.0	27273.2	32720.8	31487.6	19539.0	32720.8
Day 43	n	11	12	11	12	11		57
	Mean (SD)	2526.9 (2625.5)	3904.9 (2360.7)	10000.8 (6894.6)	7339.7 (5742.8)	7297.3 (3866.0)		6193.1 (5205.1)
	GM (95% CI)	1565.3 (745.1–3288.3)	3269.8 (2170.1–4926.9)	8427.2 (5690.8–12479.5)	5398.1 (3125.4–9323.6)	6466.1 (4535.1–9219.2)		4316.3 (3353.3–5555.8)
	Min	166.1	1017.3	3896.3	1230.8	2082.0		166.1
	Median	1418.4	3099.1	6491.5	6196.3	5849.4		5026.9
	Max	9322.8	8916.0	26657.5	19176.7	16849.3		26657.5
Day 50	n	11	10	12	12	12		57
	Mean (SD)	2297.4 (2562.9)	2905.4 (1749.6)	7136.9 (4967.1)	5341.5 (4647.5)	6475.0 (4696.2)		4943.3 (4332.5)
	GM (95% CI)	1384.1 (659.4–2905.3)	2505.3 (1667.8–3763.3)	5703.4 (3565.4–9123.6)	3894.0 (2251.0–6736.3)	5549.7 (3938.1–7820.6)		3446.6 (2691.6–4413.2)
	Min	157.6	1027.7	1083.3	612.0	2035.0		157.6
	Median	1237.4	2443.4	5386.2	3929.1	5919.2		4038.5
	Max	8900.0	6602.8	18992.3	16636.0	20642.0		20642.0
Day 85	n			11	10	12		33
	Mean (SD)			3321.7 (1536.6)	2522.8 (1850.9)	3419.7 (3666.6)		3115.2 (2545.9)
	GM (95% CI)			2991.2 (2144.7–4171.7)	1905.0 (1054.4–3441.8)	2542.6 (1590.0–4065.8)		2459.3 (1918.4–3152.5)
	Min			1331.8	571.8	621.9		571.8
	Median			2963.0	2044.5	2318.2		2712.2
	Max			6142.6	5835.8	14670.3		14670.3

Appendix Table 15: Descriptive statistics of S1 antibody concentrations [U/mL] for BNT162b2

	1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) concentrations with associated 95% confidence interval (CI) are shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution). N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.							

Appendix Table 16: Descriptive statistics of fold increase from baseline in S1 antibody concentrations for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Day 8	n	12	12	12	12	12	11	71
	Mean (SD)	1.0 (0.3)	1.0 (0.0)	1.9 (3.5)	1.2 (0.9)	1.2 (0.6)	1.0 (0.0)	1.2 (1.5)
	GM (95% CI)	0.9 (0.8–1.1)	1.0 (.–.)	0.7 (0.2–2.4)	1.0 (0.7–1.4)	1.1 (0.9–1.4)	1.0 (1.0–1.0)	1.0 (0.8–1.2)
	Min	0.5	1.0	0.0	0.4	1.0	1.0	0.0
	Median	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Max	1.7	1.0	13.1	4.0	2.9	1.1	13.1
Day 22	n	12	12	11	12	12	12	71
	Mean (SD)	110.7 (142.1)	337.0 (264.7)	1839.7 (1084.5)	941.7 (797.7)	1884.4 (2356.3)	697.2 (898.8)	956.2 (1323.6)
	GM (95% CI)	51.0 (21.6–120.4)	238.3 (129.9–437.5)	1073.7 (310.3–3715.7)	530.3 (215.3–1306.0)	1051.9 (484.6–2283.3)	405.3 (214.2–766.7)	373.2 (252.5–551.5)
	Min	9.2	38.1	4.8	16.8	92.1	137.7	4.8
	Median	57.6	313.9	1713.2	758.9	1213.5	300.6	426.6
	Max	424.8	949.9	4253.9	2554.9	8900.1	3101.7	8900.1
Day 29	n	12	12	12	12	12	12	72
	Mean (SD)	2108.5 (3191.3)	8005.9 (7109.4)	16097.0 (14104.4)	16490.7 (15922.4)	15004.4 (13279.7)	9738.9 (8918.9)	11240.9 (12101.1)
	GM (95% CI)	711.1 (246.4–2052.6)	6142.8 (3845.0–9813.8)	6360.7 (1677.0–24125.5)	8655.0 (3587.5–20880.5)	9539.7 (4466.1–20376.9)	6928.0 (3986.4–12040.3)	5014.2 (3424.6–7341.6)
	Min	39.7	1936.3	46.1	580.8	589.5	1382.4	39.7
	Median	693.6	5753.5	15249.6	13340.3	10916.8	6649.5	7126.9
	Max	10524.6	28194.3	43068.7	51671.3	49723.9	30855.1	51671.3
Day 43	n	11	12	11	12	11		57
	Mean (SD)	3475.1 (4397.2)	6166.5 (3728.0)	14416.1 (11883.9)	10856.1 (9439.9)	10109.9 (7225.4)		8987.4 (8525.7)
	GM (95% CI)	1550.6 (576.2–4172.4)	5163.6 (3426.9–7780.3)	7791.3 (2283.0–26589.8)	6919.1 (3306.9–14476.9)	7240.4 (3690.8–14203.8)		5031.5 (3501.0–7230.9)

Appendix Table 16: Descriptive statistics of fold increase from baseline in S1 antibody concentrations for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
	Min	122.7	1606.4	42.1	416.1	1122.4		42.1
	Median	1767.0	4894.0	10028.7	7196.3	8984.2		7446.7
	Max	14722.1	14079.7	42096.4	30283.0	26607.6		42096.4
Day 50	n	11	10	12	12	12		57
	Mean (SD)	3197.8 (4269.6)	4588.1 (2762.9)	10435.5 (8615.7)	7905.3 (7540.3)	9191.0 (8172.0)		7218.2 (7135.3)
	GM (95% CI)	1371.1 (506.8–3709.6)	3956.2 (2633.8–5942.8)	4796.0 (1331.2–17278.4)	4991.2 (2323.8–10720.3)	6394.9 (3406.4–12005.2)		3901.4 (2678.3–5683.2)
	Min	107.0	1622.8	24.0	206.9	943.8		24.0
	Median	1266.0	3858.5	8346.9	4685.6	8668.3		4843.9
	Max	14054.4	10426.8	29991.7	26270.8	32596.9		32596.9
Day 85	n			11	10	12		33
	Mean (SD)			4821.2 (2897.5)	3552.9 (2997.6)	4846.5 (6024.1)		4446.1 (4240.7)
	GM (95% CI)			2765.4 (800.0–9560.0)	2342.0 (1064.4–5152.9)	2929.8 (1453.8–5904.3)		2685.4 (1661.3–4340.8)
	Min			13.0	218.7	335.2		13.0
	Median			4294.0	2170.6	3322.5		3803.9
	Max			9700.1	9215.6	23166.7		23166.7

Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) fold increase from baseline with associated 95% confidence interval (CI) is shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution).
N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.

Appendix Table 17: Frequency of subjects with seroconversion (S1 antibody response) for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Day 8	n	12	12	12	12	12	11	71
	sc (% (95% CI)	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	1 (8.3 (0.2–38.5))	1 (8.3 (0.2–38.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–28.5))	2 (2.8 (0.3–9.8))
Day 22	n	12	12	11	12	12	12	71
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	71 (100.0 (94.9–100.0))
Day 29	n	12	12	12	12	12	12	72
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	72 (100.0 (95.0–100.0))
Day 43	n	11	12	11	12	11		57
	sc (% (95% CI)	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))		57 (100.0 (93.7–100.0))
Day 50	n	11	10	12	12	12		57
	sc (% (95% CI)	11 (100.0 (71.5–100.0))	10 (100.0 (69.2–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))		57 (100.0 (93.7–100.0))
Day 85	n			11	10	12		33
	sc (% (95% CI)			11 (100.0 (71.5–100.0))	10 (100.0 (69.2–100.0))	12 (100.0 (73.5–100.0))		33 (100.0 (89.4–100.0))

Seroconversion is defined as a minimum of 4-fold increase of antibody reponse as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is n.
N = Number of subjects in the analysis set; n = number of subjects with data available; sc = number of subjects with seroconversion; - = not estimable.

Appendix Table 18: Descriptive statistics of RBD antibody concentrations [U/mL] for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Day 1	n	12	12	12	12	12	12	72
	Mean (SD)	1.3 (1.0)	1.3 (2.0)	17.4 (55.5)	2.0 (2.6)	3.4 (5.4)	0.6 (0.0)	4.3 (22.8)
	GM (95% CI)	1.0 (0.7–1.6)	0.9 (0.5–1.4)	1.9 (0.7–5.0)	1.2 (0.7–2.2)	1.6 (0.7–3.4)	0.6 (.–.)	1.1 (0.9–1.4)
	Min	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Median	0.9	0.6	1.3	1.2	1.0	0.6	0.6
	Max	3.4	7.4	193.7	9.1	19.7	0.6	193.7
Day 8	n	12	12	12	12	12	11	71
	Mean (SD)	1.4 (1.1)	1.4 (1.9)	1.8 (2.0)	1.5 (1.7)	3.3 (4.2)	0.6 (0.0)	1.7 (2.3)
	GM (95% CI)	1.0 (0.6–1.7)	0.9 (0.5–1.5)	1.3 (0.7–2.2)	1.1 (0.7–1.8)	1.7 (0.8–3.6)	0.6 (.–.)	1.1 (0.9–1.3)
	Min	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Median	0.6	0.6	1.3	1.2	1.4	0.6	0.6
	Max	3.6	6.6	7.7	6.8	14.6	0.6	14.6
Day 22	n	12	12	11	12	12	12	71
	Mean (SD)	68.2 (69.5)	143.1 (146.8)	852.6 (381.4)	529.0 (592.0)	781.8 (854.1)	284.7 (423.6)	437.5 (560.3)
	GM (95% CI)	33.8 (14.0–81.1)	87.0 (43.5–173.9)	772.3 (558.1–1068.7)	283.2 (125.1–640.9)	540.5 (314.6–928.9)	151.6 (75.8–303.1)	189.8 (133.3–270.3)
	Min	5.1	15.2	286.3	31.0	146.6	31.6	5.1
	Median	38.7	80.0	729.0	329.9	484.8	124.9	199.1
	Max	198.8	509.8	1494.0	2067.0	3289.1	1549.1	3289.1
Day 29	n	12	12	12	12	12	12	72
	Mean (SD)	1440.8 (1794.2)	4468.1 (3923.6)	9155.9 (7555.9)	7898.4 (7425.2)	8038.6 (5322.6)	4960.7 (4135.8)	5993.8 (5864.9)
	GM (95% CI)	530.7 (173.4–1624.6)	3466.6 (2187.3–5493.9)	5785.0 (2695.8–12414.0)	4715.6 (2237.5–9938.2)	6298.6 (3681.9–10775.2)	3778.8 (2338.2–6107.1)	3257.4 (2353.9–4507.6)
	Min	18.0	907.0	401.4	815.7	678.6	1211.6	18.0

Appendix Table 18: Descriptive statistics of RBD antibody concentrations [U/mL] for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
	Median	645.9	3362.1	7381.9	6445.6	7026.4	3756.5	4430.0
	Max	6061.2	15932.7	24332.1	25445.6	20973.9	13720.3	25445.6
Day 43	n	11	12	11	12	11		57
	Mean (SD)	2176.3 (2523.9)	3127.0 (1780.5)	8798.7 (6373.1)	6013.2 (4636.1)	5407.1 (2420.3)		5085.7 (4436.1)
	GM (95% CI)	1219.5 (544.1–2733.6)	2671.1 (1814.2–3932.8)	7107.8 (4526.3–11161.8)	4551.3 (2739.8–7560.7)	4946.7 (3640.2–6722.2)		3494.5 (2700.1–4522.5)
	Min	122.0	828.7	2954.7	1404.2	1758.0		122.0
	Median	1181.2	2669.0	6902.8	5305.8	5392.5		4169.1
	Max	8548.6	6884.3	21775.6	15706.7	11510.5		21775.6
Day 50	n	11	10	12	12	12		57
	Mean (SD)	1853.8 (2320.5)	2186.4 (1144.6)	5896.8 (4266.1)	4184.2 (3132.9)	5262.4 (3401.2)		3971.5 (3399.8)
	GM (95% CI)	1039.9 (479.1–2257.2)	1957.8 (1382.2–2773.1)	4740.7 (3034.9–7405.3)	3207.5 (1908.8–5389.8)	4557.1 (3223.0–6443.3)		2766.8 (2153.6–3554.6)
	Min	127.0	978.2	1145.8	582.2	1570.5		127.0
	Median	834.2	1859.2	4645.6	4342.1	5060.0		3168.3
	Max	8259.5	4546.1	15880.3	12494.8	15128.9		15880.3
Day 85	n			11	10	12		33
	Mean (SD)			2510.0 (1453.0)	1958.5 (1535.6)	2248.6 (1818.6)		2247.8 (1584.2)
	GM (95% CI)			2172.9 (1486.4–3176.4)	1397.9 (726.5–2689.7)	1849.5 (1248.9–2739.1)		1792.8 (1395.6–2303.1)
	Min			895.2	406.6	541.8		406.6
	Median			2053.4	1707.0	1711.9		2014.3
	Max			5825.1	4652.1	7691.7		7691.7

Appendix Table 18: Descriptive statistics of RBD antibody concentrations [U/mL] for BNT162b2

	1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) concentrations with associated 95% confidence interval (CI) are shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution). N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.							

Appendix Table 19: Descriptive statistics of fold increase from baseline in RBD antibody concentrations for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Day 8	n	12	12	12	12	12	11	71
	Mean (SD)	1.2 (0.8)	1.1 (0.4)	1.9 (3.7)	1.0 (0.4)	1.2 (0.6)	1.0 (0.0)	1.2 (1.6)
	GM (95% CI)	1.0 (0.7–1.4)	1.0 (0.9–1.2)	0.7 (0.2–2.3)	0.9 (0.7–1.2)	1.1 (0.9–1.4)	1.0 (.–.)	0.9 (0.8–1.2)
	Min	0.4	0.7	0.0	0.4	0.7	1.0	0.0
	Median	1.0	1.0	1.1	1.0	1.0	1.0	1.0
	Max	3.5	2.2	13.4	2.0	2.5	1.0	13.4
Day 22	n	12	12	11	12	12	12	71
	Mean (SD)	63.7 (92.2)	184.5 (250.4)	755.1 (740.3)	504.6 (609.9)	998.7 (1601.7)	494.9 (736.3)	496.6 (859.6)
	GM (95% CI)	32.1 (14.3–72.1)	101.2 (51.2–200.0)	373.3 (113.0–1232.8)	232.0 (86.2–624.1)	343.1 (120.1–980.0)	263.6 (131.9–526.9)	169.7 (115.5–249.2)
	Min	4.1	26.4	3.1	5.8	24.0	55.0	3.1
	Median	47.7	86.5	501.3	286.6	416.6	217.2	182.0
	Max	345.7	886.3	2461.5	2023.9	5717.7	2692.8	5717.7
Day 29	n	12	12	12	12	12	12	72
	Mean (SD)	1105.4 (1441.2)	5276.3 (3248.5)	7361.0 (6694.4)	8638.8 (9017.0)	9556.9 (11163.6)	8623.5 (7189.5)	6760.3 (7560.2)
	GM (95% CI)	505.5 (203.5–1255.6)	4033.5 (2280.2–7135.0)	3110.9 (901.6–10733.5)	3862.9 (1441.2–10353.8)	3997.6 (1400.1–11413.8)	6569.0 (4064.6–10616.5)	2938.2 (2012.3–4290.0)
	Min	31.2	454.3	29.7	215.4	229.3	2106.3	29.7
	Median	488.9	4745.9	5643.3	5302.4	6834.8	6530.2	4015.2
	Max	5072.1	10448.1	18405.5	27603.8	36460.5	23851.0	36460.5
Day 43	n	11	12	11	12	11		57
	Mean (SD)	2636.4 (4245.0)	3919.8 (2476.9)	6598.9 (5760.3)	6646.7 (6564.0)	5761.5 (6100.7)		5118.6 (5290.4)
	GM (95% CI)	1099.7 (418.4–2890.7)	3108.0 (1857.1–5201.4)	3435.6 (1102.4–10706.8)	3728.3 (1637.5–8488.5)	2864.8 (1106.5–7417.2)		2652.2 (1840.9–3821.2)

Appendix Table 19: Descriptive statistics of fold increase from baseline in RBD antibody concentrations for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
	Min	75.8	418.3	39.0	294.7	218.0		39.0
	Median	1203.8	3673.7	4878.3	4373.3	3925.7		3544.0
	Max	14860.6	9613.8	16949.9	23171.8	20009.6		23171.8
Day 50	n	11	10	12	12	12		57
	Mean (SD)	2313.7 (4095.8)	2437.1 (987.5)	4457.5 (3605.5)	4693.4 (3914.5)	6227.5 (7343.2)		4111.6 (4636.9)
	GM (95% CI)	937.7 (366.9–2396.6)	2102.2 (1267.5–3486.6)	2549.4 (938.4–6925.5)	2627.5 (1080.6–6388.5)	2892.3 (1121.1–7461.5)		2099.9 (1456.1–3028.5)
	Min	78.9	320.7	29.5	108.2	161.0		29.5
	Median	963.9	2519.2	3451.7	2959.3	4270.7		2605.1
	Max	14358.0	3739.9	12012.3	10784.4	26299.7		26299.7
Day 85	n			11	10	12		33
	Mean (SD)			2096.6 (1951.7)	2298.3 (2616.7)	2609.8 (3617.2)		2344.3 (2768.0)
	GM (95% CI)			1050.3 (326.7–3376.6)	1062.0 (371.7–3034.2)	1173.8 (462.8–2977.2)		1097.3 (641.6–1876.7)
	Min			10.6	82.0	81.9		10.6
	Median			1423.5	904.3	1829.3		1423.5
	Max			6440.8	8087.2	13371.1		13371.1

Assay results <LLOQ are set to 0.5*LLOQ. Geometric mean (GM) fold increase from baseline with associated 95% confidence interval (CI) is shown. GM concentrations and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titers and the corresponding CIs (based on the t-distribution).
N = number of subjects in the analysis set; n = number of subjects with data available; SD = standard deviation; - = not estimable.

Appendix Table 20: Frequency of subjects with seroconversion (RBD antibody response) for BNT162b2

		1 µg younger adults N=12	3 µg younger adults N=12	10 µg younger adults N=12	20 µg younger adults N=12	30 µg younger adults N=12	20 µg older adults N=12	Total N=72
Day 8	n	12	12	12	12	12	11	71
	sc (% (95% CI)	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	1 (8.3 (0.2–38.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–26.5))	0 (0.0 (0.0–28.5))	1 (1.4 (0.0–7.6))
Day 22	n	12	12	11	12	12	12	71
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	10 (90.9 (58.7–99.8))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	70 (98.6 (92.4–100.0))
Day 29	n	12	12	12	12	12	12	72
	sc (% (95% CI)	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	72 (100.0 (95.0–100.0))
Day 43	n	11	12	11	12	11		57
	sc (% (95% CI)	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))	12 (100.0 (73.5–100.0))	11 (100.0 (71.5–100.0))		57 (100.0 (93.7–100.0))
Day 50	n	11	10	12	12	12		57
	sc (% (95% CI)	11 (100.0 (71.5–100.0))	10 (100.0 (69.2–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))	12 (100.0 (73.5–100.0))		57 (100.0 (93.7–100.0))
Day 85	n			11	10	12		33
	sc (% (95% CI)			11 (100.0 (71.5–100.0))	10 (100.0 (69.2–100.0))	12 (100.0 (73.5–100.0))		33 (100.0 (89.4–100.0))

Seroconversion is defined as a minimum of 4-fold increase of antibody reponse as compared to baseline. Number and percentage with exact 95% Clopper-Pearson confidence intervals (CIs) of subjects with data available are given. The denominator for the percentage calculation is n.
N = Number of subjects in the analysis set; n = number of subjects with data available; sc = number of subjects with seroconversion; - = not estimable.

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T Cell Immune Monitoring (TCIM) of Study Participants in the BNT162-01 Clinical Trial

GC(L)P Analytical Study Interim Report

No: GA-RB-022-01A
Version 03

19 MAR 2021

1 Preparation, review and approval

Responsibility	*Name*	*Approval signatures*	*Date*
Study director:	*Dirk Becker*	D. R	19MAR2021
Reviewer, additional study director:	*Dr. Ann-Kathrin Eller*	A. E	22.03.2021
IBC (Immune biomarker coordinator):	*Dr. Evelyna Derhovanessian*		22MAR2021
QA manager:	*Dr. Rebecca Meyer*	R. Mey	22.03.2021
Test facility manager:	*Ulrich Luxemburger*	U. Lux	22MAR2021

Meaning of signature:

Study director: As study director, I wrote this document and am responsible for the content.

Reviewer: As subject matter expert I reviewed the interim study report and confirm that it is compliant with company technical standards and requirements.

IBC: I have read the document and confirm that all text passages concerning the tasks of the IBC are correctly and completely described.

QA manager: As QA representative, I confirm that this document complies with the relevant quality assurance requirements.

Test facility manager: As test facility manager, I confirm that this document complies with the relevant company requirements.

2 Table of contents

3 Figures, tables and abbreviations

3.1 List of figures

3.2 List of tables

3.3 List of abbreviations

BCIP/NBT-plus	5-Bromo-4-chloro-3-indolyl phosphate/nitro blue tetrazolium-plus
Biosampling ID	B162 followed by 5 characters (e.g., B1620001A)
BL	Baseline
CD	Cluster of differentiation
CEF	Cytomegalovirus (CMV), Epstein-Barr virus (EBV), and influenza virus
CEFT	CMV, EBV, influenza, and tetanus toxin
Ci-xxx	Control item-xxx, assay function control in ELISpot assay and FC analysis
CoA	Certificate of analysis
CSV	Comma-separated values
DFR	Distribution-free resampling
DiTi	Disposable tip
DMSO	Dimethyl sulfoxide
EDA-001 tool	ELISpot data analysis tool-001
Effectors	Cells pipetted onto ELISpot plates
Effector cell type	Type of effectors to be used in ELISpot. These can be either bulk PBMCs or PBMCs depleted of $CD4^+$ or $CD8^+$ cells as $CD8^+$ and $CD4^+$ effectors, respectively.
ELISpot	Enzyme-linked immunosorbent spot assay
FACS	Fluorescence-activated cell scanning
FC	Flow cytometry
FL	Full length
FOR	Form
GC(L)P	Good clinical (laboratory) practice
HAN	Preparation instruction
HSA	Human serum albumin
Hu	Human
IBC	Immune biomarker coordinator
IFNγ	Interferon gamma
IMP	Investigational medicinal product
IRV	Intra-replicate variability
LN	Liquid nitrogen
LNP	Lipid nanoparticle
MACS	Magnetic activated cell sorting
MHC	Major histocompatibility complex
n/a	Not applicable
NE	Not evaluable
NR	No response
PAP	Prüfablaufprotokoll (test procedure protocols)
PBMC	Peripheral blood mononuclear cell
PBS	Phosphate-buffered saline
PR	Positive response
QA	Quality assurance
QC	Quality check
RA	Risk analysis
RBD	Receptor-binding domain
RNA	Ribonucleic acid
RT	Room temperature (according to SOP-050-004)
S protein	SARS-CoV-2 spike protein

Sample ID	Biosampling ID followed by vial specific coding (e.g., B1620001A_1WB_1PB). Sample ID will be communicated via the IBC to the study director
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SME	Subject matter expert
SOP	Standard operating procedure
Subject ID	8-digit study participant ID with 3 parts (e.g., 276-xx-yyyy; 3 digits for the country, for instance Germany: 276; 2 digits for the site, 4 digits for the study participant, knowing that the numbering will be incremented at study level)
TNTC	Too numerous to count
V1/V5/V8/V9	Visit 1/Visit 5/Visit 8/Visit 9

4 General information

4.1 Contractee (sponsor)

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Germany

Contact details
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4.2 Test facility

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4.3 Participating personnel

Study Director	**Contact details**
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Test Facility Management	**Contact details**
Ulrich Luxemburger	E-mail: Ulrich.Luxemburger@biontech.de
Quality Assurance	**Contact details**
Dr. Rebecca Meyer	E-mail: Rebecca.Meyer@biontech.de
Archivist	
BioNTech employee with the appropriate job description "Archivist"	
Lab personnel	
Mentioned by name in FOR-050-003B and filed in the study binder	
Subject Matter Expert data analysis with EDA-001 tool	
Dr. Ann-Kathrin Eller Dirk Becker Jan Grützner Dr. Manuel Tonigold Dr. Marie-Cristine Kühnle	

4.4 Study dates

Study initiation date: release date study plan	**08JUN2020**
Experimental starting date:	**15JUN2020**
Approximate completion of experiments:	**Depends on recruiting status of clinical trial**
Study completion: release date final Study Report	**Depends on recruiting status of clinical trial**

4.5 Rules & regulations

This analytical study is conducted following the Good Clinical Practice (GCP) regulations according to:

- EMA/INS/GCP/532137/2010 Reflection paper on guidance for laboratories that perform the analysis or evaluation of clinical trial samples dated 28 February 2012
- ICH Harmonized Tripartite Guideline for Good Clinical Practice (GCP) E6(R2) dated 15 December 2016

All procedures applied in this study were carried out in accordance with BioNTech's quality assurance system, the analytical study plan and BioNTech's SOPs.

4.6 Changes to the study plan

Document	Approval date	Overall rationale for the change
Analytical study plan, v01	08JUN2020	n/a
Analytical study plan, v02	16JUN2020	Decision not to analyze peptide pool SARS-CoV-2 mutOLP, but analysis of SARS-CoV-2 FL-S Protein in two separate approaches (SARS-CoV-2 FL-S Protein Pool 1 and SARS-CoV-2 FL-S Protein Pool 2).
Amendment 2.1	03AUG2020	Additional HydroSpeed Washer (GER-0565-0002) was qualified for GxP and, starting from 03AUG2020, is used for the aspiration of the blocking solution. This fastened the process as the seeding and the development is done simultaneously.
Amendment 2.2	20OCT2020	Adding one additional count setting and giving the option to use individual count settings if none matches.
Amendment 2.3	25JAN2021	Additional follow up time point samples (Visit 8 and Visit 9) shall be analyzed for selected study participants

4.7 Deviations

All deviations that occurred during the analysis of the data reported here are listed below and have been finally evaluated.

Deviation no.	Description	Subject ID	Root cause	Measures taken	Status
D-20-0331	Reference setting FACSVerse expired	All study participants included in this report	Production of FC-beads discontinued	Change CC-20-0180 was initiated. Review of the Ci with regard to assay functionality.	closed
D-20-0333	Forgotten positive control (aCD3) at seeding Run W_200617_S_02	276-01-0016 279-01-0017	Human error	none	closed
D-20-0355	Manuel Seeding (ELISpot)	276-01-0009 276-01-0019 276-01-0043 276-01-0057	Technical error	none	closed
D-20-0364	Manuel development (ELISpot)	276-01-0023 276-01-0025 276-01-0033 276-01-0068	Technical error	none	closed
D-20-0378	Manuel development (ELISpot)	276-01-0045 276-01-0036 276-01-0053 276-01-0070	Technical error	none	closed
D-20-0413	Manuel development (ELISpot)	276-02-0101 276-02-0102 276-02-0103 276-02-0105 276-02-0110	Technical error	After consultation with the technical support, a valve was suspected as the cause. After initialization the error did not occur again.	closed
D-20-0516	Peptides dilutes with insufficient volume of medium when preparing the stimuli	276-02-0176 276-02-0185	Human error	none	closed

Deviation no.	Description	Subject ID	Root cause	Measures taken	Status
D-20-0542	Implausibly high number of spots after development	276-02-0176 276-02-0193	Technical error	none	closed
D-20-0563	ELISpot Data Analysis (EDA) Tool Bug at merging	276-01-0097 276-02-0183 276-01-0151 276-01-0172 276-01-0200 276-02-0192 276-01-0225 276-01-0226 276-01-0303 276-02-0188	Technical error	The bug has been reported to the responsible development department and will be fixed in the next version of the EDA tool. Until the new version is available, a visual assessment of the data is performed when negative groups need to be replaced (CAPA-20-0597).	closed
D-20-0583	Not enough liquid after seeding run in well F1	276-02-0216	Technical error	CAPA-20-0596. Optimization of vial parameters in process. Samples were called “NE”.	closed
D-20-0626	Wrong positioning of the carrier racks	276-02-0222 276-01-0308	Human error	none	closed
D-20-0634	Usage of the wrong plate washer channel	276-01-0272 276-02-0214	Human error	No EDA was performed. Samples called “ND”.	closed
D-20-0669	Incorrect cell concentration at Visit 5 in the positive fraction when isolating the $CD4^+$ cells	276-01-0366	Human error	none	closed
D-21-0055	The cell number required for flow cytometric analysis according to the method was not available	276-02-0150	Technical error	CAPA-20-0596. Optimization of vial parameters in process. Flow cytometric analysis with less than 2.0E+05 cells performed	closed

Deviation no.	Description	Subject ID	Root cause	Measures taken	Status
D-MZ-GCP-2021-27	AutoMACS lost negative fraction after separation of cells	276-01-0261	Technical error	Analysis canceled, classification according analytical study plan as “not done”	closed

4.8 Documentation & archive

Completed test procedure protocols (PAPs) and preparation instructions (HANs) including used material, reagents, equipment and raw data as well as study participant-specific documents are documented in hard copy. Some raw data is documented electronically. Electronic raw data will be stored on BioNTech's servers and hard copy raw data will be stored at Rhenus archive service GmbH in Frankfurt for at least 30 years according SOP-100-003. Preparation of working solutions is documented either in PAPs which are attached to the study plan and is handled according to SOP-050-003 or in appropriate HANs according to SOP-020-006. All completed HANs are filed in the general hard copy binder for HANs. All completed FOR-020-004A are filed in the general hard copy binder for aliquoting.

Throughout the analytical study, the study director is responsible for compiling hard copy data in the proper analytical study folder according to SOP-050-001, protected from unauthorized access. The study participant-specific documentation is filed in clinical trial-specific study folders. Electronic documents are saved in the respective device folder (FACSVerse, TECAN ELISpot platforms, AID Reader, NucleoCounter) on the Isilon server at BioNTech which has WORM (write once read many) protection.

No samples were archived in the test facility.

4.9 Notes

- This interim report contains data from the beginning of the study until 02MAR2021.
- All data is QA-approved; exceptions are marked with an asterisk (*).
- For the purpose of this report, only study participants treated with BNT162b1 or BNT162b2 are considered. Data from Cohorts 1-10 are reported.
- Data of study participants treated with vaccine BNT162a1 or BNT162c2 are not part of this report.
- All sections of this interim report are based on the analytical study plan GA-RB-022-01A, version 02. Several passages of the plan are reproduced here in abbreviated form.
- Section 5 (Background) has been amended to the study plan to reflect more recent information.
- BioNTech RNA Pharmaceuticals GmbH was integrated into BioNTech SE on 01JAN2021.
- Contractee changed on 05MAR2021 from Dr. Ludwig Heesen to Orkun Ozhelvaci.
- PAPs, HANs, TEMs, FORs, and SOPs are written in German.

5 Background

BioNTech SE is developing four prophylactic SARS-CoV-2 vaccines that are each tested on a group of study participants naive to this virus. The four vaccines are:

Table 1: Developed SARS-CoV-2 vaccines

Vaccine	mRNA type	Vaccine encoded antigen
BNT162a1	uRNA	RBD of the SARS-CoV-2 S protein
BNT162b1	modRNA	RBD of the S protein
BNT162b2	modRNA	a modified version of the S protein
BNT162c2	saRNA	a modified version of the S protein

SARS-CoV-2 - RNA lipid nanoparticle (RNA-LNP) vaccines utilizing different RNA formats, i.e., non-modified uridine-containing messenger RNA (uRNA, called BNT162a1), nucleoside-modified messenger RNA (modRNA, two variants, called BNT162b1 and BNT162b2), self-amplifying messenger RNA (saRNA, called BNT162c2).

Data generated from participants receiving the vaccines BNT162a1 and BNT162c2 are not part of this interim report.

The clinical trial BNT162-01 (EudraCT number: 2020-001038-36, internal BioNTech project: RN9391R00) is a multi-site, Phase I/II, 2-part, dose-escalation trial investigating the safety and immunogenicity of four prophylactic SARS-CoV-2 RNA vaccines against COVID-19 using different dosing regimens in healthy adults.

6 Objectives

The objective of this analytical study is to analyze T-cell responses against SARS-CoV-2-associated antigens coded by BNT162 in peripheral blood of study participants participating in the clinical trial BNT162-01. T-cell responses are analyzed directly in an *ex vivo* overnight IFNγ ELISpot assay using MACS-depleted PBMCs ($CD4^+$ and $CD8^+$ effectors), or, in case not enough cell material is available, bulk PBMCs.

The test results are reported as a *positive response*, *no response*, *not evaluable* or *not done* call for each sample for the different targets.

7 Materials & methods

7.1 Materials & reagents

Information on materials and reagent were documented with the raw data.

Table 2: Materials/reagents used

Material/Reagent	Specification	Vendor	BioNTech MAT-No.
Microcentrifuge tube	1.5 mL	Eppendorf	MAT-00003
Falcon tube 15 mL	PP tubes sterile	Greiner Bio-One	MAT-00005
Falcon tube 50 mL	PP tubes sterile	Greiner Bio-One	MAT-00006
FACS Flow	Sheath fluid	BD Biosciences	MAT-00007
FACS Clean	Clean solution	BD Biosciences	MAT-00008
Pipette tips 10 µL	EP Dualfilter filter tips 0.1–10 µL	Eppendorf	MAT-00016
Pipette tips 100 µL	2–100 µL sterile filter	Eppendorf	MAT-00018
Pipette tips 200 µL	EP Dualfilter filter tips 2–200 µL	Eppendorf	MAT-00019
Pipette tips 1,000 µL	50–1,000 µL sterile filter	Eppendorf	MAT-00021
Aspiration pipette 2 mL	2 mL	Greiner Bio-One	MAT-00682
Serologic pipette 5 mL	0.5–7 mL	Greiner Bio-One	MAT-00023
Serologic pipette 10 mL	1–13 mL	Greiner Bio-One	MAT-00024
Serologic pipette 25 mL	2–35 mL	Greiner Bio-One	MAT-00025
Serologic pipette 50 mL	4–60 mL	Greiner Bio-One	MAT-00026
Stabilizing fixative	3x concentrate	BD Biosciences	MAT-00074
RPMI 1640	With Glutamax I	Gibco	MAT-00082

Material/Reagent	Specification	Vendor	BioNTech MAT-No.
1x PBS Dulbecco's	Without Ca^{2+} and Mg^{2+}, 1x	Gibco	MAT-00084
AQUA B.Braun ecotainer	1,000 mL sterile	B.Braun	MAT-00095
EDTA	pH 8, ~0.5 M in H_2O	Sigma-Aldrich	MAT-00099
Dimethyl sulfoxide (DMSO)	sterile-filtered	Sigma	MAT-00113
BD FACSuiteTM CS&T Research Beads	n/a	BD Biosciences	MAT-00114
Falcon, 5 mL round bottom tube	n/a	BD Biosciences	MAT-00150
Filter minisart syringe	0.22 µm	Sartorius	MAT-00167
Fixable viability dye eFluor506	n/a	eBioscience	MAT-00169
Safe Lock tube	2 mL, sterile	Eppendorf	MAT-00201
HAS	20%	CLS Behring	MAT-00216
CS&T research beads	n/a	BD Biosciences	MAT-00250
CTL wash supplement	10x	CTL	MAT-00340
Easy cell strainer	70 µm	Greiner Bio-One	MAT-00376
Screw Cap Micro tube	0.5 mL	Sarstedt	MAT-00395
Media bottle PETG	250 mL	Thermo Scientific	MAT-00412
Media bottle PETG	500 mL	Thermo Scientific	MAT-00413
CD4 MicroBeads, human	n/a	MACS Miltenyi Biotec	MAT-00428
CD8 MicroBeads, human	n/a	MACS Miltenyi Biotec	MAT-00429
Via 1-Cassette	n/a	Chemometec	MAT-00476
Auto MACS Washing Solution	1.5 L	Miltenyi Biotec GmbH	MAT-00502
Auto MACS columns	1.5 L	Miltenyi Biotec GmbH	MAT-00520
Staining buffer	n/a	BioNTech SE	MAT-00536
MACS-buffer	n/a	BioNTech SE	MAT-00541
BD Multitest CD3/CD8/CD45/CD45 FITC/ PE/PerCP/AP	50 tests	BD Biosciences	MAT-00568
AIM V Medium	n/a	Thermo Scientific	MAT-00594
h-IFNγ MABTECH ELISpot kit	Pre-coated plates 1-D1K, 7-B6-1-ALP conjugate, BCIP/NBT substrate plus positive control a-CD3	Mabtech	MAT-00596
DNase I (solved)	2 mg/mL	Roche	MAT-00604
PBS-FBS	0.5%, solution 01	BioNTech SE	MAT-00617
Aspiration pipette	2 mL	Greiner Bio-One	MAT-00682
1x PBS Dulbecco's	Without Ca^{2+} and Mg^{2+}, 1x, 10 L	Gibco	MAT-00704
Tecan pipette tips 1,000 µL (Diti 1000)	sterile, with filter	Tecan	MAT-00708
TECAN 100 mL Trough, transparent (sterile)	transparent (sterile)	Tecan	MAT-00709
TECAN 100 mL Trough	Gray	Tecan	MAT-00711
1.40 mL precapped PushCap-Tubes	V-bottom, 96-4 Rack	Becton Dickinson GmbH	MAT-00713
50 mL syringe	Sterile	BD Biosciences	MAT-00715
Ethanol 70%	Rotipuran >70%, p.a.	Carl Roth	MAT-00718
Bottle-Top-Filter	0.2 µm	Thermo Scientific	MAT-00744
Falcon, 5 mL round bottom tube	n/a	BD Biosciences	MAT-00751

Material/Reagent	Specification	Vendor	BioNTech MAT-No.
TECAN pipette tips 200 µL, (Diti 200)	sterile, with filter	Tecan	MAT-00757
Pipette tips 1,250 µL	50–1,250 µL	Eppendorf	MAT-00762
CEF (solved)	n/a	JPT	MAT-00764
CEFT (solved)	n/a	JPT	MAT-00765
Fetal calf serum (FCS)	Heat inactivated	Sigma-Aldrich	MAT-00829
SARS-CoV-2 RBD (lyophilized)	n/a	JPT	MAT-01010
SARS-CoV-2 FL-S protein Pool 1 (lyophilized)	n/a	JPT	MAT-01012
SARS-CoV-2 FL-S protein Pool 2 (lyophilized)	n/a	JPT	MAT-01033
SARS-CoV-2 RBD (solved)	n/a	prepared by BNT	MAT-01011
SARS-CoV-2 FL-S protein Pool 1 (solved)	n/a	prepared by BNT	MAT-01013
SARS-CoV-2 FL-S protein Pool 2 (solved)	n/a	prepared by BNT	MAT-01034
Media bottle	1,000 mL	Fisher Scientific GmbH	MAT-01028

7.2 Equipment

The devices used in the various process steps were documented in the respective appendices of the study plan (PAPs) and archived together with the raw data in the study folder.

Table 3: Equipment used

Equipment	BioNTech equipment number (GER-No.)
Liquid nitrogen tank	0055-0004
Vortex	0016-0001, 0016-0003, 0560-0001, 0560-0002
Water bath	0034-0004, 0564-0001, 0564-0004
Centrifuge	0510-0002, 0510-0005, 0511-0001, 0511-0002, 0511-0011
NucleoCounter	0138-0001, 0138-0002, 0138-0003
Cooling device	0567-0001, 0568-0004, 0520-0001, 0566-0001, 0591-0001
AutoMACS pro separator	0503-0001, 0503-0002, 0139-0001
Liquid handling robot	0562-0003, 0562-0004
BDK security hood	0589-0001
Hydrospeed washer	0565-0001, 0565-0002, 0565-0003
Incubator	0563-0001, 0563-0002, 0563-0003, 0563-0004
FACSVerse	0022-0002

Equipment	BioNTech equipment number (GER-No.)
AID ELISpot reader	0166-0001
Label printer	0605-0001

7.3 Workstations

Workstations are designated areas in each laboratory room that contain certain equipment and material. At workstations, numbers of specific lots and devices used during this analytical study were documented in FOR-050-003C according to SOP-050-003. Equipment and materials that are part of a workstation are not listed separately in this report.

Table 4: Workstations used

Workstation number
13-01
13-02
01-14-01
23-01
23-02
23-03

7.4 Samples

Identification: Human peripheral blood mononuclear cells (PBMCs)

Description: PBMCs isolated from whole blood of study participants participating in the clinical trial BNT162-01 (EudraCT No: 2020-001038-36). PBMCs isolated from one blood draw (one study participant, one single time point) are considered as one sample. Each sample can be cryopreserved in a variable number of aliquots depending on the amount of PBMCs isolated.

Reception: The Biosampling unit of BioNTech SE receives cryopreserved PBMCs from study sites or other PBMC labs, respectively or will isolate PBMCs from received whole blood and store processed PBMCs in liquid nitrogen (LN) tanks or (gaseous phase). Samples are provided to the test facility upon request.

Stability: According to previous studies cryopreserved PBMCs can be stored for at least 12 years with no tendency of cell loss over time (Kleeberger et al. 1999).

Number of samples: Initially 192 to 240 trial participants were planned in this analytical study. Due to additional cohorts (150 additional trial participants) and additional sample timepoints (additional samples for 72 trial participants), up to

	924 samples are expected in total. Study participant enrollment started in Q2 2020.
Sample ID	A biosampling ID is assigned to each sample by the Biosampling unit upon arrival. Sample identifier for each sample will be documented in FOR-020-010A Sample Tracking Sheet by the Biosampling unit and obtained together with the PBMCs. Thus, identification of the sample and the biosampling ID is possible by comparing the ID of the label on the vial with the sample tracking sheet.
Storage conditions	Liquid nitrogen (gaseous phase)

7.4.1 Sample transfer

In brief, the amount of PBMCs available to be used for this analytical study was communicated by the IBC (Immune Biomarker Coordinator) on behalf of the contractee to the study director. Samples were requested via the "sample_request_tracker" provided by BioNTech's Biosampling unit. After approval by the contractee's representative the requested cryovials were transferred from the Biosampling unit to the test facility. The Biosampling unit provided a Sample Tracking Sheet (FOR-020-010A) containing all required information such as study subject ID, biosampling ID, sample ID including aliquot identifier, number of vials, and number of cells per vial. Checked out samples were transferred to the test facility by lab personnel of the test facility either in a CryoPod or on dry ice.

7.4.2 Interim storage of samples

After sample transfer, samples were stored in a liquid nitrogen tank of the test facility until further use. On the day of analysis, the predetermined number of cryovials of one sample was taken out of storage. To ensure that the correct samples were taken, two trained persons of the test facility checked whether the sample ID(s) and the amount of cryovials matched with information given by the study director for planned analysis (FOR-010-019). All transferred and stored vials were transferred on dry ice and used completely for analysis.

7.5 Control item

Cryopreserved PBMCs from healthy volunteers meeting specific acceptance criteria were used in ELISpot assays and FC analyses as control item (assay function controls). The control items are characterized and released for use in analytical studies as detailed in method specific data sheets for each Ci.

7.5.1 Usage in ELISpot analysis

The control item measured in each analytical run fulfilled the following criteria: ≥15 spots for CEF or CEFT and ≥500 spots for anti-CD3. The control item used in ELISpot was only taken into consideration in case of absence of any positive response for test samples on a given plate (also no response in cells stimulated with anti-CD3).

For detailed information see analytical study plan (GA-RB-022-01A, v02, Chapter 7.3).

7.6 Peptide pools

All samples were tested with 3 different peptide pools (stimuli) if enough cell material was available.

1. SARS-CoV-2 RBD MAT-01011
2. SARS-CoV-2 FL-S Protein Pool 1 MAT-01013
3. SARS-CoV-2 FL-S Protein Pool 2 MAT-01034

The test facility received the peptide pools directly from the vendor in lyophilized form. Lyophilisate was dissolved in DMSO according to the corresponding HAN-050-019, aliquoted in micronic tubes of 8 µL each and frozen at -80°C until further use up to 30 days in advance. On the day of analysis, peptide pools were diluted with medium as described in the analytical study plan (GA-RB-022-01A, v02). All steps were witnessed and confirmed by a second trained person.

7.7 Assay procedure

An overview of the assay procedure is shown in Figure 1.

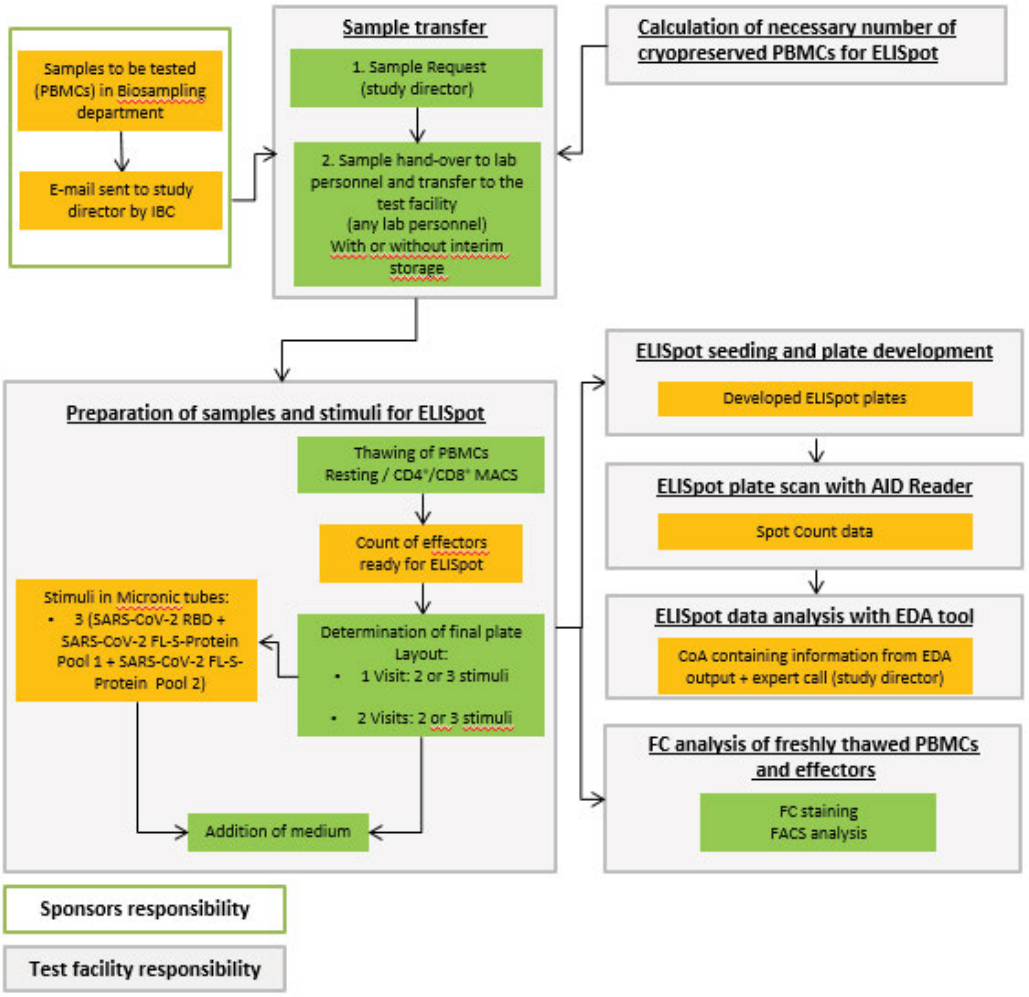

Figure 1: Assay procedure for each sample (objects highlighted in orange, process and work steps highlighted in green)

7.7.1 Sample allocation

Blood samples, used for isolation of PBMCs tested in this study, were collected prior to vaccination (Visit 1 = baseline sample (BL)) and at Visit 5 on Day 29. For follow up analyses, samples were taken at Visit 8 on Day 85 and Visit 9 on Day 184.

Sample allocation to this analytical study are communicated to the study director via the IBC. The BL and the sample taken on the Visit 5 were analyzed together in the same run using CD4/CD8 ELISpot. If not enough cells were available, Bulk PBMC ELISpot was performed instead. Follow up analyses of V8 and/or V9 were each analyzed in one run using the CD4/CD8 ELISpot format.

7.7.2 Sample characterization

If a very low cell amount was available, a sample characterization was performed before requesting samples for the CD4/CD8 ELISpot. This upstream analysis provides information on cell number and recovery of viable PBMCs after thawing (determined with NucleoCounter) as well as frequencies of $CD3^+CD4^+$ and $CD3^+CD8^+$ T cells within viable $CD45^+$ leukocytes (determined with FACS). The study director was informed by the IBC whether sample characterization had to be performed or not.

For detailed description of sample characterization and the FC analysis according to the method "Flow Cytometric Detection of human T-lymphocytes in immune cell suspensions with different T-lymphocyte frequencies and FAP_01 as diluent [FCDTF_1]" see analytical study plan (GA-RB-022-01A, v02), Chapter 7.5.1.

7.7.3 Effector cell types (sample preparations) used in IFNγ *ex vivo* ELISpot for hu T cells

The validated analytical method "IFN-γ ex vivo ELISPOT for hu T-cells" can be performed using two effector cell types: bulk PBMC effectors or CD4-/CD8-depleted PBMCs as $CD8^+$ and $CD4^+$ effectors. Two assay formats of the same analytical method are defined depending on the effector cell type being used: When using bulk PBMC effectors the assay format is called "Bulk PBMC ELISpot". When using enriched $CD4^+$ and $CD8^+$ effectors the assay is called "CD4/CD8 ELISpot". Figure 2 gives an overview of how different effector cell types are prepared.

Priority aim was to analyze samples with three peptide pools (see Section 7.6) in a CD4/CD8 ELISpot.

For further information on how to calculate the number of cells needed for both assay formats, see analytical study plan (GA-RB-022-01A, v02, Chapters 7.5.2 and 7.5.3).

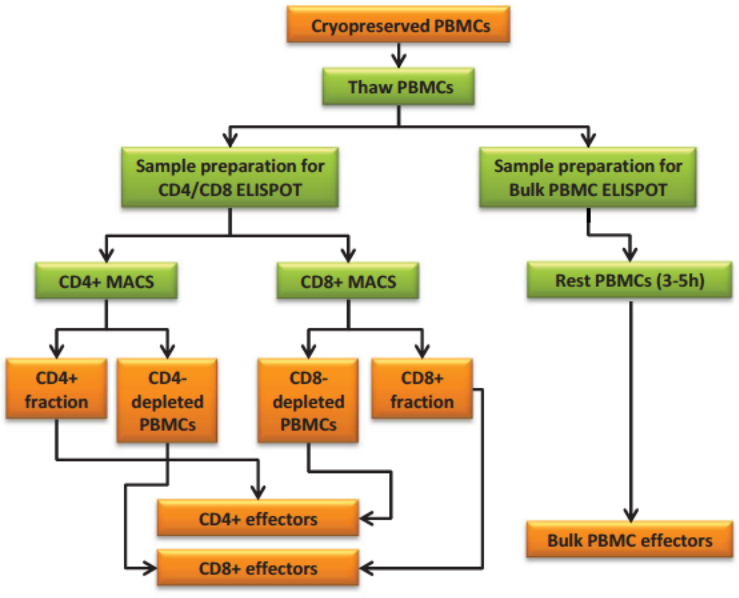

Figure 2: Different preparation of samples for the analytical method "IFN-γ ex vivo ELISpot for hu T-cells" (objects highlighted in orange, process and work steps highlighted in green).

7.7.4 IFNγ ELISpot

Regardless of which effector cell type was used, the assay procedure was identical. The analytical method included in brief:

- Blocking: ELISpot plates pre-coated with antibodies specific for IFNγ were washed and blocked with blocking medium for at least 30 minutes.
- Seeding of effector cells and control item onto ELISpot plates: After discarding the blocking medium, bulk PBMCs or $CD4^+$/$CD8^+$ cells were pipetted into the ELISpot plates according to the predefined plate layout (Figure 3). For bulk PBMCs, 300,000 cells were pipetted into each well while for the CD4/CD8 assay format 300,000 cells of the negative fraction and 30,000 cells of the positive fraction of the other cell type were pipetted into each well (e.g., 300,000 $CD4^+$-depleted cells plus 30,000 $CD8^+$ cells). For the control item 300,000 cells per well were used. Consecutively the cells were stimulated with peptides.
- Overnight incubation (≥18 hours) of effector cells and control items with peptides originating from the vaccine antigens, along with appropriate controls at 37°C and 5% CO_2.
- Development of ELISpot plates: After incubation, the cells were discarded and the plates developed with an alkaline phosphatase conjugated secondary anti-IFNγ antibody for 2 hours. After washing away unbound antibody, BCIP/NBT substrate was added and incubated for 6 minutes. The enzymatic reaction was stopped by discarding the substrate and washing the plates under running tap water.
- Drying of ELISpot plates over night at room temperature.
- Analysis of developed ELISpot plates using an AID ELISpot Reader, including scanning, counting and review by a trained operator.

Two custom-made Tecan Freedom EVO liquid handling platforms were used for blocking, seeding and development of ELISpot plates. The ELISpot EP platform (device number GER-0562-0003) was used for blocking and seeding of plates, whereas the ELISpot UPGR platform (device number GER-0562-0004) was used for the development of plates.

The following controls were included in each analytical run for the analyzed sample(s):

- **Sample function control**: Anti-CD3 antibody was used to determine the general functional status of T cells being tested in the ELISpot assay. This control should generate at least 500 spots, otherwise the negative data cannot be considered as negative.
- **Negative control (PBMCs only):** PBMCs incubated with medium alone will be used to determine possible spontaneous IFNγ secretion.
- **Assay function control:** Control item Ci-xxx (see Chapter 7.5).

In addition, a mixture of viral antigens was optional to compare the functional status of T cells in response to recall antigens as follows:

CEF: A mixture of MHC-class I restricted peptides originating from cytomegalovirus (CMV), Epstein-Barr virus (EBV), and influenza virus, which are expected to stimulate IFNγ secretion from $CD8^+$ T cells in the majority of donors. The peptides included in this pool are short peptides which mainly stimulate $CD8^+$ T cells.

CEFT: A mixture of MHC-class II restricted peptides originating from CMV, EBV, influenza virus, and tetanus toxin, which are expected to stimulate IFNγ secretion from $CD4^+$ T cells in the majority of donors.

As not every donor reacts to CEF and CEFT, these controls are not considered for data analysis of a sample. They only provide additional information (in case of a positive response) on functional status of $CD8^+$ and $CD4^+$ T cells tested at different time points. These controls were only seeded if sufficient cell material was available.

CD4/CD8 ELISPOT

Plate 1	Visit 1		Visit 2		CD4pos + CD8neg Visit 1		CD4pos + CD8neg Visit 2		CD8pos + CD4neg Visit 1		CD8pos + CD4neg Visit 2	
	1	2	3	4	5	6	7	8	9	10	9	10
A	CD4pos + CD8neg + Stimuli		CD4pos + CD8neg + Stimuli 1									
B	CD4pos + CD8neg + Stimuli		CD4pos + CD8neg + Stimuli 2		+ medium		+ medium		+ medium		+ medium	
C	CD4pos + CD8neg + Stimuli		CD4pos + CD8neg + Stimuli 3		+ CEF		+ CEF		+ CEF		+ CEF	
D	CD8pos + CD4neg + Stimuli		CD8pos + CD4neg + Stimuli 1		+ medium		+ medium		+ medium		+ medium	
E	CD8pos + CD4neg + Stimuli		CD8pos + CD4neg + Stimuli 2		+ CEFT		+ CEFT		+ CEFT		+ CEFT	
F	CD8pos + CD4neg + Stimuli		CD8pos + CD4neg + Stimuli 3		+ α-CD3	medium	+ α-CD3	medium	+ α-CD3	medium	+ α-CD3	medium
G	Assay function control + CEF		Assay function control + CEFT		Assay function control + α-CD3		Assay function control only				medium only	
H												

Figure 3: Exemplary plate layout CD4/CD8 ELISpot

7.7.5 ELISpot plate scan

Developed and dried plates were scanned and analyzed using the AID Classic Robot ELISpot Reader equipped with the AID ELISpot 7.0 software (version 7.0). The spot count was performed automatically using the most suitable out of five predefined count setting in which the negative control (PBMCs only) shows the least background. If no count setting matches an individual one can be defined. The results of the counted plates were approved by a checking step using the quality control (QC) function of the software. In the QC step, artifacts, overdeveloped areas, etc. were excluded from counting. Furthermore, a plausibility check of the given spot counts was done to confirm the chosen count setting. The spot count and QC step were carried out by dedicated study personnel authorized by the study director.

7.7.6 Data analysis

After the plates were scanned and spot count data were generated by the AID reader, the software ELISpot Data Analysis-001 Tool (EDA-001 tool) was used for statistical analysis and calling read-out in each analysis. The main inputs for the EDA tool were spot count data and csv-files containing the corresponding plate layout, as well as sample information and target information (for details see document EDA-001-04 on software specification for the EDA tool).

In brief, the EDA tool determines statistically relevant differences between an experiment group (duplicate wells of a certain stimulus on a sample) and a defined negative group (quadruplicate wells of background control).

The intra-replicate variability (IRV) of each group is calculated as: (sample variance)/(median+1).
An IRV threshold of 10 is used in this study as recommended by Moodie et al. 2010. Replicates with an IRV >10 were flagged, but not excluded from the statistical analysis.

A minimum spot count threshold of 7 spots/300,000 PBMCs being tested is used for an experiment group response to be defined as positive as described below. This threshold was set based on the technical report R-20-0120.

Each experiment group is compared to its relevant negative group using the distribution-free resampling (DRF) method with a null hypothesis of less than or equal to two-fold difference between negative and experiment group proposed by Moodie et al. 2010 (DFR(2x)).

As result of the statistical test, the EDA tool returns an individual call for each experiment group being tested that has one of the following values:

- **No response (EDA call: 0):**
  The experiment group is either statistically **not different** from its respective negative control
  or is significantly different from its respective negative control but **fails** the minimum spot count threshold. Additionally, in both scenarios, the positive control passes the positive spot count threshold.
- **Positive response (EDA call: 1):** The experiment group is statistically significant **different** from its respective negative control **and passes** the minimum spot count threshold **and** the IRV threshold.
- **Possibly positive response (EDA call: 0.5):** The experiment group is statistically significant **different** from its respective negative control **and passes** the minimum spot count threshold, but **fails** the IRV threshold.
  In this case the study director made the final call for that experiment group. In case both wells of the non-homogenous experiment group showed ≥7 spots, hence fulfilling the criterion for being a positive response, this replicate was called as "positive response". If not, the experiment group was called as "not evaluable".

Not evaluable (EDA call: NE): In addition to the cases described above a not evaluable call was issued for experiment groups not fulfilling the criteria of being called a positive response in case the positive control (sample stimulated with anti-CD3 antibody) did not show a minimum average spot count of ≥500. A low spot count response in the positive control can occur due to poor sample quality or low T-cell content in the sample. The positive control spot count threshold was set to 500, in order to avoid false negative results. Data from previous experiments in the test facility (e.g., pilot runs) demonstrated that weak responses can be missed, even if the positive control contains an average of 300 spots.

Data analysis using the EDA tool was carried out according to the study plan by the study director or a subject matter expert (SME).

For more detail on how each call is made, see the decision tree below (Figure 4).

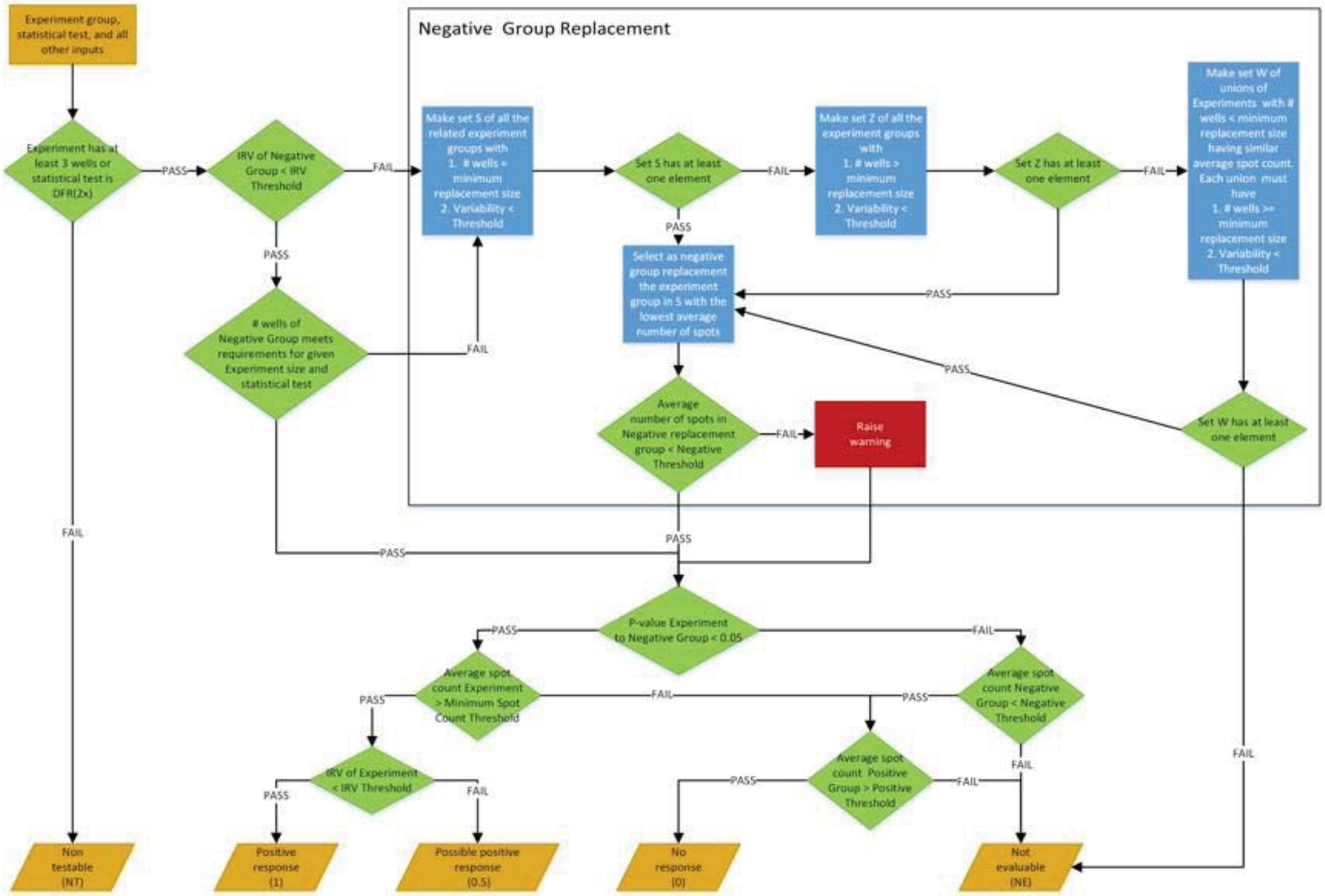

Figure 4: Decision tree used as rule set 01 for final calling by the EDA tool.

8 Results

8.1 Sample characterization

Until 02MAR2021, sample characterization has been performed for 3 study participants.

Table 5: List of characterized samples

Subject ID	IMP	CD4/CD8 Ratio	ELISpot
276-01-0001	BNT162b1	2.3	Done
276-01-0015	BNT162b1	2.5	Done
276-01-0020	BNT162b1	2.7	Not done, not enough material available

IMP = investigational medicinal product

8.2 IFNγ ELISpot BNT162b1

According to the sponsor's request only the results of peptide pool SARS-CoV-2 RBD are reported in this analytical study interim report. Immune response against SARS-CoV-2 FL-S Pool 1 and SARS-CoV-2 FL-2 Pool 2 were also evaluated but are not part of this interim report. Samples of 102 study participants treated with the BNT162b1 vaccine analyzed until 02MAR2021 are part of this interim report.

The samples of 100 study participants were analyzed in a CD4/CD8 ELISpot format and 1 study participant was analyzed in bulk PBMC ELISpot format. Both, samples of Visit 1 and Visit 5 of each study participant were tested for T-cell responses, in the same run and on the same ELISpot plate.

For the 100 study participants analyzed in CD4/CD8 ELISpot, the measured $CD4^+$ and $CD8^+$ T-cell responses are summarized in Table 6 and Table 7. A summary of all responses and the corresponding mean spot counts are shown in Table 8.

One study participant (subject ID 276-01-0083) was analyzed in a Bulk PBMC ELISpot due to a low cell number after thawing cells. This subject showed no responses to SARS-CoV-2 RBD in ELISpot analysis for both analyzed samples, before (Visit 1) and after administration (Visit 5) of BNT162b1.

Furthermore, samples of one study participant were analyzed but could not be evaluated due to insufficient cell amount (subject ID 276-01-0089, marked as "not done").

Table 6: Summarized $CD4^+$ T-cell responses to SARS-CoV-2 RBD of samples taken from BNT162b1-vaccinated study participants (n=100)

NR = no response, PR = positive response, NE = not evaluable

Responses $CD4^+$ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	5	84	0
	PR	1	2	0
	NE	0	6	2

Table 7: Summarized CD8⁺ T-cell responses to SARS-CoV-2 RBD of samples taken from BNT162b1-vaccinated study participants (n=100)

NR = no response, PR = positive response, NE = not evaluable

Responses CD8⁺ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	22	68	0
	PR	1	5	0
	NE	0	1	3

Table 8: IFNγ ELISpot results (BNT162b1)

V1 = Visit 1, V5= Visit 5, NR = no response, PR = positive response, NE = not evaluable, (n=102); [1] =Version 02 of CoA due to reanalysis; [2]= Version 02 of CoA due to typing error

Subject ID	Cell type	Response (Expert call) SARS-CoV-2 RBD	
		V1	V5
276-01-0001	CD4	NR	**PR**
	CD8	NR	NR
276-01-0003	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0004	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0005	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0006	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0007	CD4	NR	**PR**
	CD8	NR	NR
276-01-0008	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0009	CD4	*NE*	**PR**
	CD8	NR	**PR**
276-01-0011	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0015	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0016	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0017	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0018	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0019	CD4	NR	**PR**

Subject ID	Cell type	Response (Expert call)	
		SARS-CoV-2 RBD	
		V1	V5
	CD8	NR	**PR**
276-01-0021	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0023	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0025	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0028	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0032	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0033	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0034	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0036	CD4	*NE*	**PR**
	CD8	*NE*	*NE*
276-01-0037	CD4	NR	**PR**
	CD8	NR	NR
276-01-0038	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0039	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0040	CD4	NR	NR
	CD8	NR	NR
276-01-0041	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0042	CD4	NR	**PR**
	CD8	NR	NR
276-01-0043	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0045	CD4	*NE*	**PR**
	CD8	*NE*	**PR**
276-01-0047	CD4	NR	**PR**
	CD8	NR	NR
276-01-0048	CD4	NR	NR
	CD8	NR	NR
276-01-0049	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0052	CD4	NR	**PR**
	CD8	NR	**PR**

Subject ID	Cell type	Response (Expert call)	
		SARS-CoV-2 RBD	
		V1	V5
276-01-0053	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0055	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0056	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0057	CD4	NR	**PR**
	CD8	NR	NR
276-01-0059	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0060	CD4	NR	**PR**
	CD8	NR	NR
276-01-0066	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0068	CD4	**PR**	**PR**
	CD8	NR	**PR**
276-01-0070	CD4	NR	**PR**
	CD8	NR	NR
276-01-0073	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0075	CD4	NR	**PR**
	CD8	NR	NR
276-01-0076	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0078	CD4	NR	NR
	CD8	NR	NR
276-01-0083	Bulk PBMC	NR	NR
276-01-0085	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0089	Not done	Not done	Not done
	Not done	Not done	Not done
276-01-0093	CD4	**PR**	NR
	CD8	**PR**	**PR**
276-01-0096	CD4	NR	NR
	CD8	NR	NR
276-01-0103	CD4	NR	**PR**
	CD8	**PR**	**PR**
276-01-0104	CD4	NR	NR
	CD8	NR	**PR**
276-01-0151	CD4	NR	**PR**
	CD8	NR	**PR**

Subject ID	Cell type	Response (Expert call)	
		SARS-CoV-2 RBD	
		V1	V5
276-01-0170	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0171	CD4	*NE*	**PR**
	CD8	NR	**PR**
276-01-0172	CD4	NR	**PR**
	CD8	**PR**	**PR**
276-01-0173	CD4	*NE*	**PR**
	CD8	NR	NR
276-01-0178	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0179	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0181	CD4	**PR**	**PR**
	CD8	NR	**PR**
276-01-0194	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0197	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0198	CD4	NR	**PR**
	CD8	**PR**	NR
276-01-0200[1]	CD4	NR	**PR**
	CD8	NR	NR
276-01-0204	CD4	NR	**PR**
	CD8	NR	NR
276-01-0209	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0212	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0221	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0224	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0225	CD4	NR	**PR**
	CD8	**PR**	**PR**
276-01-0226	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0273	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0283	CD4	NR	**PR**
	CD8	**PR**	**PR**
276-01-0286	CD4	NR	**PR**

Subject ID	Cell type	Response (Expert call)	
		SARS-CoV-2 RBD	
		V1	V5
	CD8	NR	**PR**
276-01-0287	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0288	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0289	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0291	CD4	NR	**PR**
	CD8	NR	NR
276-01-0292	CD4	NR	**PR**
	CD8	NR	NR
276-01-0298	CD4	*NE*	*NE*
	CD8	*NE*	*NE*
276-01-0320	CD4	*NE*	*NE*
	CD8	*NE*	*NE*
276-01-0350	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0352	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0353	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0358	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0360	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0361	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0362	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0363	CD4	NR	**PR**
	CD8	NR	NR
276-01-0364	CD4	NR	**PR**
	CD8	NR	NR
276-01-0365	CD4	NR	**PR**
	CD8	NR	**PR**
276-01-0366	CD4	*NE*	**PR**
	CD8	NR	**PR**
276-02-0211	CD4	NR	**PR**
	CD8	NR	**PR**
276-02-0220	CD4	NR	**PR**
	CD8	NR	**PR**

Subject ID	Cell type	Response (Expert call)	
		SARS-CoV-2 RBD	
		V1	V5
276-02-0234	CD4	NR	**PR**
	CD8	NR	**PR**
276-02-0236	CD4	NR	**PR**
	CD8	NR	NR
276-02-0237	CD4	NR	**PR**
	CD8	NR	**PR**
276-02-0238	CD4	NR	**PR**
	CD8	NR	**PR**
276-02-0241	CD4	NR	**PR**
	CD8	NR	**PR**
276-02-0242	CD4	NR	**PR**
	CD8	NR	NR

8.3 IFNγ ELISpot BNT162b2

According to the sponsor's request the results of peptide pool RBD, SARS-CoV-2 FL-S-Protein Pool 1 and SARS-CoV-2 FL-S-Protein Pool 2 are reported in this analytical study interim report. Valid ELISpot data of 84 study participants were available on 02MAR2021 and have been included in this report.

Samples of 80 study participants were analyzed in CD4/CD8 ELISpot format. Both samples from Visit 1 and Visit 5 of each study participant were tested for $CD4^+$ and $CD8^+$ T-cell responses in the same run and on the same ELISpot plate.

The measured $CD4^+$ and $CD8^+$ T-cell responses to RBD are summarized in Table 9 and Table 10, the responses to SARS-CoV-2 FL-S-Protein Pool 1 are summarized in Table 11 and Table 12, and the responses to SARS-CoV-2 FL-S-Protein Pool 2 are summarized in Table 13 and Table 14. A summary of all responses and the corresponding mean spot counts are shown in Table 15.

One study participant (subject ID 276-02-0118) was analyzed in a bulk PBMC ELISpot and showed no responses before administration of vaccine (V1) and positive responses for all three tested peptide pools after administration of BNT162b2 (V5). Furthermore, samples of 3 study participants were analyzed but could not be evaluated (subject ID 276-01-0272 and 276-02-0214 due to deviation D-20-0634, 276-02-0195 due to insufficient cell amount) marked as "not done").

In addition, follow up data from samples collected at Visit 8 and Visit 9 were analyzed for 25 of the study participants described above. Data are summarized in Section 8.3.1.

Table 9: Summarized $CD4^+$ T-cell responses to SARS-CoV-2 RBD of samples taken from BNT162b2-vaccinated study participants (n=80)

NR = no response, PR = positive response, NE = not evaluable

Responses $CD4^+$ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	8	63	1
	PR	0	5	0
	NE	0	1	2

Table 10: Summarized $CD8^+$ T-cell responses to SARS-CoV-2 RBD of samples taken from BNT162b2-vaccinated study participants (n=80)

NR = no response, PR = positive response, NE = not evaluable

Responses $CD8^+$ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	29	44	1
	PR	0	4	0
	NE	1	0	1

Table 11: Summarized CD4+ T-cell responses to SARS-CoV-2 FL-S Protein Pool 1 of samples taken from BNT162b2-vaccinated study participants (n=80)

NR = no response, PR = positive response, NE = not evaluable

Responses CD4+ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	1	74	1
	PR	0	0	0
	NE	0	2	2

Table 12: Summarized CD8+ T-cell responses to SARS-CoV-2 FL-S Protein Pool 1 of samples taken from BNT162b2-vaccinated study participants (n=80)

NR = no response, PR = positive response, NE = not evaluable

Responses CD8+ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	12	64	0
	PR	0	1	1
	NE	0	1	1

Table 13: Summarized CD4+ T-cell responses to SARS-CoV-2 FL-S Protein Pool 2 of samples taken from BNT162b2-vaccinated study participants (n=80)

NR = no response, PR = positive response, NE = not evaluable

Responses CD4+ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	0	69	1
	PR	0	4	0
	NE	0	4	2

Table 14: Summarized CD8+ T-cell responses to SARS-CoV-2 FL-S Protein Pool 2 of samples taken from BNT162b2-vaccinated study participants (n=80)

NR = no response, PR = positive response, NE = not evaluable

Responses CD8+ effectors		Visit 5		
		NR	PR	NE
Visit 1	NR	18	44	1
	PR	1	14	0
	NE	0	1	1

Table 15: IFNγ ELISpot results (BNT162b2) (n=84)

V1 = Visit 1, V5= Visit 5, NR = no response, PR = positive response, NE = not evaluable;[1] =Version 02 of CoA due to reanalysis; [2]= Version 02 of CoA due to typing error

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-01-0261	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR
276-01-0263	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-01-0265	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-01-0267	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR
276-01-0268	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	**PR**	**PR**	NR	**PR**	**PR**	**PR**
276-01-0272	CD4	Not done	Not done	Not done	Not done	Not done	Not done
	CD8	Not done	Not done	Not done	Not done	Not done	Not done
276-01-0275	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-01-0276	CD4	**PR**	**PR**	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-01-0277	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR
276-01-0279	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	**PR**	**PR**	NR	**PR**	**PR**	**PR**
276-01-0300	CD4	**PR**	**PR**	NR	**PR**	NR	**PR**
	CD8	**PR**	**PR**	**PR**	**PR**	**PR**	**PR**
276-01-0303	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-01-0306	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-01-0308[1]	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-01-0309	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR
276-01-0310	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-01-0314	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-01-0316	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-01-0319	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-01-0323	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-01-0324	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	*NE*	NR	*NE*	**PR**	*NE*	**PR**
276-02-0101	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0102	CD4	NR	**PR**	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0103	CD4	*NE*	**PR**	*NE*	**PR**	*NE*	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0105	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0110	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0111[2]	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-02-0114	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0116	CD4	*NE*	*NE*	*NE*	*NE*	*NE*	*NE*
	CD8	NR	NR	NR	NR	NR	NR
276-02-0117	CD4	NR	**PR**	*NE*	**PR**	*NE*	**PR**
	CD8	NR	NR	NR	**PR**	NR	NR
276-02-0118	Bulk PBMC	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0121	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0127	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0128	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	**PR**	**PR**
276-02-0134	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0137	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0142	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0143	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0144	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0149	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0150	CD4	NR	NR	NR	NR	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-02-0153[2]	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0154[2]	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR
276-02-0155	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR
276-02-0156	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR
276-02-0157[1]	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR
276-02-0158	CD4	NR	*NE*	NR	*NE*	NR	*NE*
	CD8	NR	*NE*	**PR**	*NE*	NR	*NE*
276-02-0160	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	NR
276-02-0164	CD4	**PR**	**PR**	NR	**PR**	NR	**PR**
	CD8	**PR**	**PR**	NR	**PR**	NR	**PR**
276-02-0166	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0171	CD4	**PR**	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0172	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	NR	NR	**PR**
276-02-0174	CD4	NR	**PR**	NR	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR	**PR**	**PR**
276-02-0175	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0176	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-02-0177	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0178	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0179	CD4	NR	**PR**	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0180	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0181	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	NR	**PR**
276-02-0183	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0185	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR
276-02-0188	CD4	NR	**PR**	NR	**PR**	*NE*	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0189	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0191	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR
276-02-0192	CD4	NR	**PR**	NR	**PR**	*NE*	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0193	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	NR
276-02-0194	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	**PR**	**PR**
276-02-0195	CD4	Not done	Not done	Not done	Not done	Not done	Not done
	CD8	Not done	Not done	Not done	Not done	Not done	Not done

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-02-0197	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0200	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0201	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0204	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0208	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR	**PR**	NR
276-02-0214	CD4	Not done	Not done	Not done	Not done	Not done	Not done
	CD8	Not done	Not done	Not done	Not done	Not done	Not done
276-02-0215	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	NR
276-02-0216	CD4	*NE*	*NE*	*NE*	*NE*	*NE*	*NE*
	CD8	*NE*	*NE*	*NE*	*NE*	*NE*	*NE*
276-02-0221	CD4	**PR**	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	NR
276-02-0222[1]	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0224	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	**PR**	**PR**
276-02-0225	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	**PR**	NR	**PR**
276-02-0226	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**
276-02-0229	CD4	NR	NR	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**

Subject ID	Cell type	Response (Expert call)					
		SARS-CoV-2 RBD		SARS-CoV-2 FL-S-Protein Pool 1		SARS-CoV-2 FL-S-Protein Pool 2	
		V1	V5	V1	V5	V1	V5
276-02-0233	CD4	NR	**PR**	NR	**PR**	NR	**PR**
	CD8	NR	**PR**	NR	**PR**	NR	**PR**

8.3.1 Follow up data BNT162b2

To evaluate the stability of the immune responses induced by BNT162b2, the analysis of the following time points V8 and V9 were analyzed. Valid ELISpot data of 25 study participants were available on 02MAR2021 and have been included in this report.

All samples were analyzed in CD4/CD8 ELISpot format. Both samples, from Visit 8 and Visit 9, of each study participant were tested for $CD4^+$ and $CD8^+$ T-cell responses in the same run and on the same ELISpot plate. For some study participants, there was either insufficient material to analyze both time points or not all peptide pools could be tested (indicated by "not done").

The measured $CD4^+$ and $CD8^+$ T-cell responses to RBD are summarized in Table 16, the responses to SARS-CoV-2 FL-S-Protein Pool 1 are summarized in Table 17, and the responses to SARS-CoV-2 FL-S-Protein Pool 2 are summarized in Table 18.

Table 16: Summarized T-cell responses to SARS-CoV-2 RBD of samples taken from BNT162b2-vaccinated study participants (including follow up data, n=25)

V1 = Visit 1, V5= Visit 5, V8 = Visit 8, V9 = Visit 9, NR = no response, PR = positive response, NE = not evaluable, * = data not yet QA-approved; [1] =Version 02 of CoA due to reanalysis; [2]= Version 02 of CoA due to typing error

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 RBD			
		V1	V5	V8	V9
276-01-0261*	CD4	NR	NR	Not done	Not done
	CD8	NR	NR	Not done	Not done
276-01-0263*	CD4	NR	**PR**	**PR**	NR
	CD8	NR	NR	NR	NR
276-01-0265*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR
276-01-0275*	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	NR	Not done	NR
276-01-0279*	CD4	NR	**PR**	**PR**	NR
	CD8	**PR**	**PR**	NR	NR
276-02-0101*	CD4	NR	**PR**	NR	**PR**
	CD8	NR	NR	NR	NR
276-02-0102*	CD4	NR	**PR**	**PR**	NR

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 RBD			
		V1	V5	V8	V9
	CD8	NR	**PR**	**PR**	**PR**
276-02-0103*	CD4	*NE*	**PR**	Not done	Not done
	CD8	NR	**PR**	Not done	Not done
276-02-0110*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR
276-02-0111[2]	CD4	NR	**PR**	NR	NR
	CD8	NR	NR	NR	NR
276-02-0114[2]	CD4	NR	**PR**	**PR**	NR
	CD8	NR	**PR**	NR	NR
276-02-0117*	CD4	NR	**PR**	NR	NR
	CD8	NR	NR	NR	NR
276-02-0121*	CD4	NR	**PR**	Not done	Not done
	CD8	NR	**PR**	Not done	Not done
276-02-0134*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0137	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0142	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0144*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0149*	CD4	NR	**PR**	NR	NR
	CD8	NR	**PR**	NR	NR
276-02-0150*	CD4	NR	NR	NR	NR
	CD8	NR	NR	NR	NR
276-02-0156*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	NR
276-02-0172*	CD4	NR	**PR**	Not done	NR
	CD8	NR	**PR**	Not done	**PR**
276-02-0174*	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	NR	Not done	NR
276-02-0175*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 RBD			
		V1	V5	V8	V9
276-02-0177	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	**PR**	Not done	**PR**
276-02-0178	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR

Table 17: Summarized T-cell responses to SARS-CoV-2 FL-S-Protein Pool 1 of samples taken from BNT162b2-vaccinated study participants (including follow up data, n=25)

V1 = Visit 1, V5= Visit 5, V8 = Visit 8, V9 = Visit 9, NR = no response, PR = positive response, *NE* = not evaluable, * = data not yet QA-approved; [1] =Version 02 of CoA due to reanalysis; [2]= Version 02 of CoA due to typing error

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 FL-S-Protein Pool 1			
		V1	V5	V8	V9
276-01-0261*	CD4	NR	**PR**	Not done	Not done
	CD8	NR	NR	Not done	Not done
276-01-0263*	CD4	NR	**PR**	**PR**	NR
	CD8	NR	**PR**	**PR**	NR
276-01-0265*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-01-0275*	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	**PR**	Not done	**PR**
276-01-0279*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	NR
276-02-0101*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	NR
276-02-0102*	CD4	NR	**PR**	**PR**	NR
	CD8	NR	**PR**	**PR**	**PR**
276-02-0103*	CD4	*NE*	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0110*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	NR
276-02-0111[2]	CD4	NR	**PR**	NR	NR
	CD8	NR	**PR**	NR	NR
276-02-0114	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	NR
276-02-0117*	CD4	*NE*	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	NR
276-02-0121*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	*NE*

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 FL-S-Protein Pool 1			
		V1	V5	V8	V9
276-02-0134*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0137	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0142	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0144*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0149*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0150*	CD4	NR	NR	NR	NR
	CD8	NR	NR	NR	NR
276-02-0156	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	NR
276-02-0172	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	NR	Not done	NR
276-02-0174*	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	NR	Not done	NR
276-02-0175*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0177	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	**PR**	Not done	**PR**
276-02-0178	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**

Table 18: Summarized T-cell responses to SARS-CoV-2 FL-S-Protein Pool 2 of samples taken from BNT162b2-vaccinated study participants (including follow up data, n=25)

V1 = Visit 1, V5= Visit 5, V8 = Visit 8, V9 = Visit 9, NR = no response, PR = positive response, *NE* = not evaluable, * = data not yet QA-approved; [1] =Version 02 of CoA due to reanalysis; [2]= Version 02 of CoA due to typing error

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 FL-S-Protein Pool 2			
		V1	V5	V8	V9
276-01-0261*	CD4	NR	**PR**	Not done	Not done
	CD8	NR	NR	Not done	Not done
276-01-0263*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	NR
276-01-0265	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-01-0275	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	**PR**	Not done	**PR**
276-01-0279	CD4	NR	**PR**	**PR**	**PR**
	CD8	**PR**	**PR**	**PR**	**PR**
276-02-0101	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0102*	CD4	**PR**	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0103	CD4	*NE*	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	NR
276-02-0110*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0111[2]	CD4	NR	**PR**	NR	NR
	CD8	NR	**PR**	NR	NR
276-02-0114	CD4	NR	**PR**	**PR**	**PR**
	CD8	**PR**	**PR**	**PR**	**PR**
276-02-0117	CD4	*NE*	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR
276-02-0121	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**

Subject ID	Cell type	Response (Expert call)			
		SARS-CoV-2 FL-S-Protein Pool 2			
		V1	V5	V8	V9
276-02-0134*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	NR	NR
276-02-0137	CD4	NR	**PR**	**PR**	**PR**
	CD8	**PR**	**PR**	**PR**	**PR**
276-02-0142	CD4	NR	**PR**	**PR**	**PR**
	CD8	**PR**	**PR**	**PR**	**PR**
276-02-0144*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0149*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0150*	CD4	NR	**PR**	**PR**	NR
	CD8	NR	NR	NR	NR
276-02-0156	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	NR	NR	NR
276-02-0172	CD4	NR	**PR**	Not done	**PR**
	CD8	NR	**PR**	Not done	NR
276-02-0174*	CD4	**PR**	**PR**	Not done	**PR**
	CD8	**PR**	**PR**	Not done	**PR**
276-02-0175*	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**
276-02-0177	CD4	NR	**PR**	Not done	**PR**
	CD8	**PR**	**PR**	Not done	**PR**
276-02-0178	CD4	NR	**PR**	**PR**	**PR**
	CD8	NR	**PR**	**PR**	**PR**

9 Related documents

The analytical study was conducted according to the applicable standards.

10 References

Kleeberger CA, Lyles RH, Margolick JB et al. Viability and Recovery of Peripheral Blood Mononuclear Cells cryopreserved for up to 12 years in a multicenter study. *Clin Diagn Lab Immunol*. 1999;6(1):14-19.

Moodie Z, Price L, Gouttefangeas C et al. Response definition criteria for ELISPOT assays revisited. *Cancer Immunol Immunother.* 2010;59(10):1489-1501.

EDA-001-04-TEM-081-001J_v02 Software_Specifications_v01.0_signed

BioNTech technical report (R-20-0120): Lowering minimum spot count for positive responses in ELISpot data analysis tool (EDA-001)

11 Distribution

This analytical study report will be distributed as follows:

Sponsor		1 Original
BioNTech SE	(Test facility Biolytics-GCP)	1 Original

12 Document history

Third version – minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change compared to previous version:

Section	Version 02	Version 03	Reason for change
4.7	Deviations to all reported study participants in v02	Deviations to all reported study participants in v03	Inclusion of follow up data
7.7.1	n/a	Description of V8 and V9 added	Inclusion of follow up data
8.3.1	n/a	new	Inclusion of follow up data
13	Appendix A: Analytical study plan GA-RB-022-01A, v02 Appendix B: Amendment 2.1 Appendix C: Amendment 2.2	Appendices not included	The analytical study plan and its amendments are no longer attached to the report. They are referenced, and filed separately.

Second version – minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section	Version 01	Version 02	Reason for change
8.2	Data of 64 study participants were included in this section	Data of 102 study participants are included in this section	Inserting intermediate data
8.3	Data of 40 study participants were included in this section	Data of 84 study participants are included in this section	Inserting intermediate data

13 Appendix

Not applicable.

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R&D STUDY REPORT No. R-20-0235

ANALYSIS OF THE TH1/2 CYTOKINE PROFILE OF BNT162B1-SPECIFIC CD4$^+$ AND CD8$^+$ T CELLS FROM PARTICIPANTS IN THE BNT162-01 TRIAL

(INTERIM REPORT FOR 95 SUBJECTS)

Version 02
Date: 27 NOV 2020

Reported by Isabel Vogler

Test item: Overlapping peptide pools representing different portions of the wild-type sequence of SARS-CoV-2 S protein

Key words: BNT162-01 study, intracellular cytokine staining, COVID-19

This R&D report consists of 79 pages.

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LIST OF ABBREVIATIONS

aa	Amino acid
BD	Becton Dickinson
CD	Cluster of differentiation
DMSO	Dimethyl sulfoxide
DS&BA	Data Science and Biomarker Analysis Unit
FACS	Fluorescence-activated cell sorting
HCS	Human convalescent sample
ICS	Intracellular cytokine staining
IL	Interleukin
IFNγ	Interferon gamma
JPT	Jerini Peptide Technologies
N/A	Not applicable
ns	not significant
OLP	Overlapping peptide
PBMC	Peripheral blood mononuclear cell
QA	Quality assurance
QC	Quality control
RBD	Receptor-binding domain
R&D	Research and development
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
Th1/Th2	Type 1/2 helper T cells
V	Visit

RESPONSIBILITIES

Person responsible for the study:	Isabel Vogler	27NOV2020
	Dr. Isabel Vogler; Head of Immunogenicity Testing; BioNTech RNA Pharmaceuticals GmbH	Date
Author:	Isabel Vogler	27NOV2020
	Dr. Isabel Vogler; Head of Immunogenicity Testing; BioNTech RNA Pharmaceuticals GmbH	Date
Reviewer:	Jasmin Quandt	27.NOV.2020
	Dr. Jasmin Quandt; Scientist; BioNTech RNA Pharmaceuticals GmbH	Date
QA representative:	(b) (6)	27 NOV 2020
	BioNTech SE	Date

Meaning of the signatures:

Person responsible for the study: I am responsible for the content of the R&D report and confirm that it represents an accurate record of the results. This study was performed according to the SOPs and methods as well as the rules and regulations described in the report.

Author: I am the author of this document.

Reviewer: I reviewed the R&D report and confirm that this document complies with the scientific and technical standards and requirements.

QA representative: I confirm that this document complies with the relevant quality assurance requirements.

1 SUMMARY

Within the clinical trial BNT162-01, a continuous immune monitoring program was performed to analyze subject's immune responses against vaccine-encoded antigens specific to the SARS-CoV-2 S protein and/or receptor-binding domain (RBD).

The objective of this study was to assess the Th1 (IFNγ and IL-2) and Th2 (IL-4) cytokine profile of T cells specific to defined proteins / protein domains of SARS-CoV-2 as a result of immunization with two doses of 1 to 50 µg BNT162b1 or one dose of 60 µg BNT162b1 using intracellular cytokine staining (ICS).

Peripheral blood mononuclear cell (PBMC) fractions isolated from blood of study subjects collected at baseline (pre-vaccination) and 29±3 days after the primary immunization with BNT162b1 were analyzed (interim report: n=95 in total; adults: 1 µg cohort: n=10, 3 µg cohort: n=10, 10 µg cohort: n=10, 20 µg cohort: n=6, 30 µg cohort: n= 12, 50 µg cohort: n=9, 60 µg cohort: n=11 (prime only), older adults: 10 µg cohort: n=8, 20 µg cohort: n=8, 30 µg cohort: n=11). The functionality and polarization of vaccine-induced SARS-CoV-2 RBD-specific T cells were assessed by intracellular accumulation of the cytokines IFNγ, IL-2, and IL-4 in response to stimulation with overlapping peptides representing the full-length sequence of the vaccine-encoded RBD (aa 1-16 fused to aa 327-528 of the S protein) and the wild-type SARS-CoV-2 S protein by ICS. For bench-marking, PBMCs from 15 COVID-19 convalescent virologically confirmed patients were used.

Two doses of BNT162b1 (dose range 1 to 50 µg) induced cluster of differentiation 4 (CD4) and CD8 vaccine-specific T-cell responses. RBD-specific $CD4^+$ T-cell responses have a type 1 helper T (Th1) cell cytokine profile secreting IFNγ, or IL-2, or both. For 81 of the 84 analyzed subjects (1-50 µg cohorts) no production of Th2 cytokine IL-4 in response to RBD peptide pool stimulation was detected. Similarly, RBD-specific $CD8^+$ T cells secreted IFNγ in 54 of the analyzed 84 subjects of the 1-50 µg cohorts, however, lower levels of IL-2-secreting $CD8^+$ T cells compared to $CD4^+$ T cells were detected. In the 30 µg cohorts, the fractions of RBD-specific $IFN\gamma^+$ $CD8^+$ T cells reached up to 0.49% (adults) and 1.58% (older adults) of total peripheral blood $CD8^+$ T cells. In the 50 µg adult cohort, fractions of up to 3.87% were detected. The mean fraction of both $CD4^+$ and $CD8^+$ cytokine-producing T cells in the BNT162b1 vaccinated subjects (1 to 50 µg) was substantially higher (e.g., for 30 µg vaccinated subjects 11-fold above) than that observed in 15 patients who recovered from COVID-19. In the 60 µg cohort, treated with the priming dose only, mean fractions of cytokine-producing T cells were lower compared to the other cohorts, indicating the importance of the booster vaccination. Importantly, the cytokine responses elicited after vaccination with BNT162b1 in older adults was similar in response pattern and intensity with that of the 18 to 55 years of age cohort.

BNT162b1 induced poly-functional and pro-inflammatory $CD4^+/CD8^+$ T-cell responses in almost all subjects, with a Th1 polarization of the helper response. The detection of IFNγ, IL-2 but not IL-4 indicates a favorable Th1 profile and the absence of a potentially deleterious Th2 immune response.

Data cut-off date for this interim report is 17 NOV 2020.

Responsible Person: Dr. Isabel Vogler; Head of Immunogenicity Testing; BioNTech RNA Pharmaceuticals GmbH Isabel Vogler	Date 27 NOV 2020

2 GENERAL INFORMATION

2.1 Sponsor and Test Facility

BioNTech RNA Pharmaceuticals GmbH
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2.2 Participating Sponsor Personnel

Responsible person: (as defined in SOP-100-024)	Dr. Isabel Vogler Head of Immunogenicity Testing
Author:	Dr. Isabel Vogler Head of Immunogenicity Testing
Experimenter: Planning, execution, documentation, final analysis	Dr. Jasmin Quandt Scientist
Experimenter: Planning, final analysis	Dr. Isabel Vogler Head of Immunogenicity Testing
Experimenter: Planning, execution, documentation, final analysis	Rebecca Schulz Research Associate
Experimenter: Planning, execution, documentation, final analysis	Belinda Stock Research Associate
Experimenter: Execution	Louisa-Marie Schmid Intern
Experimenter: Planning, execution, documentation, final analysis	Cora Ecker Research Associate
Experimenter: Planning, execution, documentation, final analysis	Kathrin Schmoldt Research Associate
Experimenter: Execution, documentation	Silvia Wessel Research Associate

2.3 Study Dates

Start of experiments: 23 JUN 2020

Completion of experiments: 13 NOV 2020

2.4 Guidelines and Regulations

All experiments are executed in accordance with the existing standard operating procedures and described processes from BioNTech RNA Pharmaceuticals GmbH. Applicable documents are listed below.

- SOP-010-098 Zellzählgerät CASY TTT
- SOP-010-103 Geräteanweisung BD FACSVerse - Flow Cytometry Core Facility
- SOP-030-041 Auftauen von Zellen
- SOP-030-100 Aufarbeitung von PBMCs und Plasma aus Vollblut - Biosampling
- SOP-100-003 Archiving of Paper-Based Documents

2.5 Changes and Deviations

Not applicable. There is no formal R&D plan available.

2.6 Documentation and Archive

Study plans and reports are stored and archived according to SOP-100-003.

Raw data and evaluated data are saved at

- Test item sequence lists (delivery list) of peptide preparations including purity, amount and peptide content were saved at:
- \\biontech.int\Projects\BioNTechRNA\RN9391R00 CoV-VAC\06 Biomarker\00 Overview\02 Summary of analyses\01 Documents\ JPT\Bestellung in Apr2020Raw data (FACS data) were saved at: \\isicfs101\rndrawdata\WKSBNT950\9391
- Experimental data were saved at: \\biontech.int\Projects\BioNTechRNA\RN9391R00 CoV-VAC\06.1 Biomarker clinical data\ICS with respective batch folders …… BNT162b1 batch1 30µg 10µg 20200625
- Flow Cytometry analysis files were saved at \\biontech.int\Projects\BioNTechRNA\RN9391R00 CoV-VAC\06.1 Biomarker clinical data\ICS\BNT162b1 batchX X\FACS data
- Files transferred to DS&BA Unit for each analyzed batch were saved at: \\biontech.int\Projects\BioNTechRNA\RN9391R00 CoV-VAC\06.1 Biomarker clinical data\ICS\BNT162b1 batchX X\FACS data\post box
- lab book entries can be found in lab book #1966 (pages 1-102 and pages 180-190), lab book #2021 (pages 33-54, 106-127) and lab book #2022 (pages 19-77)

3 INTRODUCTION

3.1 Background

Within the clinical trial BNT162-01, a continuous immune monitoring program was performed to analyze study participants' immune responses against vaccine-encoded antigens specific to SARS-CoV-2 S protein or RBD including ELISA, *ex vivo* ELISpot, and ICS.

3.2 Objectives

The objective of this study was to assess the Th1 (IFNγ and IL-2) and Th2 (IL-4) cytokine profile of T cells by ICS in response to defined proteins / protein domains of SARS-CoV-2 as a result of immunization with BNT162b1. In the presented second version of this report, subject cohorts of older individuals at higher risk for severe courses of COVID-19 immunized with BNT162b1 were also monitored for Th1/Th2 cell responses post vaccination.

3.3 Study Design

PBMC fractions isolated from blood of study subjects collected at baseline (pre-vaccination) and 29±3 days after the primary immunization (post-vaccination) with BNT162b1 were analyzed by ICS (interim report: n=95 in total; adults: 1 µg cohort: n=10, 3 µg cohort: n=10, 10 µg cohort: n=10, 20 µg cohort: n=6, 30 µg cohort: n= 12, 50 µg cohort: n=9, 60 µg cohort: n=11, older adults: 10 µg cohort: n=8, 20 µg cohort: n=8, 30 µg cohort: n=11). Study subjects with insufficient PBMC material for all cell-based assays were not analyzed by ICS. For bench-marking, PBMCs from recovered COVID-19 patients were used. PBMCs isolated from healthy volunteer leukapheresis samples were used as in-house reference samples (intra- and inter-assay controls). Assay control sample bridging was performed in one experiment.

PBMCs were stimulated with overlapping peptide pools representing different portions of the wild-type sequence of the SARS-CoV-2 S protein, namely N-terminal pools 'S pool 1' (aa 1-643) and 'RBD' [aa 1-16 fused to aa 327-528 of the S protein], and the C-terminal 'S pool 2' (aa 633-1273), and stained with fluorescently labeled antibodies directed against lineage markers CD3, CD4, and CD8 as well as cytokine-specific antibodies detecting IFNγ, IL-2, and IL-4. After the staining procedure, cells were analyzed on a flow cytometer to measure the frequency of vaccine antigen-specific Th1 and Th2 $CD4^+$ T cells as well as cytotoxic $CD8^+$ T cells. Lastly, the results generated with pre- and post-vaccination samples of each subject were compared individually to identify the induction/expansion of cellular immune responses and to characterize their Th1 and Th2 balance after vaccination in adult and older adult cohorts.

4 MATERIALS AND METHODS

4.1 Test Item

Test items were overlapping peptide pools representing different portions of the wild-type sequence of SARS-CoV-2 S protein, namely N-terminal pools 'S pool 1' (aa 1-643) and 'RBD' [aa 1-16 fused to aa 327-528 of the S protein], and the C-terminal 'S pool 2' (aa 633-1273).

Peptide Formulation

Freeze-dried peptide preparations were purchased from JPT Peptide Technologies GmbH and were of a purity of >90% (HPLC purified, ISO-PLUS specification). Peptides were delivered as pepmixes (pre-pooled overlapping peptides (OLPs) with 0.025 mg/peptide) for SARS-CoV-2 RBD (refer to Table 4-1), SARS-CoV-2 FL-S-Protein 'S pool 1' (SARS-COV-2 FL-S-PROTEIN 1 - SARS-COV-2 FL-S-PROTEIN 158), and SARS-CoV-2 FL-S-Protein 'S pool 2' (SARS-COV-2 FL-S-PROTEIN 159 - SARS-COV-2 FL-S-PROTEIN 315) (refer to Table 4-2). Pepmixes were dissolved in dimethyl sulfoxide (DMSO) to 0.5 mg/mL/peptide and stored at -80°C until use. The peptide concentrations of all test items were adjusted to 2 µg/mL/peptide at point of use.

Table 4-1: Overview of single OLPs contained in SARS-CoV-2 RBD pepmix

JPT#	Sequence	Peptide name
43224_001	H-MFVFLVLLPLVSSQC-OH	SARS-COV-2_RBD_1
43224_002	H-LVLLPLVSSQCVVRF-OH	SARS-COV-2_RBD_2
43224_003	H-PLVSSQCVVRFPNIT-OH	SARS-COV-2_RBD_3
43224_004	H-SQCVVRFPNITNLCP-OH	SARS-COV-2_RBD_4
43224_005	H-VRFPNITNLCPFGEV-OH	SARS-COV-2_RBD_5
43224_006	H-NITNLCPFGEVFNAT-OH	SARS-COV-2_RBD_6
43224_007	H-LCPFGEVFNATRFAS-OH	SARS-COV-2_RBD_7
43224_008	H-GEVFNATRFASVYAW-OH	SARS-COV-2_RBD_8
43224_009	H-NATRFASVYAWNRKR-OH	SARS-COV-2_RBD_9
43224_010	H-FASVYAWNRKRISNC-OH	SARS-COV-2_RBD_10
43224_011	H-YAWNRKRISNCVADY-OH	SARS-COV-2_RBD_11
43224_012	H-RKRISNCVADYSVLY-OH	SARS-COV-2_RBD_12
43224_013_W1	H-SNCVADYSVLYNSAS-OH	SARS-COV-2_RBD_13
43224_014_W3	H-ADYSVLYNSASFSTF-OH	SARS-COV-2_RBD_14
43224_015	H-VLYNSASFSTFKCYG-OH	SARS-COV-2_RBD_15
43224_016	H-SASFSTFKCYGVSPT-OH	SARS-COV-2_RBD_16
43224_017	H-STFKCYGVSPTKLND-OH	SARS-COV-2_RBD_17
43224_018	H-CYGVSPTKLNDLCFT-OH	SARS-COV-2_RBD_18
43224_019	H-SPTKLNDLCFTNVYA-OH	SARS-COV-2_RBD_19
43224_020_W1	H-LNDLCFTNVYADSFV-OH	SARS-COV-2_RBD_20

JPT#	Sequence	Peptide name
43224_021_W2	H-CFTNVYADSFVIRGD-OH	SARS-COV-2_RBD_21
43224_022	H-VYADSFVIRGDEVRQ-OH	SARS-COV-2_RBD_22
43224_023	H-SFVIRGDEVRQIAPG-OH	SARS-COV-2_RBD_23
43224_024	H-RGDEVRQIAPGQTGK-OH	SARS-COV-2_RBD_24
43224_025	H-VRQIAPGQTGKIADY-OH	SARS-COV-2_RBD_25
43224_026	H-APGQTGKIADYNYKL-OH	SARS-COV-2_RBD_26
43224_027	H-TGKIADYNYKLPDDF-OH	SARS-COV-2_RBD_27
43224_028	H-ADYNYKLPDDFTGCV-OH	SARS-COV-2_RBD_28
43224_029	H-YKLPDDFTGCVIAWN-OH	SARS-COV-2_RBD_29
43224_030_W1	H-DDFTGCVIAWNSNNL-OH	SARS-COV-2_RBD_30
43224_031	H-GCVIAWNSNNLDSKV-OH	SARS-COV-2_RBD_31
43224_032	H-AWNSNNLDSKVGGNY-OH	SARS-COV-2_RBD_32
43224_033	H-NNLDSKVGGNYNYLY-OH	SARS-COV-2_RBD_33
43224_034	H-SKVGGNYNYLYRLFR-OH	SARS-COV-2_RBD_34
43224_035	H-GNYNYLYRLFRKSNL-OH	SARS-COV-2_RBD_35
43224_036	H-YLYRLFRKSNLKPFE-OH	SARS-COV-2_RBD_36
43224_037	H-LFRKSNLKPFERDIS-OH	SARS-COV-2_RBD_37
43224_038	H-SNLKPFERDISTEIY-OH	SARS-COV-2_RBD_38
43224_039	H-PFERDISTEIYQAGS-OH	SARS-COV-2_RBD_39
43224_040_W1	H-DISTEIYQAGSTPCN-OH	SARS-COV-2_RBD_40
43224_041	H-EIYQAGSTPCNGVEG-OH	SARS-COV-2_RBD_41
43224_042	H-AGSTPCNGVEGFNCY-OH	SARS-COV-2_RBD_42
43224_043	H-PCNGVEGFNCYFPLQ-OH	SARS-COV-2_RBD_43
43224_044	H-VEGFNCYFPLQSYGF-OH	SARS-COV-2_RBD_44
43224_045	H-NCYFPLQSYGFQPTN-OH	SARS-COV-2_RBD_45
43224_046	H-PLQSYGFQPTNGVGY-OH	SARS-COV-2_RBD_46
43224_047	H-YGFQPTNGVGYQPYR-OH	SARS-COV-2_RBD_47
43224_048	H-PTNGVGYQPYRVVVL-OH	SARS-COV-2_RBD_48
43224_049	H-VGYQPYRVVVLSFEL-OH	SARS-COV-2_RBD_49
43224_050_W2	H-PYRVVVLSFELLHAP-OH	SARS-COV-2_RBD_50
43224_051	H-VVLSFELLHAPATVC-OH	SARS-COV-2_RBD_51
43224_052	H-SFELLHAPATVCGPK-OH	SARS-COV-2_RBD_52

Table 4-2: Overview of single OLPs contained in SARS-CoV-2_FL-S-Protein pool 1 and pool 2

Pool	JPT-#	Sequence	Peptide name
1	43224_053_W1	H-MFVFLVLLPLVSSQC-OH	SARS-COV-2_FL-S-PROTEIN_1
	43224_054	H-LVLLPLVSSQCVNLT-OH	SARS-COV-2_FL-S-PROTEIN_2
	43224_055	H-PLVSSQCVNLTTRTQ-OH	SARS-COV-2_FL-S-PROTEIN_3
	43224_056	H-SQCVNLTTRTQLPPA-OH	SARS-COV-2_FL-S-PROTEIN_4
	43224_057	H-NLTTRTQLPPAYTNS-OH	SARS-COV-2_FL-S-PROTEIN_5
	43224_058	H-RTQLPPAYTNSFTRG-OH	SARS-COV-2_FL-S-PROTEIN_6
	43224_059	H-PPAYTNSFTRGVYYP-OH	SARS-COV-2_FL-S-PROTEIN_7

Pool	JPT-#	Sequence	Peptide name
	43224_060	H-TNSFTRGVYYPDKVF-OH	SARS-COV-2_FL-S-PROTEIN_8
	43224_061	H-TRGVYYPDKVFRSSV-OH	SARS-COV-2_FL-S-PROTEIN_9
	43224_062	H-YYPDKVFRSSVLHST-OH	SARS-COV-2_FL-S-PROTEIN_10
	43224_063	H-KVFRSSVLHSTQDLF-OH	SARS-COV-2_FL-S-PROTEIN_11
	43224_064	H-SSVLHSTQDLFLPFF-OH	SARS-COV-2_FL-S-PROTEIN_12
	43224_065	H-HSTQDLFLPFFSNVT-OH	SARS-COV-2_FL-S-PROTEIN_13
	43224_066	H-DLFLPFFSNVTWFHA-OH	SARS-COV-2_FL-S-PROTEIN_14
	43224_067	H-PFFSNVTWFHAIHVS-OH	SARS-COV-2_FL-S-PROTEIN_15
	43224_068	H-NVTWFHAIHVSGTNG-OH	SARS-COV-2_FL-S-PROTEIN_16
	43224_069	H-FHAIHVSGTNGTKRF-OH	SARS-COV-2_FL-S-PROTEIN_17
	43224_070	H-HVSGTNGTKRFDNPV-OH	SARS-COV-2_FL-S-PROTEIN_18
	43224_071	H-TNGTKRFDNPVLPFN-OH	SARS-COV-2_FL-S-PROTEIN_19
	43224_072	H-KRFDNPVLPFNDGVY-OH	SARS-COV-2_FL-S-PROTEIN_20
	43224_073	H-NPVLPFNDGVYFAST-OH	SARS-COV-2_FL-S-PROTEIN_21
	43224_074	H-PFNDGVYFASTEKSN-OH	SARS-COV-2_FL-S-PROTEIN_22
	43224_075	H-GVYFASTEKSNIIRG-OH	SARS-COV-2_FL-S-PROTEIN_23
	43224_076	H-ASTEKSNIIRGWIFG-OH	SARS-COV-2_FL-S-PROTEIN_24
	43224_077	H-KSNIIRGWIFGTTLD-OH	SARS-COV-2_FL-S-PROTEIN_25
	43224_078	H-IRGWIFGTTLDSKTQ-OH	SARS-COV-2_FL-S-PROTEIN_26
	43224_079	H-IFGTTLDSKTQSLLI-OH	SARS-COV-2_FL-S-PROTEIN_27
	43224_080_W2	H-TLDSKTQSLLIVNNA-OH	SARS-COV-2_FL-S-PROTEIN_28
	43224_081	H-KTQSLLIVNNATNVV-OH	SARS-COV-2_FL-S-PROTEIN_29
	43224_082_W1	H-LLIVNNATNVVIKVC-OH	SARS-COV-2_FL-S-PROTEIN_30
	43224_083_W1	H-NNATNVVIKVCEFQF-OH	SARS-COV-2_FL-S-PROTEIN_31
	43224_084_W1	H-NVVIKVCEFQFCNDP-OH	SARS-COV-2_FL-S-PROTEIN_32
	43224_085	H-KVCEFQFCNDPFLGV-OH	SARS-COV-2_FL-S-PROTEIN_33
	43224_086	H-FQFCNDPFLGVYYHK-OH	SARS-COV-2_FL-S-PROTEIN_34
	43224_087	H-NDPFLGVYYHKNNKS-OH	SARS-COV-2_FL-S-PROTEIN_35
	43224_088	H-LGVYYHKNNKSWMES-OH	SARS-COV-2_FL-S-PROTEIN_36
	43224_089	H-YHKNNKSWMESEFRV-OH	SARS-COV-2_FL-S-PROTEIN_37
	43224_090	H-NKSWMESEFRVYSSA-OH	SARS-COV-2_FL-S-PROTEIN_38
	43224_091a	H-MESEFRVYSSANNCT-OH	SARS-COV-2_FL-S-PROTEIN_39
	43224_092a	H-FRVYSSANNCTFEYV-OH	SARS-COV-2_FL-S-PROTEIN_40
	43224_093	H-SSANNCTFEYVSQPF-OH	SARS-COV-2_FL-S-PROTEIN_41
	43224_094a	H-NCTFEYVSQPFLMDL-OH	SARS-COV-2_FL-S-PROTEIN_42
	43224_095	H-EYVSQPFLMDLEGKQ-OH	SARS-COV-2_FL-S-PROTEIN_43
	43224_096	H-QPFLMDLEGKQGNFK-OH	SARS-COV-2_FL-S-PROTEIN_44
	43224_097	H-MDLEGKQGNFKNLRE-OH	SARS-COV-2_FL-S-PROTEIN_45
	43224_098	H-GKQGNFKNLREFVFK-OH	SARS-COV-2_FL-S-PROTEIN_46
	43224_099	H-NFKNLREFVFKNIDG-OH	SARS-COV-2_FL-S-PROTEIN_47
	43224_100	H-LREFVFKNIDGYFKI-OH	SARS-COV-2_FL-S-PROTEIN_48
	43224_101	H-VFKNIDGYFKIYSKH-OH	SARS-COV-2_FL-S-PROTEIN_49
	43224_102	H-IDGYFKIYSKHTPIN-OH	SARS-COV-2_FL-S-PROTEIN_50
	43224_103	H-FKIYSKHTPINLVRD-OH	SARS-COV-2_FL-S-PROTEIN_51

Pool	JPT-#	Sequence	Peptide name
	43224_104	H-SKHTPINLVRDLPQG-OH	SARS-COV-2_FL-S-PROTEIN_52
	43224_105	H-PINLVRDLPQGFSAL-OH	SARS-COV-2_FL-S-PROTEIN_53
	43224_106	H-VRDLPQGFSALEPLV-OH	SARS-COV-2_FL-S-PROTEIN_54
	43224_107	H-PQGFSALEPLVDLPI-OH	SARS-COV-2_FL-S-PROTEIN_55
	43224_108	H-SALEPLVDLPIGINI-OH	SARS-COV-2_FL-S-PROTEIN_56
	43224_109	H-PLVDLPIGINITRFQ-OH	SARS-COV-2_FL-S-PROTEIN_57
	43224_110	H-LPIGINITRFQTLLA-OH	SARS-COV-2_FL-S-PROTEIN_58
	43224_111	H-INITRFQTLLALHRS-OH	SARS-COV-2_FL-S-PROTEIN_59
	43224_112	H-RFQTLLALHRSYLTP-OH	SARS-COV-2_FL-S-PROTEIN_60
	43224_113	H-LLALHRSYLTPGDSS-OH	SARS-COV-2_FL-S-PROTEIN_61
	43224_114	H-HRSYLTPGDSSSGWT-OH	SARS-COV-2_FL-S-PROTEIN_62
	43224_115	H-LTPGDSSSGWTAGAA-OH	SARS-COV-2_FL-S-PROTEIN_63
	43224_116a	H-DSSSGWTAGAAAYYV-OH	SARS-COV-2_FL-S-PROTEIN_64
	43224_117a	H-GWTAGAAAYYVGYLQ-OH	SARS-COV-2_FL-S-PROTEIN_65
	43224_118	H-GAAAYYVGYLQPRTF-OH	SARS-COV-2_FL-S-PROTEIN_66
	43224_119	H-YYVGYLQPRTFLLKY-OH	SARS-COV-2_FL-S-PROTEIN_67
	43224_120	H-YLQPRTFLLKYNENG-OH	SARS-COV-2_FL-S-PROTEIN_68
	43224_121	H-RTFLLKYNENGTITD-OH	SARS-COV-2_FL-S-PROTEIN_69
	43224_122	H-LKYNENGTITDAVDC-OH	SARS-COV-2_FL-S-PROTEIN_70
	43224_123_W1	H-ENGTITDAVDCALDP-OH	SARS-COV-2_FL-S-PROTEIN_71
	43224_124	H-ITDAVDCALDPLSET-OH	SARS-COV-2_FL-S-PROTEIN_72
	43224_125_W1	H-VDCALDPLSETKCTL-OH	SARS-COV-2_FL-S-PROTEIN_73
	43224_126	H-LDPLSETKCTLKSFT-OH	SARS-COV-2_FL-S-PROTEIN_74
	43224_127	H-SETKCTLKSFTVEKG-OH	SARS-COV-2_FL-S-PROTEIN_75
	43224_128	H-CTLKSFTVEKGIYQT-OH	SARS-COV-2_FL-S-PROTEIN_76
	43224_129	H-SFTVEKGIYQTSNFR-OH	SARS-COV-2_FL-S-PROTEIN_77
	43224_130	H-EKGIYQTSNFRVQPT-OH	SARS-COV-2_FL-S-PROTEIN_78
	43224_131	H-YQTSNFRVQPTESIV-OH	SARS-COV-2_FL-S-PROTEIN_79
	43224_132	H-NFRVQPTESIVRFPN-OH	SARS-COV-2_FL-S-PROTEIN_80
	43224_133	H-QPTESIVRFPNITNL-OH	SARS-COV-2_FL-S-PROTEIN_81
	43224_134	H-SIVRFPNITNLCPFG-OH	SARS-COV-2_FL-S-PROTEIN_82
	43224_135	H-FPNITNLCPFGEVFN-OH	SARS-COV-2_FL-S-PROTEIN_83
	43224_136	H-TNLCPFGEVFNATRF-OH	SARS-COV-2_FL-S-PROTEIN_84
	43224_137	H-PFGEVFNATRFASVY-OH	SARS-COV-2_FL-S-PROTEIN_85
	43224_138_W1	H-VFNATRFASVYAWNR-OH	SARS-COV-2_FL-S-PROTEIN_86
	43224_139	H-TRFASVYAWNRKRIS-OH	SARS-COV-2_FL-S-PROTEIN_87
	43224_140	H-SVYAWNRKRISNCVA-OH	SARS-COV-2_FL-S-PROTEIN_88
	43224_141_W1	H-WNRKRISNCVADYSV-OH	SARS-COV-2_FL-S-PROTEIN_89
	43224_142	H-RISNCVADYSVLYNS-OH	SARS-COV-2_FL-S-PROTEIN_90
	43224_143_W1	H-CVADYSVLYNSASFS-OH	SARS-COV-2_FL-S-PROTEIN_91
	43224_144	H-YSVLYNSASFSTFKC-OH	SARS-COV-2_FL-S-PROTEIN_92
	43224_145a	H-YNSASFSTFKCYGVS-OH	SARS-COV-2_FL-S-PROTEIN_93
	43224_146	H-SFSTFKCYGVSPTKL-OH	SARS-COV-2_FL-S-PROTEIN_94
	43224_147	H-FKCYGVSPTKLNDLC-OH	SARS-COV-2_FL-S-PROTEIN_95

Pool	JPT-#	Sequence	Peptide name
	43224_148	H-GVSPTKLNDLCFTNV-OH	SARS-COV-2_FL-S-PROTEIN_96
	43224_149	H-TKLNDLCFTNVYADS-OH	SARS-COV-2_FL-S-PROTEIN_97
	43224_150_W1	H-DLCFTNVYADSFVIR-OH	SARS-COV-2_FL-S-PROTEIN_98
	43224_151	H-TNVYADSFVIRGDEV-OH	SARS-COV-2_FL-S-PROTEIN_99
	43224_152	H-ADSFVIRGDEVRQIA-OH	SARS-COV-2_FL-S-PROTEIN_100
	43224_153	H-VIRGDEVRQIAPGQT-OH	SARS-COV-2_FL-S-PROTEIN_101
	43224_154	H-DEVRQIAPGQTGKIA-OH	SARS-COV-2_FL-S-PROTEIN_102
	43224_155	H-QIAPGQTGKIADYNY-OH	SARS-COV-2_FL-S-PROTEIN_103
	43224_156	H-GQTGKIADYNYKLPD-OH	SARS-COV-2_FL-S-PROTEIN_104
	43224_157	H-KIADYNYKLPDDFTG-OH	SARS-COV-2_FL-S-PROTEIN_105
	43224_158a	H-YNYKLPDDFTGCVIA-OH	SARS-COV-2_FL-S-PROTEIN_106
	43224_159_W2	H-LPDDFTGCVIAWNSN-OH	SARS-COV-2_FL-S-PROTEIN_107
	43224_160	H-FTGCVIAWNSNNLDS-OH	SARS-COV-2_FL-S-PROTEIN_108
	43224_161	H-VIAWNSNNLDSKVGG-OH	SARS-COV-2_FL-S-PROTEIN_109
	43224_162	H-NSNNLDSKVGGNYNY-OH	SARS-COV-2_FL-S-PROTEIN_110
	43224_163	H-LDSKVGGNYNYLYRL-OH	SARS-COV-2_FL-S-PROTEIN_111
	43224_164	H-VGGNYNYLYRLFRKS-OH	SARS-COV-2_FL-S-PROTEIN_112
	43224_165_W1	H-YNYLYRLFRKSNLKP-OH	SARS-COV-2_FL-S-PROTEIN_113
	43224_166	H-YRLFRKSNLKPFERD-OH	SARS-COV-2_FL-S-PROTEIN_114
	43224_167	H-RKSNLKPFERDISTE-OH	SARS-COV-2_FL-S-PROTEIN_115
	43224_168	H-LKPFERDISTEIYQA-OH	SARS-COV-2_FL-S-PROTEIN_116
	43224_169	H-ERDISTEIYQAGSTP-OH	SARS-COV-2_FL-S-PROTEIN_117
	43224_170_W1	H-STEIYQAGSTPCNGV-OH	SARS-COV-2_FL-S-PROTEIN_118
	43224_171	H-YQAGSTPCNGVEGFN-OH	SARS-COV-2_FL-S-PROTEIN_119
	43224_172_W1	H-STPCNGVEGFNCYFP-OH	SARS-COV-2_FL-S-PROTEIN_120
	43224_173a	H-NGVEGFNCYFPLQSY-OH	SARS-COV-2_FL-S-PROTEIN_121
	43224_174	H-GFNCYFPLQSYGFQP-OH	SARS-COV-2_FL-S-PROTEIN_122
	43224_175	H-YFPLQSYGFQPTNGV-OH	SARS-COV-2_FL-S-PROTEIN_123
	43224_176	H-QSYGFQPTNGVGYQP-OH	SARS-COV-2_FL-S-PROTEIN_124
	43224_177	H-FQPTNGVGYQPYRVV-OH	SARS-COV-2_FL-S-PROTEIN_125
	43224_178	H-NGVGYQPYRVVVLSF-OH	SARS-COV-2_FL-S-PROTEIN_126
	43224_179	H-YQPYRVVVLSFELLH-OH	SARS-COV-2_FL-S-PROTEIN_127
	43224_180	H-RVVVLSFELLHAPAT-OH	SARS-COV-2_FL-S-PROTEIN_128
	43224_181	H-LSFELLHAPATVCGP-OH	SARS-COV-2_FL-S-PROTEIN_129
	43224_182	H-LLHAPATVCGPKKST-OH	SARS-COV-2_FL-S-PROTEIN_130
	43224_183	H-PATVCGPKKSTNLVK-OH	SARS-COV-2_FL-S-PROTEIN_131
	43224_184_W1	H-CGPKKSTNLVKNKCV-OH	SARS-COV-2_FL-S-PROTEIN_132
	43224_185	H-KSTNLVKNKCVNFNF-OH	SARS-COV-2_FL-S-PROTEIN_133
	43224_186	H-LVKNKCVNFNFNGLT-OH	SARS-COV-2_FL-S-PROTEIN_134
	43224_187	H-KCVNFNFNGLTGTGV-OH	SARS-COV-2_FL-S-PROTEIN_135
	43224_188	H-FNFNGLTGTGVLTES-OH	SARS-COV-2_FL-S-PROTEIN_136
	43224_189	H-GLTGTGVLTESNKKF-OH	SARS-COV-2_FL-S-PROTEIN_137
	43224_190	H-TGVLTESNKKFLPFQ-OH	SARS-COV-2_FL-S-PROTEIN_138
	43224_191	H-TESNKKFLPFQQFGR-OH	SARS-COV-2_FL-S-PROTEIN_139

Pool	JPT-#	Sequence	Peptide name
	43224_192	H-KKFLPFQQFGRDIAD-OH	SARS-COV-2_FL-S-PROTEIN_140
	43224_193	H-PFQQFGRDIADTTDA-OH	SARS-COV-2_FL-S-PROTEIN_141
	43224_194	H-FGRDIADTTDAVRDP-OH	SARS-COV-2_FL-S-PROTEIN_142
	43224_195	H-IADTTDAVRDPQTLE-OH	SARS-COV-2_FL-S-PROTEIN_143
	43224_196	H-TDAVRDPQTLEILDI-OH	SARS-COV-2_FL-S-PROTEIN_144
	43224_197	H-RDPQTLEILDITPCS-OH	SARS-COV-2_FL-S-PROTEIN_145
	43224_198	H-TLEILDITPCSFGGV-OH	SARS-COV-2_FL-S-PROTEIN_146
	43224_199_W1	H-LDITPCSFGGVSVIT-OH	SARS-COV-2_FL-S-PROTEIN_147
	43224_200	H-PCSFGGVSVITPGTN-OH	SARS-COV-2_FL-S-PROTEIN_148
	43224_201	H-GGVSVITPGTNTSNQ-OH	SARS-COV-2_FL-S-PROTEIN_149
	43224_202	H-VITPGTNTSNQVAVL-OH	SARS-COV-2_FL-S-PROTEIN_150
	43224_203	H-GTNTSNQVAVLYQDV-OH	SARS-COV-2_FL-S-PROTEIN_151
	43224_204a	H-SNQVAVLYQDVNCTE-OH	SARS-COV-2_FL-S-PROTEIN_152
	43224_205	H-AVLYQDVNCTEVPVA-OH	SARS-COV-2_FL-S-PROTEIN_153
	43224_206	H-QDVNCTEVPVAIHAD-OH	SARS-COV-2_FL-S-PROTEIN_154
	43224_207	H-CTEVPVAIHADQLTP-OH	SARS-COV-2_FL-S-PROTEIN_155
	43224_208	H-PVAIHADQLTPTWRV-OH	SARS-COV-2_FL-S-PROTEIN_156
	43224_209	H-HADQLTPTWRVYSTG-OH	SARS-COV-2_FL-S-PROTEIN_157
	43224_210	H-LTPTWRVYSTGSNVF-OH	SARS-COV-2_FL-S-PROTEIN_158
2	43224_211	H-WRVYSTGSNVFQTRA-OH	SARS-COV-2_FL-S-PROTEIN_159
	43224_212	H-STGSNVFQTRAGCLI-OH	SARS-COV-2_FL-S-PROTEIN_160
	43224_213a	H-NVFQTRAGCLIGAEH-OH	SARS-COV-2_FL-S-PROTEIN_161
	43224_214	H-TRAGCLIGAEHVNNS-OH	SARS-COV-2_FL-S-PROTEIN_162
	43224_215	H-CLIGAEHVNNSYECD-OH	SARS-COV-2_FL-S-PROTEIN_163
	43224_216	H-AEHVNNSYECDIPIG-OH	SARS-COV-2_FL-S-PROTEIN_164
	43224_217	H-NNSYECDIPIGAGIC-OH	SARS-COV-2_FL-S-PROTEIN_165
	43224_218a	H-ECDIPIGAGICASYQ-OH	SARS-COV-2_FL-S-PROTEIN_166
	43224_219_W1	H-PIGAGICASYQTQTN-OH	SARS-COV-2_FL-S-PROTEIN_167
	43224_220	H-GICASYQTQTNSPRR-OH	SARS-COV-2_FL-S-PROTEIN_168
	43224_221	H-SYQTQTNSPRRARSV-OH	SARS-COV-2_FL-S-PROTEIN_169
	43224_222	H-QTNSPRRARSVASQS-OH	SARS-COV-2_FL-S-PROTEIN_170
	43224_223	H-PRRARSVASQSIIAY-OH	SARS-COV-2_FL-S-PROTEIN_171
	43224_224	H-RSVASQSIIAYTMSL-OH	SARS-COV-2_FL-S-PROTEIN_172
	43224_225a	H-SQSIIAYTMSLGAEN-OH	SARS-COV-2_FL-S-PROTEIN_173
	43224_226	H-IAYTMSLGAENSVAY-OH	SARS-COV-2_FL-S-PROTEIN_174
	43224_227	H-MSLGAENSVAYSNNS-OH	SARS-COV-2_FL-S-PROTEIN_175
	43224_228	H-AENSVAYSNNSIAIP-OH	SARS-COV-2_FL-S-PROTEIN_176
	43224_229	H-VAYSNNSIAIPTNFT-OH	SARS-COV-2_FL-S-PROTEIN_177
	43224_230	H-NNSIAIPTNFTISVT-OH	SARS-COV-2_FL-S-PROTEIN_178
	43224_231	H-AIPTNFTISVTTEIL-OH	SARS-COV-2_FL-S-PROTEIN_179
	43224_232_W1	H-NFTISVTTEILPVSM-OH	SARS-COV-2_FL-S-PROTEIN_180
	43224_233	H-SVTTEILPVSMTKTS-OH	SARS-COV-2_FL-S-PROTEIN_181
	43224_234a	H-EILPVSMTKTSVDCT-OH	SARS-COV-2_FL-S-PROTEIN_182
	43224_235_W4	H-VSMTKTSVDCTMYIC-OH	SARS-COV-2_FL-S-PROTEIN_183

Pool	JPT-#	Sequence	Peptide name
	43224_236_W1	H-KTSVDCTMYICGDST-OH	SARS-COV-2_FL-S-PROTEIN_184
	43224_237_W2	H-DCTMYICGDSTECSN-OH	SARS-COV-2_FL-S-PROTEIN_185
	43224_238a	H-YICGDSTECSNLLLQ-OH	SARS-COV-2_FL-S-PROTEIN_186
	43224_239	H-DSTECSNLLLQYGSF-OH	SARS-COV-2_FL-S-PROTEIN_187
	43224_240	H-CSNLLLQYGSFCTQL-OH	SARS-COV-2_FL-S-PROTEIN_188
	43224_241	H-LLQYGSFCTQLNRAL-OH	SARS-COV-2_FL-S-PROTEIN_189
	43224_242	H-GSFCTQLNRALTGIA-OH	SARS-COV-2_FL-S-PROTEIN_190
	43224_243	H-TQLNRALTGIAVEQD-OH	SARS-COV-2_FL-S-PROTEIN_191
	43224_244	H-RALTGIAVEQDKNTQ-OH	SARS-COV-2_FL-S-PROTEIN_192
	43224_245	H-GIAVEQDKNTQEVFA-OH	SARS-COV-2_FL-S-PROTEIN_193
	43224_246_W1	H-EQDKNTQEVFAQVKQ-OH	SARS-COV-2_FL-S-PROTEIN_194
	43224_247a	H-NTQEVFAQVKQIYKT-OH	SARS-COV-2_FL-S-PROTEIN_195
	43224_248	H-VFAQVKQIYKTPPIK-OH	SARS-COV-2_FL-S-PROTEIN_196
	43224_249	H-VKQIYKTPPIKDFGG-OH	SARS-COV-2_FL-S-PROTEIN_197
	43224_250	H-YKTPPIKDFGGFNFS-OH	SARS-COV-2_FL-S-PROTEIN_198
	43224_251	H-PIKDFGGFNFSQILP-OH	SARS-COV-2_FL-S-PROTEIN_199
	43224_252	H-FGGFNFSQILPDPSK-OH	SARS-COV-2_FL-S-PROTEIN_200
	43224_253	H-NFSQILPDPSKPSKR-OH	SARS-COV-2_FL-S-PROTEIN_201
	43224_254	H-ILPDPSKPSKRSFIE-OH	SARS-COV-2_FL-S-PROTEIN_202
	43224_255	H-PSKPSKRSFIEDLLF-OH	SARS-COV-2_FL-S-PROTEIN_203
	43224_256	H-SKRSFIEDLLFNKVT-OH	SARS-COV-2_FL-S-PROTEIN_204
	43224_257	H-FIEDLLFNKVTLADA-OH	SARS-COV-2_FL-S-PROTEIN_205
	43224_258	H-LLFNKVTLADAGFIK-OH	SARS-COV-2_FL-S-PROTEIN_206
	43224_259	H-KVTLADAGFIKQYGD-OH	SARS-COV-2_FL-S-PROTEIN_207
	43224_260	H-ADAGFIKQYGDCLGD-OH	SARS-COV-2_FL-S-PROTEIN_208
	43224_261	H-FIKQYGDCLGDIAAR-OH	SARS-COV-2_FL-S-PROTEIN_209
	43224_262	H-YGDCLGDIAARDLIC-OH	SARS-COV-2_FL-S-PROTEIN_210
	43224_263	H-LGDIAARDLICAQKF-OH	SARS-COV-2_FL-S-PROTEIN_211
	43224_264	H-AARDLICAQKFNGLT-OH	SARS-COV-2_FL-S-PROTEIN_212
	43224_265	H-LICAQKFNGLTVLPP-OH	SARS-COV-2_FL-S-PROTEIN_213
	43224_266	H-QKFNGLTVLPPLLTD-OH	SARS-COV-2_FL-S-PROTEIN_214
	43224_267	H-GLTVLPPLLTDEMIA-OH	SARS-COV-2_FL-S-PROTEIN_215
	43224_268	H-LPPLLTDEMIAQYTS-OH	SARS-COV-2_FL-S-PROTEIN_216
	43224_269	H-LTDEMIAQYTSALLA-OH	SARS-COV-2_FL-S-PROTEIN_217
	43224_270_W1	H-MIAQYTSALLAGTIT-OH	SARS-COV-2_FL-S-PROTEIN_218
	43224_271_W1	H-YTSALLAGTITSGWT-OH	SARS-COV-2_FL-S-PROTEIN_219
	43224_272_W1	H-LLAGTITSGWTFGAG-OH	SARS-COV-2_FL-S-PROTEIN_220
	43224_273	H-TITSGWTFGAGAALQ-OH	SARS-COV-2_FL-S-PROTEIN_221
	43224_274	H-GWTFGAGAALQIPFA-OH	SARS-COV-2_FL-S-PROTEIN_222
	43224_275	H-GAGAALQIPFAMQMA-OH	SARS-COV-2_FL-S-PROTEIN_223
	43224_276	H-ALQIPFAMQMAYRFN-OH	SARS-COV-2_FL-S-PROTEIN_224
	43224_277	H-PFAMQMAYRFNGIGV-OH	SARS-COV-2_FL-S-PROTEIN_225
	43224_278	H-QMAYRFNGIGVTQNV-OH	SARS-COV-2_FL-S-PROTEIN_226
	43224_279	H-RFNGIGVTQNVLYEN-OH	SARS-COV-2_FL-S-PROTEIN_227

Pool	JPT-#	Sequence	Peptide name
	43224_280	H-IGVTQNVLYENQKLI-OH	SARS-COV-2_FL-S-PROTEIN_228
	43224_281	H-QNVLYENQKLIANQF-OH	SARS-COV-2_FL-S-PROTEIN_229
	43224_282	H-YENQKLIANQFNSAI-OH	SARS-COV-2_FL-S-PROTEIN_230
	43224_283	H-KLIANQFNSAIGKIQ-OH	SARS-COV-2_FL-S-PROTEIN_231
	43224_284	H-NQFNSAIGKIQDSLS-OH	SARS-COV-2_FL-S-PROTEIN_232
	43224_285	H-SAIGKIQDSLSSTAS-OH	SARS-COV-2_FL-S-PROTEIN_233
	43224_286	H-KIQDSLSSTASALGK-OH	SARS-COV-2_FL-S-PROTEIN_234
	43224_287	H-SLSSTASALGKLQDV-OH	SARS-COV-2_FL-S-PROTEIN_235
	43224_288	H-TASALGKLQDVVNQN-OH	SARS-COV-2_FL-S-PROTEIN_236
	43224_289	H-LGKLQDVVNQNAQAL-OH	SARS-COV-2_FL-S-PROTEIN_237
	43224_290_W1	H-QDVVNQNAQALNTLV-OH	SARS-COV-2_FL-S-PROTEIN_238
	43224_291	H-NQNAQALNTLVKQLS-OH	SARS-COV-2_FL-S-PROTEIN_239
	43224_292	H-QALNTLVKQLSSNFG-OH	SARS-COV-2_FL-S-PROTEIN_240
	43224_293	H-TLVKQLSSNFGAISS-OH	SARS-COV-2_FL-S-PROTEIN_241
	43224_294	H-QLSSNFGAISSVLND-OH	SARS-COV-2_FL-S-PROTEIN_242
	43224_295	H-NFGAISSVLNDILSR-OH	SARS-COV-2_FL-S-PROTEIN_243
	43224_296	H-ISSVLNDILSRLDKV-OH	SARS-COV-2_FL-S-PROTEIN_244
	43224_297	H-LNDILSRLDKVEAEV-OH	SARS-COV-2_FL-S-PROTEIN_245
	43224_298	H-LSRLDKVEAEVQIDR-OH	SARS-COV-2_FL-S-PROTEIN_246
	43224_299	H-DKVEAEVQIDRLITG-OH	SARS-COV-2_FL-S-PROTEIN_247
	43224_300	H-AEVQIDRLITGRLQS-OH	SARS-COV-2_FL-S-PROTEIN_248
	43224_301a	H-IDRLITGRLQSLQTY-OH	SARS-COV-2_FL-S-PROTEIN_249
	43224_302	H-ITGRLQSLQTYVTQQ-OH	SARS-COV-2_FL-S-PROTEIN_250
	43224_303	H-LQSLQTYVTQQLIRA-OH	SARS-COV-2_FL-S-PROTEIN_251
	43224_304_W1	H-QTYVTQQLIRAAEIR-OH	SARS-COV-2_FL-S-PROTEIN_252
	43224_305a	H-TQQLIRAAEIRASAN-OH	SARS-COV-2_FL-S-PROTEIN_253
	43224_306	H-IRAAEIRASANLAAT-OH	SARS-COV-2_FL-S-PROTEIN_254
	43224_307	H-EIRASANLAATKMSE-OH	SARS-COV-2_FL-S-PROTEIN_255
	43224_308	H-SANLAATKMSECVLG-OH	SARS-COV-2_FL-S-PROTEIN_256
	43224_309	H-AATKMSECVLGQSKR-OH	SARS-COV-2_FL-S-PROTEIN_257
	43224_310_W1	H-MSECVLGQSKRVDFC-OH	SARS-COV-2_FL-S-PROTEIN_258
	43224_311a	H-VLGQSKRVDFCGKGY-OH	SARS-COV-2_FL-S-PROTEIN_259
	43224_312	H-SKRVDFCGKGYHLMS-OH	SARS-COV-2_FL-S-PROTEIN_260
	43224_313	H-DFCGKGYHLMSFPQS-OH	SARS-COV-2_FL-S-PROTEIN_261
	43224_314	H-KGYHLMSFPQSAPHG-OH	SARS-COV-2_FL-S-PROTEIN_262
	43224_315	H-LMSFPQSAPHGVVFL-OH	SARS-COV-2_FL-S-PROTEIN_263
	43224_316	H-PQSAPHGVVFLHVTY-OH	SARS-COV-2_FL-S-PROTEIN_264
	43224_317	H-PHGVVFLHVTYVPAQ-OH	SARS-COV-2_FL-S-PROTEIN_265
	43224_318	H-VFLHVTYVPAQEKNF-OH	SARS-COV-2_FL-S-PROTEIN_266
	43224_319	H-VTYVPAQEKNFTTAP-OH	SARS-COV-2_FL-S-PROTEIN_267
	43224_320	H-PAQEKNFTTAPAICH-OH	SARS-COV-2_FL-S-PROTEIN_268
	43224_321	H-KNFTTAPAICHDGKA-OH	SARS-COV-2_FL-S-PROTEIN_269
	43224_322	H-TAPAICHDGKAHFPR-OH	SARS-COV-2_FL-S-PROTEIN_270
	43224_323	H-ICHDGKAHFPREGVF-OH	SARS-COV-2_FL-S-PROTEIN_271

Pool	JPT-#	Sequence	Peptide name
	43224_324	H-GKAHFPREGVFVSNG-OH	SARS-COV-2_FL-S-PROTEIN_272
	43224_325	H-FPREGVFVSNGTHWF-OH	SARS-COV-2_FL-S-PROTEIN_273
	43224_326	H-GVFVSNGTHWFVTQR-OH	SARS-COV-2_FL-S-PROTEIN_274
	43224_327	H-SNGTHWFVTQRNFYE-OH	SARS-COV-2_FL-S-PROTEIN_275
	43224_328	H-HWFVTQRNFYEPQII-OH	SARS-COV-2_FL-S-PROTEIN_276
	43224_329	H-TQRNFYEPQIITTDN-OH	SARS-COV-2_FL-S-PROTEIN_277
	43224_330a	H-FYEPQIITTDNTFVS-OH	SARS-COV-2_FL-S-PROTEIN_278
	43224_331a	H-QIITTDNTFVSGNCD-OH	SARS-COV-2_FL-S-PROTEIN_279
	43224_332	H-TDNTFVSGNCDVVIG-OH	SARS-COV-2_FL-S-PROTEIN_280
	43224_333_W3	H-FVSGNCDVVIGIVNN-OH	SARS-COV-2_FL-S-PROTEIN_281
	43224_334_W2	H-NCDVVIGIVNNTVYD-OH	SARS-COV-2_FL-S-PROTEIN_282
	43224_335	H-VIGIVNNTVYDPLQP-OH	SARS-COV-2_FL-S-PROTEIN_283
	43224_336	H-VNNTVYDPLQPELDS-OH	SARS-COV-2_FL-S-PROTEIN_284
	43224_337	H-VYDPLQPELDSFKEE-OH	SARS-COV-2_FL-S-PROTEIN_285
	43224_338	H-LQPELDSFKEELDKY-OH	SARS-COV-2_FL-S-PROTEIN_286
	43224_339	H-LDSFKEELDKYFKNH-OH	SARS-COV-2_FL-S-PROTEIN_287
	43224_340	H-KEELDKYFKNHTSPD-OH	SARS-COV-2_FL-S-PROTEIN_288
	43224_341	H-DKYFKNHTSPDVDLG-OH	SARS-COV-2_FL-S-PROTEIN_289
	43224_342	H-KNHTSPDVDLGDISG-OH	SARS-COV-2_FL-S-PROTEIN_290
	43224_343a	H-SPDVDLGDISGINAS-OH	SARS-COV-2_FL-S-PROTEIN_291
	43224_344	H-DLGDISGINASVVNI-OH	SARS-COV-2_FL-S-PROTEIN_292
	43224_345	H-ISGINASVVNIQKEI-OH	SARS-COV-2_FL-S-PROTEIN_293
	43224_346	H-NASVVNIQKEIDRLN-OH	SARS-COV-2_FL-S-PROTEIN_294
	43224_347	H-VNIQKEIDRLNEVAK-OH	SARS-COV-2_FL-S-PROTEIN_295
	43224_348	H-KEIDRLNEVAKNLNE-OH	SARS-COV-2_FL-S-PROTEIN_296
	43224_349	H-RLNEVAKNLNESLID-OH	SARS-COV-2_FL-S-PROTEIN_297
	43224_350	H-VAKNLNESLIDLQEL-OH	SARS-COV-2_FL-S-PROTEIN_298
	43224_351	H-LNESLIDLQELGKYE-OH	SARS-COV-2_FL-S-PROTEIN_299
	43224_352	H-LIDLQELGKYEQYIK-OH	SARS-COV-2_FL-S-PROTEIN_300
	43224_353	H-QELGKYEQYIKWPWY-OH	SARS-COV-2_FL-S-PROTEIN_301
	43224_354	H-KYEQYIKWPWYIWLG-OH	SARS-COV-2_FL-S-PROTEIN_302
	43224_355	H-YIKWPWYIWLGFIAG-OH	SARS-COV-2_FL-S-PROTEIN_303
	43224_356	H-PWYIWLGFIAGLIAI-OH	SARS-COV-2_FL-S-PROTEIN_304
	43224_357_W2	H-WLGFIAGLIAIVMVT-OH	SARS-COV-2_FL-S-PROTEIN_305
	43224_358_W2	H-IAGLIAIVMVTIMLC-OH	SARS-COV-2_FL-S-PROTEIN_306
	43224_359_W2	H-IAIVMVTIMLCCMTS-OH	SARS-COV-2_FL-S-PROTEIN_307
	43224_360_W4	H-MVTIMLCCMTSCCSC-OH	SARS-COV-2_FL-S-PROTEIN_308
	43224_361_W3	H-MLCCMTSCCSCLKGC-OH	SARS-COV-2_FL-S-PROTEIN_309
	43224_362_W3	H-MTSCCSCLKGCCSCG-OH	SARS-COV-2_FL-S-PROTEIN_310
	43224_363_W2	H-CSCLKGCCSCGSCCK-OH	SARS-COV-2_FL-S-PROTEIN_311
	43224_364	H-KGCCSCGSCCKFDED-OH	SARS-COV-2_FL-S-PROTEIN_312
	43224_365	H-SCGSCCKFDEDDSEP-OH	SARS-COV-2_FL-S-PROTEIN_313
	43224_366_W1	H-CCKFDEDDSEPVLKG-OH	SARS-COV-2_FL-S-PROTEIN_314
	43224_367_W1	H-DEDDSEPVLKGVKLHYT-OH	SARS-COV-2_FL-S-PROTEIN_315

4.2 Control Item

As a control item (negative control group) peptide solvent DMSO was used for all analyzed vaccinated subjects.

As internal positive stimulation controls, CEFX Ultra SuperStim Pool (JPT) and anti-CD3 antibody were used for all analyzed vaccinated subjects.

4.3 Test System

PBMC fractions isolated from blood of study subjects and recovered COVID-19 patients.

Processing of Li-Heparin blood samples from study subjects 276-02-0XXX was performed at a contracted laboratory (Precision for Medicine/ Epiontis GmbH) according to the Laboratory Instructions Manual.

Processing of Li-Heparin blood samples from study subjects 276-01-0XXX, isolation of PBMCs from recovered COVID-19 patients and isolation of PBMCs from healthy volunteer leukapheresis samples was performed at the Biosampling Unit (BioNTech SE) or in the labs of the Biosampling Core Facility (BioNTech RNA Pharmaceuticals) as back up according to BioNTech standards (SOP-030-100). COVID-19 patients' blood samples were obtained from the Frankfurt University Hospital (Germany).

Table 4-3: Study subject material

V1: baseline; V5: 29±3 days after primary immunization

Subject number	Biosampling ID	Cohort (BNT162b1)	Visit	Collection date	Visit	Collection date
276-01-0007	B1620001	10 µg	V1	23-Apr-2020	V5	25-May-2020
276-01-0004	B1620003	10 µg	V1	24-Apr-2020	V5	22-May-2020
276-01-0005	B1620004	10 µg	V1	24-Apr-2020	V5	22-May-2020
276-01-0011	B1620005	10 µg	V1	24-Apr-2020	V5	22-May-2020
276-01-0003	B1620007	10 µg	V1	28-Apr-2020	V5	27-May-2020
276-01-0006	B1620009	10 µg	V1	28-Apr-2020	V5	27-May-2020
276-01-0008	B1620012	10 µg	V1	28-Apr-2020	V5	27-May-2020
276-01-0009	B1620008	10 µg	V1	28-Apr-2020	V5	27-May-2020
276-01-0017	B1620010	10 µg	V1	28-Apr-2020	V5	27-May-2020
276-01-0019	B1620011	10 µg	V1	28-Apr-2020	V5	27-May-2020
276-01-0016	B1620015	30 µg	V1	29-Apr-2020	V5	27-May-2020
276-01-0020	B1620016	30 µg	V1	29-Apr-2020	V5	27-May-2020
276-01-0021	B1620017	30 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0032	B1620020	30 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0034	B1620019	30 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0037	B1620022	30 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0028	B1620025	30 µg	V1	07-May-2020	V5	04-Jun-2020
276-01-0031	B1620026	30 µg	V1	07-May-2020	V5	04-Jun-2020

Subject number	Biosampling ID	Cohort (BNT162b1)	Visit	Collection date	Visit	Collection date
276-01-0038	B1620027	30 µg	V1	07-May-2020	V5	04-Jun-2020
276-01-0039	B1620028	30 µg	V1	07-May-2020	V5	04-Jun-2020
276-01-0043	B1620029	30 µg	V1	07-May-2020	V5	03-Jun-2020
276-01-0047	B1620030	30 µg	V1	07-May-2020	V5	04-Jun-2020
276-01-0018	B1620014	1 µg	V1	29-Apr-2020	V5	27-May-2020
276-01-0023	B1620021	1 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0025	B1620018	1 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0033	B1620023	1 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0045	B1620024	1 µg	V1	05-May-2020	V5	02-Jun-2020
276-01-0040	B1620032	1 µg	V1	08-May-2020	V5	04-Jun-2020
276-01-0041	B1620033	1 µg	V1	08-May-2020	V5	04-Jun-2020
276-01-0042	B1620034	1 µg	V1	08-May-2020	V5	04-Jun-2020
276-01-0048	B1620035	1 µg	V1	08-May-2020	V5	04-Jun-2020
276-01-0052	B1620036	1 µg	V1	08-May-2020	V5	03-Jun-2020
276-01-0066	B1620050	60 µg	V1	19-May-2020	V5	16-Jun-2020
276-01-0096	B1620049	60 µg	V1	19-May-2020	V5	17-Jun-2020
276-01-0083	B1620051	60 µg	V1	20-May-2020	V5	16-Jun-2020
276-01-0089	B1620052	60 µg	V1	20-May-2020	V5	16-Jun-2020
276-01-0093	B1620053	60 µg	V1	20-May-2020	V5	16-Jun-2020
276-01-0104	B1620054	60 µg	V1	20-May-2020	V5	17-Jun-2020
276-01-0075	B1620059	60 µg	V1	22-May-2020	V5	19-Jun-2020
276-01-0076	B1620058	60 µg	V1	22-May-2020	V5	19-Jun-2020
276-01-0078	B1620060	60 µg	V1	22-May-2020	V5	19-Jun-2020
276-01-0085	B1620056	60 µg	V1	22-May-2020	V5	19-Jun-2020
276-01-0103	B1620057	60 µg	V1	22-May-2020	V5	22-Jun-2020
276-01-0049	B1620037	50 µg	V1	12-May-2020	V5	09-Jun-2020
276-01-0055	B1620039	50 µg	V1	13-May-2020	V5	09-Jun-2020
276-01-0056	B1620040	50 µg	V1	13-May-2020	V5	09-Jun-2020
276-01-0059	B1620041	50 µg	V1	13-May-2020	V5	09-Jun-2020
276-01-0060	B1620042	50 µg	V1	13-May-2020	V5	09-Jun-2020
276-01-0057	B1620044	50 µg	V1	15-May-2020	V5	12-Jun-2020
276-01-0068	B1620045	50 µg	V1	15-May-2020	V5	12-Jun-2020
276-01-0070	B1620047	50 µg	V1	15-May-2020	V5	12-Jun-2020
276-01-0073	B1620048	50 µg	V1	15-May-2020	V5	12-Jun-2020
276-01-0151	B1620140	20 µg	V1	16-Jul-2020	V5	13-Aug-2020
276-01-0171	B1620141	20 µg	V1	16-Jul-2020	V5	13-Aug-2020
276-01-0172	B1620142	20 µg	V1	16-Jul-2020	V5	13-Aug-2020
276-01-0173	B1620150	20 µg	V1	16-Jul-2020	V5	13-Aug-2020
276-01-0178	B1620147	20 µg	V1	16-Jul-2020	V5	13-Aug-2020
276-01-0197	B1620146	20 µg	V1	16-Jul-2020	V5	13-Aug-2020
276-01-0194	B1620172	3 µg	V1	22-Jul-2020	V5	18-Aug-2020
276-01-0198	B1620173	3 µg	V1	22-Jul-2020	V5	18-Aug-2020
276-01-0204	B1620168	3 µg	V1	22-Jul-2020	V5	18-Aug-2020

Subject number	Biosampling ID	Cohort (BNT162b1)	Visit	Collection date	Visit	Collection date
276-01-0209	B1620170	3 µg	V1	22-Jul-2020	V5	18-Aug-2020
276-01-0212	B1620169	3 µg	V1	22-Jul-2020	V5	18-Aug-2020
276-01-0170	B1620205	3 µg	V1	31-Jul-2020	V5	28-Aug-2020
276-01-0221	B1620206	3 µg	V1	31-Jul-2020	V5	28-Aug-2020
276-01-0224	B1620207	3 µg	V1	31-Jul-2020	V5	28-Aug-2020
276-01-0225	B1620208	3 µg	V1	31-Jul-2020	V5	28-Aug-2020
276-01-0226	B1620209	3 µg	V1	31-Jul-2020	V5	28-Aug-2020
276-01-0289	B1620254	10 µg older	V1	20-Aug-2020	V5	17-Sep-2020
276-01-0287	B1620260	10 µg older	V1	25-Aug-2020	V5	22-Sep-2020
276-01-0288	B1620259	10 µg older	V1	25-Aug-2020	V5	22-Sep-2020
276-01-0291	B1620258	10 µg older	V1	25-Aug-2020	V5	22-Sep-2020
276-01-0273	B1620266	10 µg older	V1	27-Aug-2020	V5	24-Sep-2020
276-01-0292	B1620267	10 µg older	V1	27-Aug-2020	V5	24-Sep-2020
276-01-0298	B1620262	10 µg older	V1	27-Aug-2020	V5	24-Sep-2020
276-01-0320	B1620263	10 µg older	V1	27-Aug-2020	V5	24-Sep-2020
276-02-0220	B1620332	20 µg older	V1	08-Sep-2020	V5	06-Oct-2020
276-02-0211	B1620331	20 µg older	V1	08-Sep-2020	V5	06-Oct-2020
276-02-0234	B1620335	20 µg older	V1	09-Sep-2020	V5	07-Oct-2020
276-02-0241	B1620336	20 µg older	V1	09-Sep-2020	V5	07-Oct-2020
276-02-0242	B1620337	20 µg older	V1	09-Sep-2020	V5	07-Oct-2020
276-02-0237	B1620340	20 µg older	V1	11-Sep-2020	V5	09-Oct-2020
276-02-0238	B1620341	20 µg older	V1	11-Sep-2020	V5	09-Oct-2020
276-02-0236	B1620339	20 µg older	V1	11-Sep2020	V5	09-Oct-2020
276-01-0352	B1620308	30 µg older	V1	22-Sep-2020	V5	20-Oct-2020
276-01-0353	B1620307	30 µg older	V1	22-Sep-2020	V5	20-Oct-2020
276-01-0358	B1620312	30 µg older	V1	23-Sep-2020	V5	21-Oct-2020
276-01-0360	B1620310	30 µg older	V1	23-Sep-2020	V5	21-Oct-2020
276-01-0366	B1620311	30 µg older	V1	23-Sep-2020	V5	21-Oct-2020
276-01-0365	B1620309	30 µg older	V1	23-Sep-2020	V5	21-Oct-2020
276-01-0363	B1620315	30 µg older	V1	25-Sep-2020	V5	22-Oct-2020
276-01-0350	B1620313	30 µg older	V1	25-Sep-2020	V5	22-Oct-2020
276-01-0364	B1620316	30 µg older	V1	25-Sep-2020	V5	22-Oct-2020
276-01-0362	B1620314	30 µg older	V1	25-Sep-2020	V5	22-Oct-2020
276-01-0361	B1620318	30 µg older	V1	25-Sep-2020	V5	22-Oct-2020

Table 4-4: Material from recovered COVID-19 patients

Clinical score 1: asymptomatic; 2: mild infection, 4-5: hospitalization was required

Subject number	Biosampling ID	Clinical score	Days after first diagnosis (PCR confirmed)	Collection date
051-488-594	RC000001	2	42	08-May-2020
194-881-889	RC000008	2	30	11-May-2020
330-696-901	RC000011	2	42	12-May-2020
390-644-567	RC000045	1	45	14-May-2020

Subject number	Biosampling ID	Clinical score	Days after first diagnosis (PCR confirmed)	Collection date
416-996-055	RC000009	5	45	11-May-2020
453-078-861	RC000013	2	41	12-May-2020
484-881-737	RC000044	2	62	14-May-2020
507-380-282	RC000012	1	48	12-May-2020
526-024-091	RC000041	4	59	14-May-2020
543-431-342	RC000004	2	51	08-May-2020
648-618-598	RC000006	2	52	11-May-2020
856-710-398	RC000005	2	46	11-May-2020
938-269-939	RC000043	1	47	14-May-2020
963-850-946	RC000010	2	43	12-May-2020
986-087-577	RC000040	2	62	14-May-2020

Table 4-5: Healthy volunteer leukapheresis material

Subject number	Biosampling ID	Collection date
HV-T050	HV000058	20-Jun-2017
HV-T097	HV000090	09-May-2019

4.4 Materials

Table 4-6: Equipment

Device	Model	Manufacturer	Site
Cell counter	CASY TTT	OMNI Life Sciences	BioNTech RNA Pharmaceuticals GmbH
Flow cytometer	FACS Verse	BD	

Table 4-7: Software

Device	Model	Manufacturer	Software
Cell counter	CASY TTT	OMNI Life Sciences	CASY® Measure
Flow cytometer	FACS Verse	BD	BD FACSuite™

Table 4-8: Material and reagents used

Experimental step/Materials	Product name	Manufacturer	Order number
Medium & supplements	CTL wash supplement 10×	CTL Immunospot	#CTLW-010-5
	OpTmizer™ T-Cell Expansion basal medium	Invitrogen	A10485-01
	OpTmizer™ T-Cell Expansion supplement	Invitrogen	A25761
	DNAse I	Roche	11284932001
	Dulbecco's phosphate-buffered saline (D-PBS)	Life Technologies	14190-169
	RPMI 1640 medium, GlutaMAX™ supplement	Life Technologies	61870-010
	Dimethyl sulfoxide (DMSO) for cell culture	AppliChem	A3672,0100
	CASYton	OMNI Life Sciences	5651808

Experimental step/Materials	Product name	Manufacturer	Order number
	Brefeldin A (BD GolgiPlug™)	BD	555029
	Anti-human CD3, positive control (mAb CD3-2)	MABtech	Kit (3420-2APT-10)
Peptides	SARS-CoV-2 RBD pepmix (25 µg/peptide)	JPT	Custom order 43224 (Iso-Plus grade)
	SARS-CoV-2 S protein pool 1 pepmix (25 µg/peptide)	JPT	Custom order 43224 (Iso-Plus grade)
	SARS-CoV-2 S protein pool 2 pepmix (25 µg/peptide)	JPT	Custom order 43224 (Iso-Plus grade)
	CEFX Ultra SuperStim Pool	JPT	PM-CEFX-2
ICS reagents	Fixation/Permeabilization Solution kit (250 tests)	BD	554714
	Ethylenediaminetetraacetic acid solution (EDTA)	Sigma-Aldrich	03690-100ML
	Fetal bovine serum (FBS)	Biochrom	S0115
	Brilliant Stain Buffer	BD Horizon™	563794 (100 tests) 566349 (1,000 tests)
	Brilliant Stain Buffer Plus	BD Horizon™	566385 (1,000 tests)
	CD3 BV421 (clone: UCHT1)	BD	562426
	CD4 BV480 (clone: RPA-T4)	BD	746541
	CD8 BB515 (clone: RPA-T8)	BD	564526
	IFNγ PE-Cy7 (clone: B27)	BD	557643
	IL-4 APC (clone: MP4-25D2)	BD	554486
	IL-2 PE (clone: MO1-17H12)	BD	554566
	Fixable Viability Dye eFluor™ 780	eBioscience	65-0865-14

4.5 Methods

4.5.1 Sample Preparation

PBMCs were thawed according to SOP-030-041 and cell numbers were determined according to SOP-010-098 using the cell counter CASY TTT. Prior to peptide stimulations, PBMCs were rested for 4 hours at 37°C in OpTmizer medium supplemented with 2 µg/mL DNase I.

4.5.2 Peptide Stimulation

Stimulation of PBMCs was performed using pools of synthetic peptides representing different portions of the wild-type sequence of SARS-CoV-2 S protein, namely N-terminal pools 'S pool 1' (aa 1-643) and 'RBD' (aa 1-16 fused to aa 327-528 of the S protein), and the C-terminal 'S pool 2' (aa 633-1273). Peptide pools consisted of 15-mer overlapping peptides covering the whole length with 11aa overlap. The last peptide for the S pool 2 is a 17-mer.

After resting, PBMCs were harvested by centrifugation, resuspended in OpTmizer medium, and counted using the cell counter CASY TTT. Cell number was adjusted to 10×10^6 PBMCs/mL, and PBMCs were restimulated in a round-bottom 96-well plate at 1×10^6 PBMCs/well with S pool 1, S pool 2 and RBD peptide pool (2 µg/mL/peptide;

JPT Peptide Technologies) in the presence of GolgiPlug (BD) for 18 hours at 37°C. Negative controls were treated with DMSO-containing medium, positive controls were stimulated with anti-CD3 antibody (final dilution of 1:1,000) and CEFX pepmix (2 µg/mL/peptide).

4.5.3 Intracellular Cytokine Staining

ICS is a flow cytometry-based assay to detect the production and accumulation of cytokines intracellularly upon cell stimulation. After antigen-specific stimulation of PBMCs, inhibitors of protein transport were added to retain the produced cytokines within the cells. Cells were then stained for viability (fixable viability dye eFluor™ 780; 1:1,666). In order to discriminate between antigen-specific CD4- and CD8-T-cell responses, fluorescently labeled antibodies for CD4, CD8, and CD3 were used for staining of extracellular surface markers (D-PBS [Gibco] supplemented with 2% FBS [Biochrom], 2 mM EDTA [Sigma-Aldrich] and Brilliant Stain Buffer Plus [BD Horizon™, according to the manufacturer's instructions] or in Brilliant Stain Buffer [BD Horizon™]) for 20 minutes at 4°C (see Table 4-9).

Next, PBMCs were fixed and permeabilized using the Cytofix/Cytoperm kit according to the manufacturer's instructions (BD Biosciences). Intracellular staining of CD4, CD8, CD3, and of produced cytokines was performed in Perm/Wash buffer (supplemented with Brilliant Stain Buffer Plus starting with older adult cohort) for 30 minutes at 4°C using fluorescently labeled, cytokine-specific antibodies detecting IFNγ, IL-2, and IL-4 (see Table 4-9). For acquisition, samples were resuspended in flow buffer.

In order to monitor the quality and assess the variance of the stainings, PBMCs isolated from healthy volunteer leukapheresis samples generated prior to the COVID-19 pandemic were used as in-house reference assay controls. Since the stimulation and staining of pre- and post-vaccination samples were performed on separate 96 well plates, one reference sample row was included on each plate to control for intra-assay variability. The PBMC material available from one donor was not sufficient to cover all subject screenings in this report. Hence, a bridging experiment to a 2nd PBMC donor was performed during the reported study dates. Furthermore, it became apparent, that in order to assure optimal staining conditions, reduce staining artifacts, and reduce unspecific background signals that it was favorable to include Brilliant Stain Buffer and Brilliant Stain Buffer Plus into the flow cytometric staining mixes for ICS. This was especially relevant when investigating older study subjects as a more frequent general immune activation was observed presenting itself in higher cytokine background signals. A test experiment was performed to assure that inclusion of Brilliant Stain Buffer formats into the flow cytometric staining mixes does not affect the frequencies of detected cytokine positive events in the generated flow cytometry data.

Table 4-9: Antibody dilutions used for surface marker and intracellular cytokine staining

Specificity	Host, Reactivity	Dilution	Location
CD3	mouse anti-human	1:250	extracellular/intracellular
CD4	mouse anti-human	1:50	extracellular/intracellular
CD8	mouse anti-human	1:100	extracellular/intracellular
IFNγ	mouse anti-human	1:50	intracellular
IL-2	rat anti-human	1:10	intracellular
IL-4	rat anti-human	1:500	intracellular

4.5.4 Data Acquisition and Analysis

After the staining procedure, cells were analyzed on a flow cytometer to measure the frequency of vaccine antigen-specific Th1 and Th2 $CD4^+$ T cells as well as cytotoxic $CD8^+$ T cells. Lastly, the results generated with pre- and post-vaccination samples of each subject were compared individually to identify the induction/expansion of cellular immune responses and to characterize their Th1 and Th2 balance after vaccination.

Samples were acquired utilizing a FACSVerse cytometer (BD Biosciences) and analyzed with FlowJo software version 10.5.3 and 10.6.2 (FlowJo LLC, BD Biosciences) for CD4 and CD8 cytokine-producing T cells (IFNγ, IL-2, and IL-4). The gating strategy used is shown in Figure 9.1.

A performance qualification check (PQC) was performed daily using CS&T beads to monitor the performance of the BD FACS Verse flow cytometer.

4.5.5 Data Transfer to DS&BA

Respective data (sample information .xlxs-formatted file and data .XML-formatted file exported from FlowJo analysis workspaces) were transferred to the DS&BA Unit, processed, and uploaded to a Spotfire data platform. Stimulation-specific cytokine production was background corrected by subtraction of values obtained with DMSO-containing medium samples (representing the negative assay controls). Negative values after background subtraction were set to zero.

4.5.6 Statistical Analysis

All statistical analyses were performed using GraphPad Prism software version 9.0.0.

5 RESULTS

Th1- and Th2-specific cytokine production in CD4+ and CD8+ T cells of 95 BNT162b1 vaccinated subjects were measured via intracellular cytokine staining followed by flow cytometric analysis. The disposition and the analysis set of subjects is described in Table 5-1. Exemplary flow cytometry pseudo-color plots are shown in Figure 5.1.

Table 5-1: Subject disposition and analysis set

ICS analysis: Values indicate number of participants for whom ICS analysis was performed. N/A not applicable

Cohort	BNT162b1 vaccinated		ICS analysis	
	Primary	Booster	Day 1	Day 29±3
1 µg	12	12	10	10
3 µg	12	12	10	10
10 µg	12	11	10	10
20 µg	12	11	6	6
30 µg	12	12	12	12
50 µg	12	11	9	9
60 µg	12	N/A	11	11
10 µg older	12	12	8	8
20 µg older	12	12	8	8
30 µg older	12	12	11	11

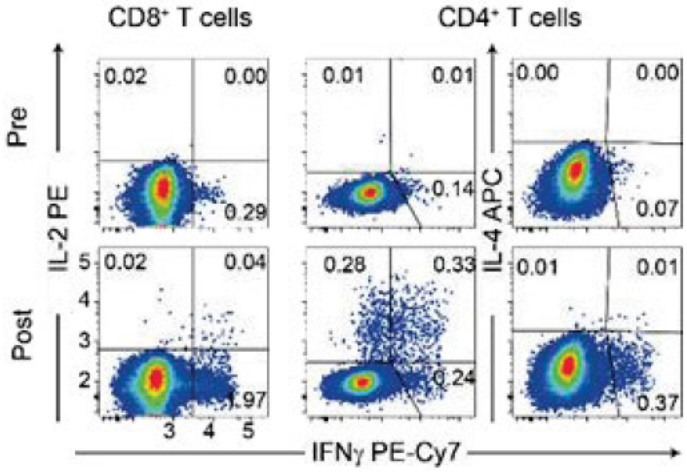

Figure 5.1: Exemplary pseudo-color flow cytometry plots of cytokine-producing CD4+ and CD8+ T cells from a 10-µg cohort subject

Numbers within the plots indicate the frequency of cytokine-producing T cells in %.

5.1 Characterization of vaccine-induced CD4+ T-cell responses

Vaccine-induced, RBD-specific CD4+ T-cell responses analyzed in 68 adult subjects (18 to 55 years of age) and 27 older adult subjects (56-85 years of age) are characterized by a Th1 cytokine profile secreting IFNγ, IL-2, or both (Figure 5.2 and Figure 5.4 for adults and Figure 5.3 and Figure 5.5 for older adults). Importantly, the vast majority of subjects analyzed did not secrete the Th2 cytokine IL-4 in response to RBD peptide pool stimulation (mean fraction: 0.03% of antigen-specific circulating CD4+ T cells in the 30 µg adult cohort and 0.01% in all other cohorts). The mean fraction of CD4+ cytokine-producing T cells in BNT162b1 vaccinated subjects (1-50 µg cohorts) was substantially higher than that observed in 15 patients who recovered from COVID-19 (human convalescent sample (HCS), Figure 5.4 for adults and Figure 5.5 for older adults). In the 60 µg cohort, treated with the priming dose only, the mean fraction of cytokine-producing CD4+ T cells was comparable to HCS.

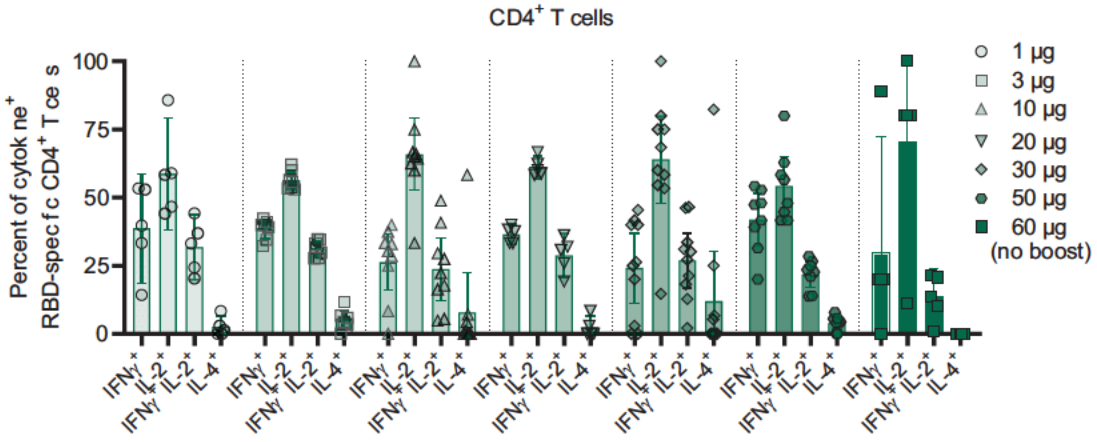

Figure 5.2: RBD-specific CD4+ T cells producing the indicated cytokines as a fraction of total cytokine-producing RBD-specific CD4+ T cells (1 – 60 µg adult cohorts)

Bar charts show arithmetic means with 95% confidence interval (CI). Cytokine production was calculated by summing up the fractions of all CD4+ T cells positive for either IFNγ, IL-2, or IL-4, setting this sum to 100%, and calculating the fraction of each specific cytokine-producing subset thereof. CD4 non-responders (<0.03% total cytokine-producing CD4+ T cells; 1 µg n 5, 3 µg n 3, 10 µg n 1, 20 µg n 1, 30 µg n 2, 50 µg n 1, and 60 µg n 6) were excluded from this analysis.

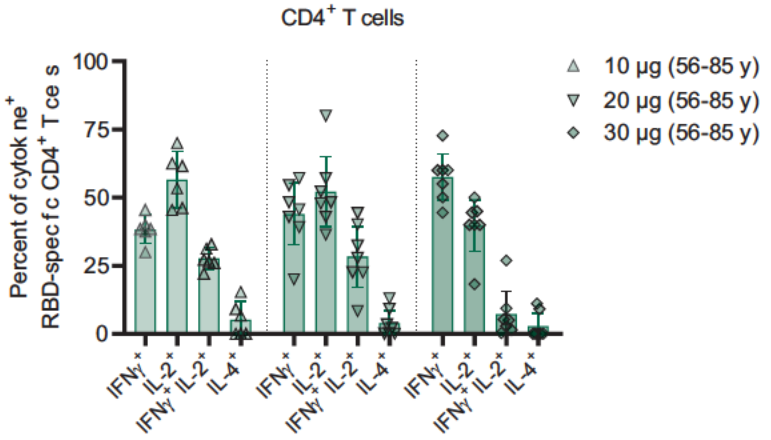

Figure 5.3: RBD-specific CD4+ T cells producing the indicated cytokines as a fraction of total cytokine-producing RBD-specific CD4+ T cells (10 – 30 µg older adult cohorts, 56 – 85 years (y) of age)

Bar charts show arithmetic means with 95% confidence interval (CI). Cytokine production was calculated by summing up the fractions of all CD4+ T cells positive for either IFNγ, IL-2, or IL-4, setting this sum to 100%, and calculating the fraction of each specific cytokine-producing subset thereof. CD4 non-responders (<0.03% total cytokine-producing CD4+ T cells; 10 µg n 2, 20 µg n 1 and 30 µg n 4) were excluded from this analysis.

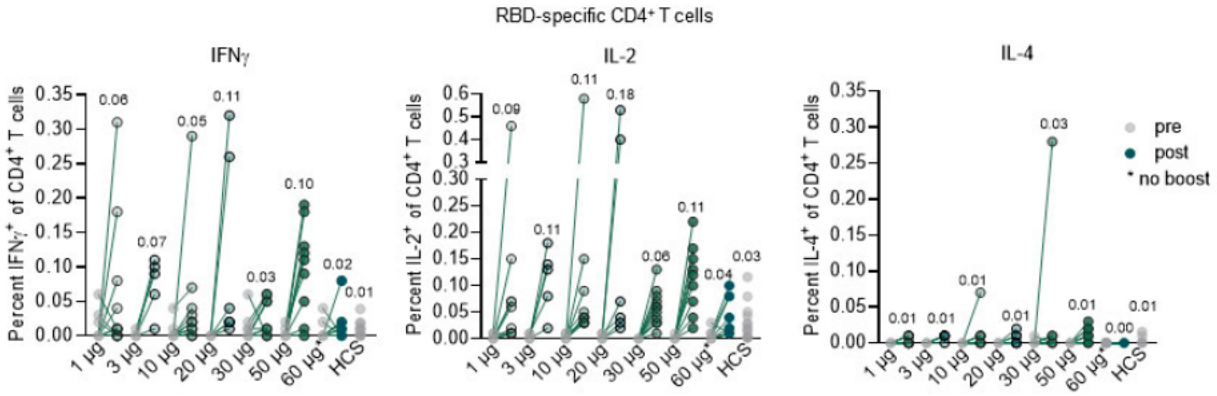

Figure 5.4: RBD-specific CD4+ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4+ T cells (1 – 60 µg adult cohorts)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample; pre: pre-vaccination baseline, post: 29±3 days after primary vaccination, no boost: no booster vaccination.

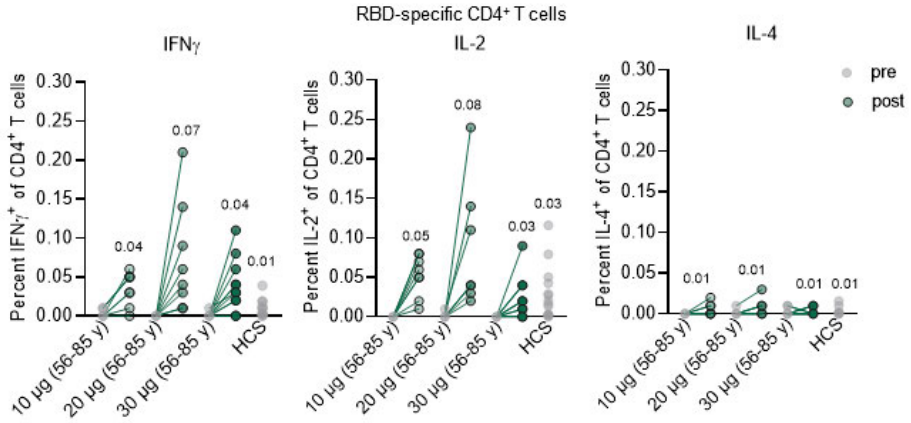

Figure 5.5: RBD-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (10 – 30 µg older adult cohorts, 56 – 85 years (y) of age)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample; pre: pre-vaccination baseline, post: 29±3 days after primary vaccination.

5.2 Characterization of vaccine-induced CD8⁺ T-cell responses

Similarly, BNT162b1 vaccine-induced, RBD-specific CD8⁺ T cells secreted IFNγ in a large proportion of analyzed subjects (adults: 35 out of 57 subjects (1-50 µg) and older adults: 19 out of 27 subjects (10-30 µg)) and lower levels of IL-2-secreting CD8⁺ T cells were detectable (Figure 5.6 adults and Figure 5.7 older adults). Importantly, fractions of RBD-specific IFNγ⁺ CD8⁺ T cells reached up to 0.49% of total peripheral blood CD8⁺ T cells in the 30 µg adult cohort and up to 1.58% in the 30 µg older adult cohort. In the 50 µg cohort fractions of up to 3.87% were detected. The fraction of RBD-specific IFNγ⁺ CD8⁺ T cells of one subject of the 10 µg older adult cohort even reached 6.66%. The mean fraction of RBD-specific CD8⁺ T cells in BNT162b1 vaccinated subjects (1-50 µg cohorts) was substantially higher than that observed in 15 patients who recovered from COVID-19. In the 60 µg cohort, treated with the priming dose only, the mean fraction of cytokine-producing CD8⁺ T cells was comparable to HCS.

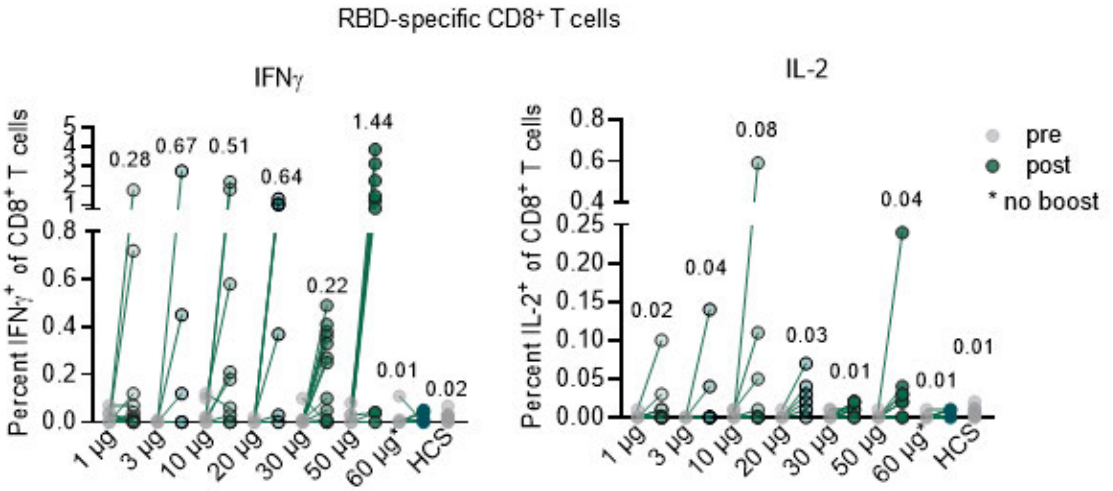

Figure 5.6: RBD-specific CD8⁺ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8⁺ T cells

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample. pre: pre-vaccination baseline, post: 29±3 days after primary vaccination, no boost: no booster vaccination.

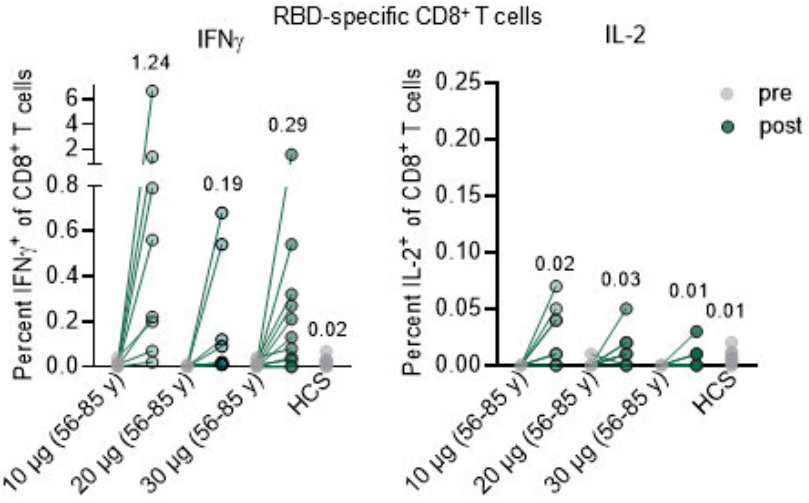

Figure 5.7: RBD-specific CD8⁺ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8⁺ T cells

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample. pre: pre-vaccination baseline, post: 29±3 days after primary vaccination, no boost: no booster vaccination.

5.3 Comparison of vaccine-induced T-cell responses in two age groups

Vaccine-induced RBD-specific CD4+ T-cell responses among subjects from the different age groups were directly compared (adult cohorts: 18 to 55 years and older adult cohorts: 56 to 85 years). No significant differences in CD4+ T-cell cytokine responses following RBD peptide pool stimulations were observed with only one exception (Figure 5.8). RBD-specific IL-2 producing CD4+ T cells in the 30 µg cohorts were reduced in older adults.

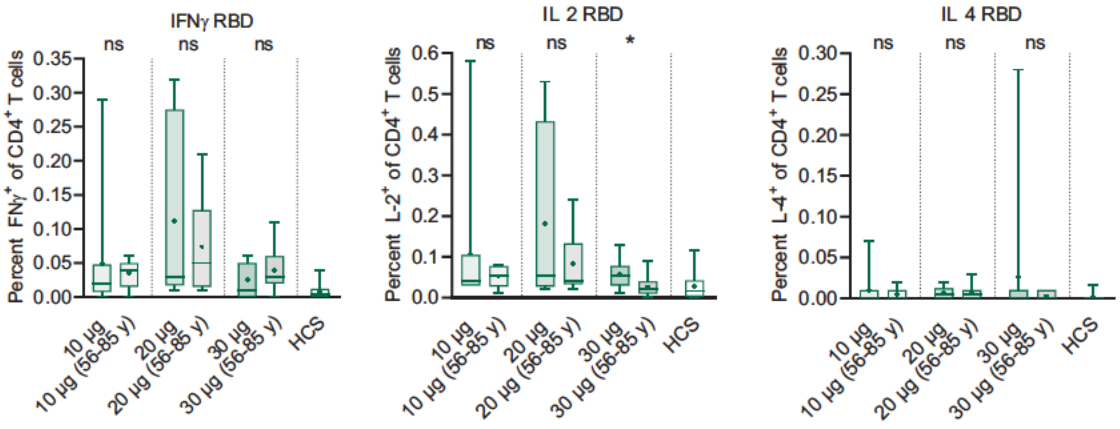

Figure 5.8: RBD-specific CD4+ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4+ T cells (10 – 30 µg cohorts, 18 – 55 years (y) vs. 56 – 85 years of age)

Data are plotted for vaccinated subjects (cohorts: 10, 20, and 30 µg for both age groups) from day 29. HCS: human convalescent sample (n 15); Mann-Whitney test, ns not significant, * ($p < 0.05$); Box-Whisker plots indicating the min and max values, lines in the boxes indicate the median values, + indicates the mean values.

Similar to the CD4 responses described above, the CD8+ T cell cytokine responses after immunization with BNT162b1 in older adults was comparable to those of the 18 to 55 years of age group with one exception (Figure 5.9). As for the CD4+ T cells, RBD-specific IL-2 producing CD8+ T cells in the 30 µg cohorts were reduced in older adults.

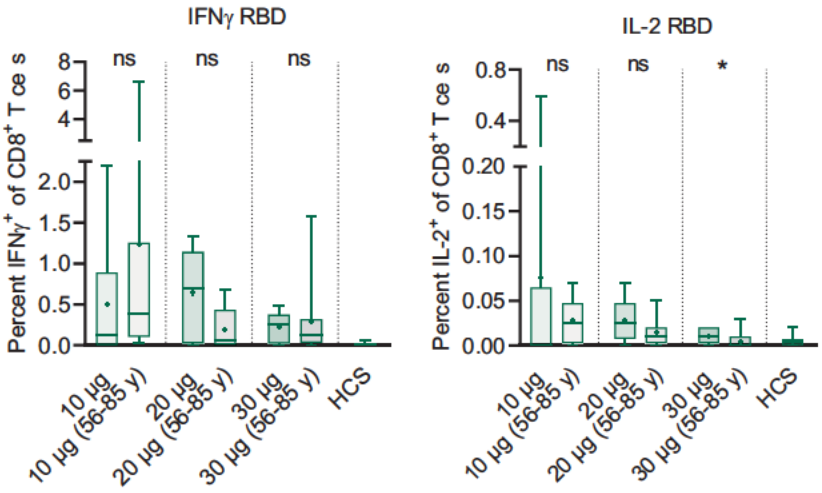

Figure 5.9: RBD-specific CD8⁺ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8⁺ T cells (10 – 30 µg cohorts, 18 – 55 years (y) vs. 56 – 85 years of age)

Data are plotted for vaccinated subjects (cohorts: 10, 20, and 30 µg for both age groups) from day 29. HCS: human convalescent sample (n 15); Mann-Whitney test, ns not significant, * ($p < 0.05$); Box-Whisker plots indicating the min and max values, lines in the boxes indicate the median values, + indicates the mean values.

Data generated for the combined SARS-CoV-2 S protein pool 1 and pool 2 as well as positive control stimulations (CEFX and anti-CD3) are not shown. Raw data can be found in the APPENDIX.

6 CONCLUSION

Vaccination with two doses of 1 to 50 µg of BNT162b1 elicited *de novo* SARS-CoV-2 RBD-specific T-cell responses in 70 out of the 84 tested study subjects post vaccination. Vaccine-induced, RBD-specific $CD4^+$ T cells secreted IFNγ, IL-2, or both in response to RBD peptide pool stimulation, but the vast majority of subjects did not secrete IL-4. The detection of IFNγ, IL-2 but not IL-4 indicates a favorable Th1 profile and the absence of a potentially deleterious Th2 immune response. Similarly, fractions of vaccine-induced, RBD-specific $CD8^+$ T cells secreted $IFN\gamma^+$ and IL-2. Importantly, fractions of RBD-specific $IFN\gamma^+$ $CD8^+$ T cells reached up to 0.49% of total peripheral blood $CD8^+$ T cells for 30 µg adult cohort and up to 1.58% in the 30 µg older adult cohort. The mean fraction of RBD-specific $CD4^+$ and $CD8^+$ T cells within total circulating T cells obtained by BNT162b1 vaccination was substantially higher in the 1 to 50 µg cohorts (e.g., 30 µg dosed participants 11-fold above) than that observed in 15 patients who recovered from COVID-19. Moreover, the cytokine responses elicited after vaccination with BNT162b1 in older adults was similar in response pattern and intensity with that of the 18-55 years of age cohort. In the 60 µg adult cohort, treated with the priming dose only, mean fractions of cytokine-producing T cells were lower compared to the other cohorts, indicating the importance of the booster vaccination.

BNT162b1 induced poly-functional and pro-inflammatory $CD4^+$/$CD8^+$ T-cell responses in the majority of study subjects, with a Th1 polarization of the helper response characterized by the secretion of IFNγ and IL-2 but not IL-4.

7 DOCUMENT HISTORY

Second version minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section(s)	Version 01	Version 02	Reason for change
4.1	SARS-CoV-2 spike protein pool 1: SARS COV 2_FL-S-PROTEIN_1 to SARS COV 2_FL-S-PROTEIN_106 SARS-CoV-2 spike protein pool 2: SARS COV 2_FL-S-PROTEIN_107 to SARS COV 2_FL-S-PROTEIN_315	SARS-CoV-2 spike protein pool 1: SARS COV 2_FL-S-PROTEIN_1 to SARS COV 2_FL-S-PROTEIN_158 SARS-CoV-2 spike protein pool 2: SARS COV 2_FL-S-PROTEIN_159 to SARS COV 2_FL-S-PROTEIN_315	The wrong pooling information was provided by the peptide supplier JPT. The wrong pooling information had no impact on the conclusions drawn in version 01 of this R&D report.
4.3, 5, 6, and Appendix	n=63 subjects (adults)	n=95 subjects in total adults: n=68 older adults: n=27	Update of this report with available ICS data for adult and older adult cohorts
4.5.3	n/a	BSB and BSB Plus was included in ICS staining procedure	In order to assure optimal staining conditions, reduce staining artifacts, and reduce unspecific background signals Brilliant Stain Buffer and Brilliant Stain Buffer Plus was included into the flow cytometric staining mixes for ICS. This was especially relevant when investigating older study subjects as a more frequent general immune activation was observed presenting itself in higher cytokine background signals.
4.3 and Appendix	n/a	Addition of in-house reference sample data	Request from MHRA
Appendix	n/a	Graphical representation of $CD4^+$ and $CD8^+$ T cell cytokine frequencies as Box-Whisker-Plots	Request from MHRA

8 REFERENCES

BioNTech R&D study report, uID R-20-0241, version 02. Analysis of the Th1/2 cytokine profile of BNT162b2-specific $CD4^+$ and $CD8^+$ T cells from participants in the BNT162-01 trial (interim report for 74 subjects)

9 APPENDIX

Appendix 1: Gating strategy

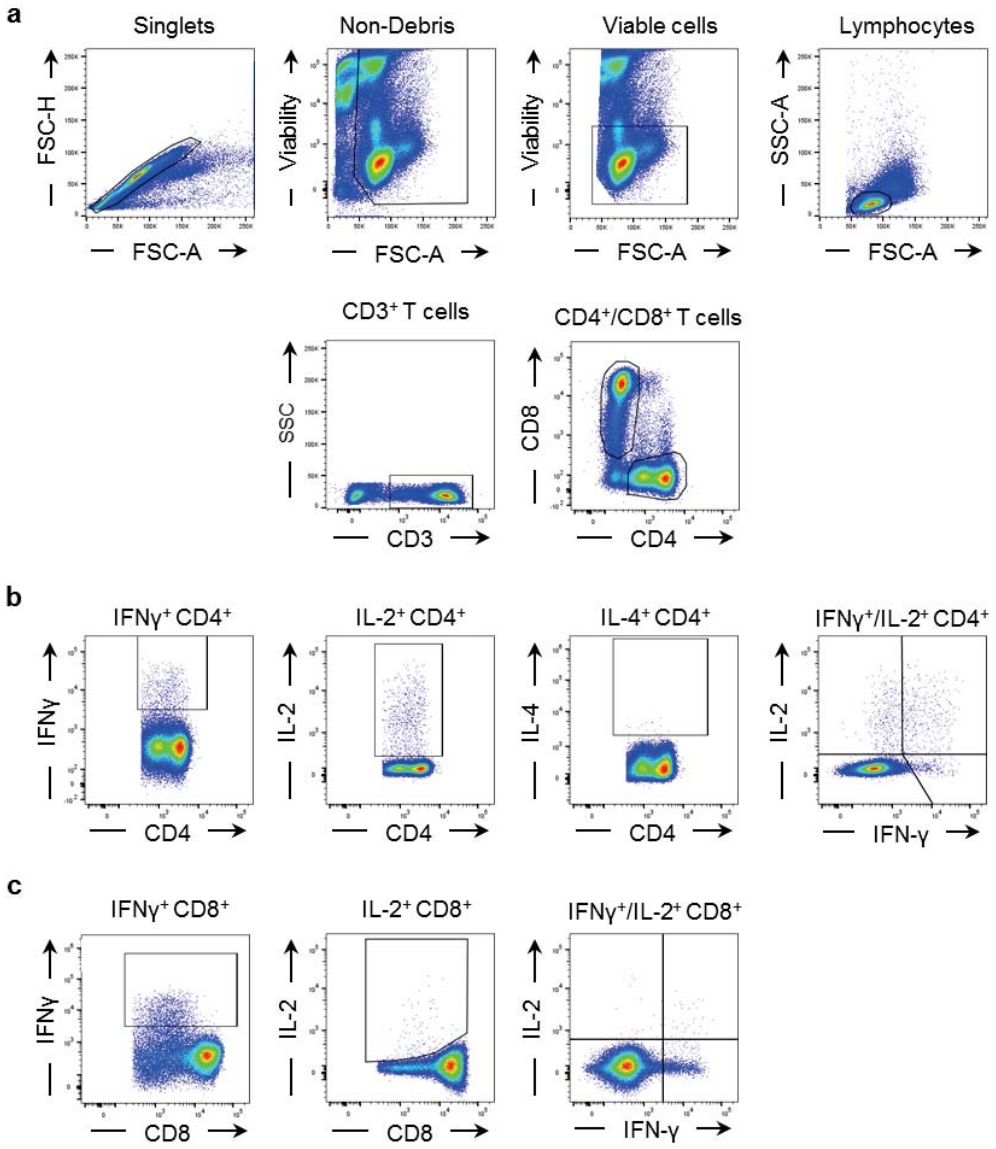

Figure 9.1: Gating strategy for flow cytometry analysis

Flow cytometry gating strategy for identification of IFNγ-, IL-2-, and IL-4-secreting T cells in study subject PBMC samples. a, $CD4^+$ and $CD8^+$ T cells were gated within single, viable lymphocytes. b, c, Gating of IFNγ, IL-2, and IL-4 in $CD4^+$ T cells (b), and IFNγ and IL-2 in $CD8^+$ T cells (c).

Appendix 2: RBD-specific CD4 cytokine data plotted as Box-Whisker plots

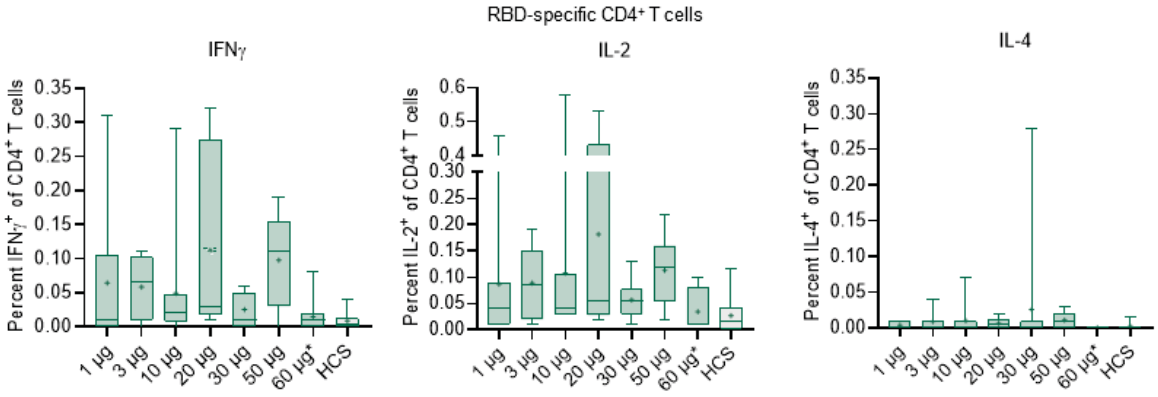

Figure 9.2: RBD-specific CD4+ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4+ T cells (1 – 60 µg adult cohorts)

Cytokine data are plotted for all vaccinated subjects from day 29 in response to RBD peptide pool stimulation. HCS: human convalescent sample (n 15); Box-Whisker plots indicating the min and max values, lines in the boxes indicate the median values, + indicates the mean values, * no boost

Appendix 3: RBD-specific CD8 cytokine data plotted as Box-Whisker plots

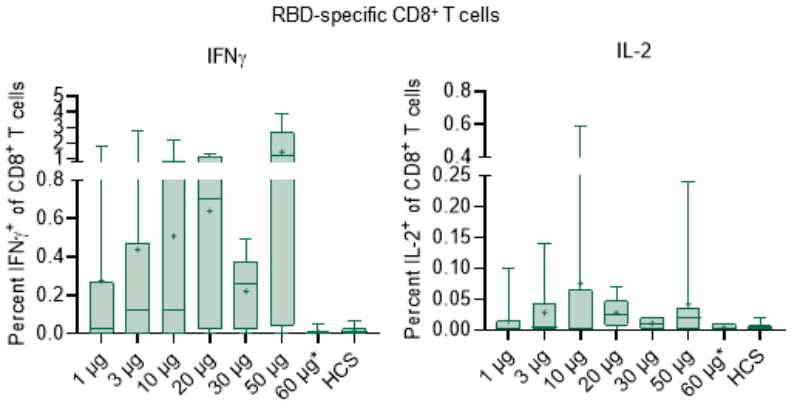

Figure 9.3: RBD-specific CD8+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells (1 – 60 µg adult cohorts)

Cytokine data are plotted for all vaccinated subjects from day 29 in response to RBD peptide pool stimulation. HCS: human convalescent sample (n 15); Box-Whisker plots indicating the min and max values, lines in the boxes indicate the median values, + indicates the mean values, * no boost

Appendix 4: Frequency of cytokine-producing CD4+ T cells in response to RBD

Table 9-1: Frequency of cytokine-producing CD4+ T cells in response to RBD

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0.01	0	0.01	0	0.06	0	0
	276-01-0023	0	0.04	0	0.03	0	0.07	0	0.01
	276-01-0025	0	0.01	0	0	0.01	0.01	0	0
	276-01-0033	0	0.31	0	0.22	0.01	0.46	0	0.01
	276-01-0040	0.03	0	0	0	0	0.01	0	0
	276-01-0041	0	0.18	0	0.08	0	0.15	0	0.01
	276-01-0042	0	0.08	0	0.04	0	0.07	0	0
	276-01-0045	0	0	0	0	0	0.02	0	0.01
	276-01-0048	0.02	0	0	0	0	0.01	0	0
	276-01-0052	0.06	0.01	0	0.01	0	0.01	0	0
3 µg	276-01-0170	0	0.02	0	0.01	0	0.03	0	0
	276-01-0194	0	0.11	0	0.06	0	0.14	0	0.01
	276-01-0198	0.01	0.09	0	0.05	0.01	0.13	0	0.01
	276-01-0204	0	0.01	0	0.01	0	0.02	0	0
	276-01-0209	0	0.1	0	0.06	0	0.18	0	0.01
	276-01-0212	0	0.06	0	0.04	0.01	0.08	0	0.01
	276-01-0221	0	0	0	0	0	0.01	0	0
	276-01-0224	0	0.07	0	0.04	0.01	0.09	0	0.01
	276-01-0225	0	0.11	0	0.08	0	0.19	0	0.04
	276-01-0226	0	0.01	0	0	0	0.02	0	0
10 µg	276-01-0003	0	0	0	0	0	0.04	0	0
	276-01-0004	0	0.02	0	0.01	0	0.03	0	0
	276-01-0005	0	0.02	0	0.01	0	0.04	0	0
	276-01-0006	0	0.04	0	0.03	0	0.09	0	0.01
	276-01-0007	0.01	0	0	0	0.01	0.03	0	0
	276-01-0008	0.04	0.07	0	0.05	0	0.15	0	0.01
	276-01-0009	0	0.01	0	0.01	0	0.04	0	0.07
	276-01-0011	0	0.01	0	0.01	0	0.03	0	0
	276-01-0017	0	0.29	0	0.31	0	0.58	0	0.01
	276-01-0019	0	0.03	0	0.01	0.01	0.05	0	0
20 µg	276-01-0151	0	0.04	0	0.03	0	0.07	0	0.01
	276-01-0171	0	0.32	0	0.21	0	0.53	0	0
	276-01-0172	0	0.01	0	0	0	0.02	0	0.01
	276-01-0173	0	0.26	0	0.16	0.01	0.4	0	0.02
	276-01-0178	0	0.02	0	0.01	0.01	0.04	0	0
	276-01-0197	0	0.02	0	0.01	0	0.03	0	0
30 µg	276-01-0016	0.01	0.01	0	0.02	0	0.04	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
	276-01-0020	0	0.01	0	0.01	0	0.03	0	0
	276-01-0021	0.06	0	0	0.01	0	0.03	0	0
	276-01-0028	0	0	0	0.01	0	0.03	0	0.01
	276-01-0031	0	0.05	0	0.02	0	0.13	0	0.01
	276-01-0032	0	0	0	0.02	0	0.06	0	0
	276-01-0034	0	0	0	0	0	0.01	0.01	0
	276-01-0037	0	0.05	0	0.02	0	0.07	0	0
	276-01-0038	0	0.05	0	0.03	0	0.06	0	0
	276-01-0039	0.01	0.06	0	0.04	0	0.09	0	0
	276-01-0043	0.02	0.06	0	0.04	0	0.08	0	0.01
	276-01-0047	0	0.01	0	0.01	0	0.05	0	0.28
50 µg	276-01-0049	0	0.18	0	0.08	0	0.17	0	0.03
	276-01-0055	0.01	0.19	0	0.06	0	0.15	0	0.02
	276-01-0056	0	0.13	0.01	0.03	0.01	0.1	0	0.01
	276-01-0057	0	0	0	0	0	0.02	0	0
	276-01-0059	0	0.12	0	0.05	0	0.12	0	0.01
	276-01-0060	0	0.05	0	0.02	0	0.07	0	0
	276-01-0068	0.02	0.09	0	0.04	0	0.13	0	0.01
	276-01-0070	0	0.01	0	0.01	0	0.04	0	0
	276-01-0073	0	0.11	0	0.07	0	0.22	0	0.02
60 µg	276-01-0066	0	0.02	0	0.02	0.01	0.08	0	0
	276-01-0075	0.04	0	0	0	0	0.02	0	0
	276-01-0076	0	0.02	0	0.02	0	0.08	0	0
	276-01-0078	0	0	0	0	0	0.01	0	0
	276-01-0083	0	0.02	0	0	0	0.01	0	0
	276-01-0085	0	0.01	0	0.01	0	0.04	0	0
	276-01-0089	0	0.01	0	0	0	0.01	0	0
	276-01-0093	0	0	0	0	0.03	0.01	0	0
	276-01-0096	0	0	0	0	0	0.01	0	0
	276-01-0103	0.02	0	0	0.01	0.01	0.1	0	0
	276-01-0104	0	0.08	0	0	0	0.01	0	0
10 µg older adults	276-01-0273	0	0.03	0	0.02	0	0.07	0	0
	276-01-0287	0.01	0.05	0	0.03	0	0.06	0	0.02
	276-01-0288	0.01	0.05	0	0.03	0	0.08	0	0
	276-01-0289	0	0	0	0	0	0.02	0	0
	276-01-0291	0	0.01	0	0	0	0.01	0	0
	276-01-0292	0.01	0.05	0	0.02	0	0.05	0	0.01
	276-01-0298	0	0.06	0	0.03	0	0.08	0	0.01
	276-01-0320	0	0.03	0	0.02	0	0.05	0	0
	276-02-0211	0	0.03	0	0.01	0	0.04	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0	0.06	0	0.02	0	0.04	0	0.01
	276-02-0234	0	0.04	0	0.02	0	0.03	0	0
	276-02-0236	0	0.01	0	0.01	0	0.02	0	0
	276-02-0237	0	0.14	0	0.08	0	0.14	0	0.01
	276-02-0238	0	0.21	0	0.11	0	0.24	0	0.01
	276-02-0241	0	0.09	0	0.05	0.01	0.11	0.01	0.03
	276-02-0242	0	0.01	0	0	0	0.04	0	0
30 µg older adults	276-01-0350	0	0.08	0	0	0	0.02	0	0.01
	276-01-0352	0	0.02	0	0.01	0	0.01	0	0
	276-01-0353	0	0.04	0	0.02	0	0.04	0	0.01
	276-01-0358	0	0.11	0	0.01	0	0.09	0	0
	276-01-0360	0	0.06	0	0.01	0	0.04	0	0
	276-01-0361	0	0	0	0	0	0	0	0
	276-01-0362	0	0.03	0	0	0	0.02	0	0
	276-01-0363	0	0.02	0	0	0	0	0	0
	276-01-0364	0	0	0	0	0	0.01	0	0.01
	276-01-0365	0	0.04	0	0.01	0	0.04	0.01	0
	276-01-0366	0.01	0.03	0	0	0	0.02	0.01	0

Appendix 5: Frequency of cytokine-producing CD8+ T cells in response to RBD

Table 9-2: Frequency of cytokine-producing CD8+ T cells in response to RBD

	Cytokine	CD8+ IFNγ+	CD8+ IFNγ+	CD8+ IFNγ+ IL-2+	CD8+ IFNγ+ IL-2+	CD8+ IL-2+	CD8+ IL-2+
Dose	Subject ID	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0.04	0	0	0	0.01
	276-01-0023	0	0.12	0	0.01	0	0.03
	276-01-0025	0	0.02	0	0	0	0
	276-01-0033	0	1.78	0	0.05	0.01	0.1
	276-01-0040	0.04	0	0	0	0	0
	276-01-0041	0	0.72	0	0.01	0	0.01
	276-01-0042	0	0	0	0	0	0
	276-01-0045	0	0.01	0	0	0	0
	276-01-0048	0.03	0	0	0	0	0
	276-01-0052	0.07	0.07	0	0	0	0
3 µg	276-01-0170	0	0.13	0	0.01	0	0.01
	276-01-0194	0	0.12	0	0	0	0
	276-01-0198	0	0	0	0	0	0
	276-01-0204	0	0	0	0	0	0
	276-01-0209	0.01	0.45	0	0.02	0	0.04
	276-01-0212	0	2.76	0	0.08	0	0.14
	276-01-0221	0	0	0	0	0	0
	276-01-0224	0	0.54	0	0.01	0	0.04
	276-01-0225	0	0.38	0	0.02	0	0.05
	276-01-0226	0	0.01	0	0	0	0
10 µg	276-01-0003	0	0	0	0	0	0
	276-01-0004	0	2.2	0	0.33	0	0.59
	276-01-0005	0.02	0.18	0	0	0	0
	276-01-0006	0	0.21	0	0.01	0	0.01
	276-01-0007	0	0	0	0	0	0
	276-01-0008	0.12	0.06	0	0	0	0
	276-01-0009	0	0	0	0	0	0
	276-01-0011	0	0.03	0	0	0	0
	276-01-0017	0.02	1.82	0	0.04	0.01	0.11
	276-01-0019	0.1	0.58	0	0.01	0.01	0.05
20 µg	276-01-0151	0	1.03	0	0.03	0.01	0.07
	276-01-0171	0.02	0.37	0	0	0	0.02
	276-01-0172	0	0	0	0	0	0
	276-01-0173	0	1.33	0	0.01	0	0.03
	276-01-0178	0	0.03	0	0.01	0	0.01
	276-01-0197	0	1.08	0	0.01	0	0.04
30 µg	276-01-0016	0	0.27	0	0.01	0	0

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5
	276-01-0020	0	0	0	0	0.01	0.01
	276-01-0021	0.1	0	0	0	0.01	0.01
	276-01-0028	0.01	0.36	0	0.01	0	0.02
	276-01-0031	0	0.49	0	0	0	0.01
	276-01-0032	0	0.25	0	0	0	0.02
	276-01-0034	0	0.33	0	0.01	0	0.01
	276-01-0037	0	0.05	0	0	0	0
	276-01-0038	0	0.38	0	0.02	0	0.02
	276-01-0039	0.01	0.1	0	0	0	0.01
	276-01-0043	0	0.41	0	0.01	0	0.02
	276-01-0047	0	0.01	0	0	0	0
50 µg	276-01-0049	0	0.84	0	0.01	0	0.04
	276-01-0055	0.03	3.87	0	0.13	0.01	0.24
	276-01-0056	0	1.47	0	0.01	0	0.02
	276-01-0057	0	0	0	0	0	0
	276-01-0059	0	3.14	0	0.02	0	0.03
	276-01-0060	0.03	0.04	0	0	0	0
	276-01-0068	0.08	1.26	0	0	0	0.02
	276-01-0070	0	0.04	0	0	0	0
	276-01-0073	0	2.27	0	0.01	0	0.03
60 µg	276-01-0066	0	0.04	0	0	0.01	0.01
	276-01-0075	0.01	0	0	0	0	0
	276-01-0076	0	0	0	0	0	0
	276-01-0078	0	0	0	0	0	0
	276-01-0083	0	0.01	0	0	0	0.01
	276-01-0085	0	0	0	0	0	0.01
	276-01-0089	0	0	0	0	0	0
	276-01-0093	0.11	0	0	0	0	0
	276-01-0096	0	0	0	0	0	0
	276-01-0103	0	0.01	0	0	0	0
	276-01-0104	0	0.05	0	0	0	0.01
10 µg older adults	276-01-0273	0	0.56	0	0.02	0	0.04
	276-01-0287	0.02	1.41	0	0.03	0	0.05
	276-01-0288	0	0.79	0	0.02	0	0.04
	276-01-0289	0.01	0.07	0	0	0	0
	276-01-0291	0	0.02	0	0	0	0.01
	276-01-0292	0	0.22	0	0	0	0
	276-01-0298	0	6.66	0	0.04	0	0.07
	276-01-0320	0.04	0.2	0	0	0	0.01
	276-02-0211	0	0.68	0	0.02	0	0.05

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0	0.02	0	0	0	0
	276-02-0234	0.01	0.01	0	0	0.01	0
	276-02-0236	0	0.01	0	0	0	0.01
	276-02-0237	0	0.12	0	0.01	0	0.02
	276-02-0238	0	0.09	0	0.01	0	0.02
	276-02-0241	0	0.54	0	0.01	0	0.01
	276-02-0242	0	0.01	0	0	0	0.01
30 µg older adults	276-01-0350	0.01	0.03	0	0	0	0
	276-01-0352	0	0.13	0	0	0	0
	276-01-0353	0	0.04	0	0	0	0.01
	276-01-0358	0	0.21	0	0	0	0
	276-01-0360	0.01	1.58	0	0	0	0.03
	276-01-0361	0	0	0	0	0	0
	276-01-0362	0.01	0.27	0	0	0	0
	276-01-0363	0.04	0.08	0	0	0	0
	276-01-0364	0	0	0	0	0	0
	276-01-0365	0	0.54	0	0	0	0
	276-01-0366	0.03	0.32	0	0	0	0.01

Appendix 6: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1

Table 9-3: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0.01	0	0.01	0	0.05	0.01	0
	276-01-0023	0	0.01	0	0.01	0	0.02	0	0.01
	276-01-0025	0	0.01	0	0	0	0.01	0	0
	276-01-0033	0	0.17	0	0.1	0	0.21	0	0
	276-01-0040	0	0.02	0	0	0	0.01	0	0
	276-01-0041	0	0.16	0	0.06	0	0.13	0	0.01
	276-01-0042	0	0.01	0	0.01	0	0.01	0	0
	276-01-0045	0	0.01	0	0	0	0.01	0	0
	276-01-0048	0.01	0	0	0	0	0.01	0	0
	276-01-0052	0	0	0	0	0	0.01	0	0
3 µg	276-01-0170	0	0.03	0	0.02	0.01	0.04	0	0
	276-01-0194	0	0.05	0	0.01	0	0.04	0	0
	276-01-0198	0	0.04	0	0.03	0	0.06	0	0
	276-01-0204	0	0.01	0	0.01	0	0.02	0	0
	276-01-0209	0	0.07	0	0.04	0	0.13	0	0.01
	276-01-0212	0	0.06	0	0.04	0	0.08	0	0.01
	276-01-0221	0	0	0	0	0	0	0	0
	276-01-0224	0	0.06	0	0.03	0.01	0.07	0	0.02
	276-01-0225	0	0.11	0	0.08	0	0.2	0	0.03
	276-01-0226	0	0	0	0	0	0.02	0	0
	276-01-0170	0	0.03	0	0.02	0.01	0.04	0	0
10 µg	276-01-0003	0.02	0.02	0	0.01	0	0.06	0.02	0
	276-01-0004	0	0.03	0	0.02	0	0.03	0	0
	276-01-0005	0.02	0.04	0	0.01	0	0.03	0	0
	276-01-0006	0	0.06	0	0.02	0.01	0.07	0	0
	276-01-0007	0.01	0.01	0	0	0	0.02	0	0
	276-01-0008	0	0.11	0	0.07	0	0.2	0	0.01
	276-01-0009	0	0	0	0.01	0	0.01	0	0.09
	276-01-0011	0	0.01	0	0.01	0	0.02	0	0
	276-01-0017	0	0.26	0.01	0.3	0.01	0.55	0	0.01
	276-01-0019	0.01	0.04	0	0.02	0	0.07	0	0
20 µg	276-01-0151	0	0.05	0	0.04	0	0.07	0	0.01
	276-01-0171	0	0.33	0	0.21	0	0.54	0	0
	276-01-0172	0	0.01	0	0.01	0	0.02	0	0
	276-01-0173	0	0.35	0	0.23	0.01	0.47	0	0.01
	276-01-0178	0	0.02	0	0.01	0	0.03	0	0.01
	276-01-0197	0	0.02	0	0.01	0	0.05	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
30 µg	276-01-0016	0.01	0	0	0.02	0	0.05	0	0
	276-01-0020	0	0.02	0	0	0	0.03	0	0
	276-01-0021	0	0	0	0.01	0	0.03	0	0
	276-01-0028	0	0.02	0	0.01	0.01	0.03	0	0
	276-01-0031	0	0.05	0	0.02	0	0.1	0	0.01
	276-01-0032	0	0	0	0.02	0.01	0.04	0	0
	276-01-0034	0	0	0	0.01	0	0.02	0.01	0
	276-01-0037	0	0.05	0	0.02	0.01	0.1	0.01	0.01
	276-01-0038	0	0	0	0.02	0	0.04	0	0
	276-01-0039	0.01	0.05	0	0.03	0	0.08	0	0
	276-01-0043	0	0.09	0	0.03	0	0.07	0	0.01
	276-01-0047	0	0.01	0	0	0	0.03	0	0.32
50 µg	276-01-0049	0	0.12	0	0.04	0	0.11	0	0.07
	276-01-0055	0	0.19	0	0.08	0.01	0.16	0	0.01
	276-01-0056	0	0.12	0	0.04	0	0.12	0	0.01
	276-01-0057	0	0	0	0	0	0.02	0	0
	276-01-0059	0	0.09	0	0.05	0	0.13	0	0
	276-01-0060	0	0.03	0	0.02	0	0.06	0	0
	276-01-0068	0.01	0.09	0	0.05	0	0.17	0	0.01
	276-01-0070	0	0.01	0	0.01	0.01	0.03	0	0
	276-01-0073	0	0.15	0	0.09	0	0.33	0	0.01
60 µg	276-01-0066	0	0	0	0.02	0.01	0.08	0	0
	276-01-0075	0.02	0	0	0	0	0.01	0	0
	276-01-0076	0	0.03	0	0.01	0	0.06	0	0
	276-01-0078	0	0	0	0	0.01	0.02	0	0
	276-01-0083	0	0	0	0.01	0	0.03	0	0
	276-01-0085	0	0	0	0.01	0	0.03	0	0
	276-01-0089	0	0.01	0	0	0	0.03	0	0
	276-01-0093	0	0	0	0	0	0.01	0	0
	276-01-0096	0	0	0	0	0	0.01	0	0
	276-01-0103	0.01	0	0	0.01	0.01	0.08	0	0
	276-01-0104	0	0.03	0	0	0	0.01	0	0
10 µg older adults	276-01-0273	0	0.04	0	0.02	0	0.05	0	0.01
	276-01-0287	0.01	0.08	0	0.03	0.01	0.06	0	0.01
	276-01-0288	0	0.05	0	0.03	0	0.07	0	0
	276-01-0289	0	0	0	0	0	0.02	0	0
	276-01-0291	0	0	0	0	0	0.01	0	0
	276-01-0292	0	0.04	0	0.02	0	0.04	0.01	0.01
	276-01-0298	0	0.05	0	0.03	0	0.08	0	0.01
	276-01-0320	0	0.03	0	0.02	0	0.04	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0211	0	0.03	0	0.01	0	0.03	0	0.01
	276-02-0220	0	0.04	0	0.03	0	0.04	0	0.01
	276-02-0234	0	0.03	0	0.01	0	0.02	0.02	0
	276-02-0236	0	0.01	0	0	0.01	0.01	0	0
	276-02-0237	0	0.12	0	0.07	0	0.12	0	0.01
	276-02-0238	0	0.19	0	0.11	0	0.23	0	0.01
	276-02-0241	0	0.07	0	0.04	0.01	0.09	0	0
	276-02-0242	0	0.01	0	0	0	0.03	0	0
30 µg older adults	276-01-0350	0	0.06	0	0	0	0.01	0	0
	276-01-0352	0.01	0.02	0	0.01	0	0.02	0	0
	276-01-0353	0	0.03	0	0.02	0	0.05	0	0.01
	276-01-0358	0	0.09	0	0.01	0	0.08	0	0
	276-01-0360	0	0.07	0	0.01	0	0.04	0	0
	276-01-0361	0	0	0	0	0	0	0	0
	276-01-0362	0	0.03	0	0	0	0.02	0	0
	276-01-0363	0.01	0.01	0	0	0	0.01	0	0
	276-01-0364	0.01	0	0	0	0	0	0	0.06
	276-01-0365	0	0.04	0	0.01	0	0.04	0	0
	276-01-0366	0	0.01	0	0	0	0.01	0	0

Appendix 7: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1

Table 9-4: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1

	Cytokine	CD8+ IFNγ+	CD8+ IFNγ+	CD8+ IFNγ+ IL-2+	CD8+ IFNγ+ IL-2+	CD8+ IL-2+	CD8+ IL-2+
Dose	Subject ID	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0.04	0	0	0	0
	276-01-0023	0	0.05	0	0.01	0	0.02
	276-01-0025	0.01	0.02	0	0	0	0
	276-01-0033	0	3.34	0	0.05	0	0.12
	276-01-0040	0	0	0	0	0	0
	276-01-0041	0	0.43	0	0.01	0	0.01
	276-01-0042	0	0.03	0	0	0	0
	276-01-0045	0	0.01	0	0	0	0
	276-01-0048	0	0	0	0	0	0
	276-01-0052	0	0.09	0	0.01	0	0
3 µg	276-01-0170	0	0.06	0	0	0	0
	276-01-0194	0	0.44	0	0.02	0	0.02
	276-01-0198	0	0.02	0	0	0	0
	276-01-0204	0	0	0	0	0	0
	276-01-0209	0	1.04	0	0.06	0	0.1
	276-01-0212	0	4.54	0	0.22	0	0.33
	276-01-0221	0.01	0	0	0	0	0
	276-01-0224	0	0.51	0	0.02	0	0.05
	276-01-0225	0	1.7	0	0.18	0	0.28
	276-01-0226	0	0	0	0	0	0
10 µg	276-01-0003	0	0.01	0	0	0	0
	276-01-0004	0	1.82	0.01	0.18	0.01	0.42
	276-01-0005	0.05	0.17	0	0	0	0
	276-01-0006	0	0.32	0	0	0	0.02
	276-01-0007	0.01	0	0	0	0	0
	276-01-0008	0.08	0.33	0	0.01	0.01	0.03
	276-01-0009	0	0.07	0	0	0	0
	276-01-0011	0	0.01	0	0	0	0
	276-01-0017	0	3.32	0	0.13	0	0.28
	276-01-0019	0.11	0.68	0	0.01	0	0.04
20 µg	276-01-0151	0.02	1.07	0	0.03	0.01	0.06
	276-01-0171	0	1.19	0	0.02	0	0.05
	276-01-0172	0	0.02	0	0	0	0.01
	276-01-0173	0	1.82	0	0.02	0	0.05
	276-01-0178	0	0.02	0	0	0	0
	276-01-0197	0	0.15	0	0.01	0.01	0.01
30 µg	276-01-0016	0	0.69	0.01	0.01	0.03	0.02

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5
	276-01-0020	0	0.01	0	0	0	0
	276-01-0021	0	0	0	0.01	0.01	0.04
	276-01-0028	0	0.2	0	0	0	0
	276-01-0031	0	0.2	0	0	0	0
	276-01-0032	0	0.25	0	0	0	0
	276-01-0034	0	0.14	0	0	0	0.01
	276-01-0037	0	0.05	0	0	0	0.01
	276-01-0038	0	0	0	0	0	0
	276-01-0039	0.02	0.13	0	0	0	0
	276-01-0043	0	0.26	0	0.01	0	0.02
	276-01-0047	0	0.02	0	0	0	0
50 µg	276-01-0049	0	1.4	0	0.02	0	0.04
	276-01-0055	0.05	3.42	0	0.13	0	0.23
	276-01-0056	0	1.09	0	0	0	0.01
	276-01-0057	0	0	0	0	0	0
	276-01-0059	0.11	0.28	0	0	0	0
	276-01-0060	0.03	0.05	0	0	0	0.01
	276-01-0068	0.02	1.04	0	0	0	0.03
	276-01-0070	0.02	0.03	0	0	0	0
	276-01-0073	0	2.05	0	0.01	0	0.02
60 µg	276-01-0066	0	0.04	0	0.01	0.01	0
	276-01-0075	0.02	0	0	0	0	0
	276-01-0076	0	0.12	0	0	0	0.01
	276-01-0078	0	0	0	0	0	0
	276-01-0083	0	0	0	0	0.01	0.01
	276-01-0085	0	0	0	0	0	0
	276-01-0089	0	0	0	0	0	0.01
	276-01-0093	0.01	0	0	0	0	0.02
	276-01-0096	0	0	0	0	0	0
	276-01-0103	0	0.03	0	0	0	0
	276-01-0104	0	0	0	0	0	0
10 µg older adults	276-01-0273	0	0.43	0	0.01	0	0.03
	276-01-0287	0	3.93	0	0.17	0	0.26
	276-01-0288	0.01	1.11	0	0.03	0	0.04
	276-01-0289	0	0.02	0	0	0	0
	276-01-0291	0	0.01	0	0	0	0.01
	276-01-0292	0	0.43	0	0	0	0
	276-01-0298	0	7.19	0	0.04	0	0.07
	276-01-0320	0.02	0.43	0	0.01	0	0.02
	276-02-0211	0	0.24	0	0.01	0	0.02

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ IL-2^+	$CD8^+$ $IFN\gamma^+$ IL-2^+	$CD8^+$ IL-2^+	$CD8^+$ IL-2^+
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0	0.03	0	0	0	0
	276-02-0234	0	0.03	0	0	0.02	0.01
	276-02-0236	0	0	0	0	0	0
	276-02-0237	0	0.15	0	0.02	0	0.03
	276-02-0238	0	0.3	0	0.02	0	0.04
	276-02-0241	0	1.54	0	0.02	0	0.04
	276-02-0242	0.01	0.03	0	0	0	0.01
30 µg older adults	276-01-0350	0	0	0	0	0	0
	276-01-0352	0	0.11	0	0	0	0
	276-01-0353	0	0.01	0	0	0	0.01
	276-01-0358	0	0.52	0	0	0	0
	276-01-0360	0.01	1.68	0	0	0	0.01
	276-01-0361	0	0	0	0	0	0
	276-01-0362	0.01	0.14	0	0	0	0
	276-01-0363	0.05	0.09	0	0	0	0
	276-01-0364	0	0	0	0	0	0
	276-01-0365	0	0.6	0	0	0	0
	276-01-0366	0	0.1	0	0	0	0

Appendix 8: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 2

Table 9-5: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 2

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0	0	0	0.01	0	0	0
	276-01-0023	0.01	0	0	0	0	0.01	0.01	0
	276-01-0025	0	0.01	0	0	0	0	0	0
	276-01-0033	0	0.01	0	0	0.01	0.01	0	0
	276-01-0040	0	0	0	0	0.01	0.01	0	0
	276-01-0041	0	0	0	0	0	0.01	0	0
	276-01-0042	0	0	0	0	0	0	0	0
	276-01-0045	0.01	0.01	0	0	0.01	0.01	0	0
	276-01-0048	0	0	0	0	0.01	0.01	0	0
	276-01-0052	0	0	0	0	0	0	0	0
3 µg	276-01-0170	0.01	0	0.01	0	0.01	0.01	0	0
	276-01-0194	0.01	0	0	0	0.01	0.01	0	0
	276-01-0198	0.01	0	0	0	0.01	0.01	0	0
	276-01-0204	0	0	0	0	0.01	0.01	0	0
	276-01-0209	0.01	0	0	0	0	0	0	0
	276-01-0212	0.01	0.01	0	0	0.01	0	0	0
	276-01-0221	0	0	0	0	0	0	0	0
	276-01-0224	0.01	0.01	0	0	0.01	0.01	0.01	0
	276-01-0225	0	0.01	0	0.01	0.01	0.01	0	0
	276-01-0226	0	0	0	0	0	0	0	0
10 µg	276-01-0003	0	0.01	0	0	0	0	0	0
	276-01-0004	0	0.02	0	0	0	0	0.01	0
	276-01-0005	0.04	0	0	0	0	0.01	0	0
	276-01-0006	0	0.01	0	0	0	0.01	0.01	0
	276-01-0007	0	0	0	0	0.01	0.01	0	0
	276-01-0008	0.01	0	0	0	0	0.01	0	0
	276-01-0009	0	0	0	0	0	0	0	0
	276-01-0011	0	0.01	0	0	0	0.01	0	0
	276-01-0017	0	0	0	0	0.01	0	0	0
	276-01-0019	0	0	0	0	0.01	0	0	0
20 µg	276-01-0151	0	0	0	0	0	0	0	0
	276-01-0171	0.03	0.02	0.02	0.02	0.02	0.03	0	0
	276-01-0172	0	0	0	0	0	0	0	0
	276-01-0173	0.01	0	0.01	0	0.01	0.01	0	0
	276-01-0178	0	0	0	0	0.01	0.02	0	0
	276-01-0197	0	0	0	0	0	0	0	0
30 µg	276-01-0016	0	0	0	0	0.01	0	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
	276-01-0020	0.01	0.01	0	0	0.01	0	0	0
	276-01-0021	0	0.01	0	0	0.01	0.01	0	0.01
	276-01-0028	0	0	0	0	0.01	0	0	0
	276-01-0031	0	0.04	0	0	0.01	0.02	0	0
	276-01-0032	0	0	0	0	0.01	0	0	0
	276-01-0034	0	0	0	0	0	0	0.01	0
	276-01-0037	0	0.01	0	0	0	0.01	0	0
	276-01-0038	0	0	0	0	0.01	0	0	0
	276-01-0039	0.02	0	0	0	0.01	0.01	0	0
	276-01-0043	0.09	0.06	0	0	0	0	0	0
	276-01-0047	0	0.01	0	0	0.01	0.01	0	0.02
50 µg	276-01-0049	0	0	0	0	0.01	0	0	0
	276-01-0055	0	0	0	0.01	0.01	0.02	0	0
	276-01-0056	0	0.02	0	0	0	0	0	0
	276-01-0057	0	0	0	0	0.01	0	0	0
	276-01-0059	0	0	0	0	0	0.02	0	0
	276-01-0060	0	0.01	0	0	0	0.01	0.01	0.01
	276-01-0068	0.01	0	0	0	0	0.01	0	0
	276-01-0070	0	0	0	0	0.01	0.01	0	0
	276-01-0073	0.01	0	0	0.01	0	0.04	0	0
60 µg	276-01-0066	0	0	0.01	0.01	0.02	0.03	0.02	0
	276-01-0075	0.04	0	0	0	0	0.01	0	0
	276-01-0076	0.03	0.01	0	0	0.01	0.01	0	0
	276-01-0078	0	0	0	0	0	0	0	0
	276-01-0083	0	0.08	0	0	0	0.01	0	0
	276-01-0085	0.01	0	0	0	0.01	0	0	0
	276-01-0089	0	0	0	0	0	0.01	0	0
	276-01-0093	0	0	0	0	0	0	0	0
	276-01-0096	0	0	0	0	0	0.01	0	0
	276-01-0103	0	0	0	0	0	0.01	0	0
	276-01-0104	0	0	0	0	0	0.01	0	0
10 µg older adults	276-01-0273	0	0	0	0	0	0	0	0
	276-01-0287	0.37	0.26	0.02	0.02	0.02	0.02	0	0
	276-01-0288	0.04	0.03	0.01	0.01	0.02	0.01	0	0
	276-01-0289	0	0	0	0	0	0	0	0
	276-01-0291	0	0	0	0	0	0	0	0
	276-01-0292	0	0	0	0	0	0	0.01	0
	276-01-0298	0	0	0	0	0	0	0	0
	276-01-0320	0	0	0	0	0	0	0	0
	276-02-0211	0	0	0	0	0	0.01	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0	0	0	0	0	0	0	0.01
	276-02-0234	0	0	0	0	0	0	0.01	0
	276-02-0236	0	0	0	0	0.01	0.01	0	0
	276-02-0237	0	0.01	0	0	0	0	0	0
	276-02-0238	0	0	0	0	0	0	0	0
	276-02-0241	0.01	0	0	0	0.01	0	0	0
	276-02-0242	0	0	0	0	0	0	0	0
30 µg older adults	276-01-0350	0	0.01	0	0	0	0.01	0	0.01
	276-01-0352	0	0	0	0	0	0	0	0
	276-01-0353	0	0	0	0	0	0	0	0
	276-01-0358	0	0	0	0	0	0	0	0
	276-01-0360	0.01	0	0	0	0	0	0.01	0
	276-01-0361	0	0	0	0	0	0	0	0
	276-01-0362	0	0	0	0	0	0	0.09	0
	276-01-0363	0	0.01	0	0	0	0	0	0.01
	276-01-0364	0.01	0	0	0	0	0	0	0.02
	276-01-0365	0.01	0.01	0	0	0	0.01	0	0
	276-01-0366	0	0	0	0	0	0	0	0

Appendix 9: Frequency of cytokine-producing $CD8^+$ T cells in response to S protein pool 2

Table 9-6: Frequency of cytokine-producing $CD8^+$ T cells in response to S protein pool 2

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0.02	0.03	0	0	0	0
	276-01-0023	0	0	0	0	0	0
	276-01-0025	0	0.01	0	0	0	0
	276-01-0033	0	0.02	0	0	0	0
	276-01-0040	0	0	0	0	0	0
	276-01-0041	0.09	0.02	0	0	0	0
	276-01-0042	0.1	0.01	0	0	0	0
	276-01-0045	0.01	0	0	0	0	0
	276-01-0048	0	0	0	0	0	0
	276-01-0052	0	0	0	0	0	0
3 µg	276-01-0170	0.04	0.01	0	0	0	0
	276-01-0194	0.01	0	0	0	0	0
	276-01-0198	0.01	0	0	0	0	0
	276-01-0204	0.01	0	0	0	0	0
	276-01-0209	0.02	0.01	0	0	0	0
	276-01-0212	0.25	0.27	0.02	0.02	0.04	0.02
	276-01-0221	0.01	0	0	0	0	0
	276-01-0224	0.01	0	0	0	0.01	0
	276-01-0225	0	0.01	0	0	0	0
	276-01-0226	0	0	0	0	0	0
10 µg	276-01-0003	0	0.01	0	0	0	0
	276-01-0004	0	0.02	0	0	0	0.01
	276-01-0005	0.23	0	0	0	0	0.01
	276-01-0006	0.08	0.13	0.01	0	0.01	0
	276-01-0007	0	0.01	0	0	0	0
	276-01-0008	1.13	0.73	0.01	0	0.01	0
	276-01-0009	0	0	0	0	0.04	0
	276-01-0011	0.04	0.15	0.01	0	0.01	0
	276-01-0017	0.06	0.03	0	0	0	0
	276-01-0019	0.1	0	0	0	0	0.01
20 µg	276-01-0151	0	0	0	0	0	0
	276-01-0171	0.01	0	0	0	0	0
	276-01-0172	0.02	0.04	0	0	0	0
	276-01-0173	0	0	0	0	0	0
	276-01-0178	0	0	0	0	0	0
	276-01-0197	0.01	0	0	0	0	0
30 µg	276-01-0016	0.02	0.06	0.01	0.01	0.02	0

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0020	0	0.05	0	0	0	0
	276-01-0021	0	0.06	0	0.01	0.01	0.03
	276-01-0028	0.01	0	0	0	0.01	0
	276-01-0031	0	0.06	0	0	0	0
	276-01-0032	0	0	0	0	0	0
	276-01-0034	0	0	0	0.01	0	0.01
	276-01-0037	0.04	0.14	0	0	0	0
	276-01-0038	0	0	0	0	0	0
	276-01-0039	0.02	0.07	0	0	0	0
	276-01-0043	0.72	1	0	0	0	0
	276-01-0047	0	0.02	0	0	0	0
50 µg	276-01-0049	0	0	0	0	0	0
	276-01-0055	0.04	0	0	0	0.01	0
	276-01-0056	0	0.06	0	0	0	0
	276-01-0057	0	0	0	0	0	0.01
	276-01-0059	0.02	0	0	0	0	0
	276-01-0060	0.04	0.05	0	0	0	0
	276-01-0068	0.1	0.14	0	0	0	0.01
	276-01-0070	0.01	0	0	0	0	0
	276-01-0073	0.01	0	0	0	0	0
60 µg	276-01-0066	0	0	0	0	0	0
	276-01-0075	0.01	0	0	0	0	0
	276-01-0076	0.06	0.02	0	0	0	0
	276-01-0078	0	0	0	0	0	0
	276-01-0083	0	0	0	0	0.02	0
	276-01-0085	0	0	0	0	0	0
	276-01-0089	0	0	0	0	0	0
	276-01-0093	0	0	0	0	0	0.02
	276-01-0096	0.05	0	0	0	0	0
	276-01-0103	0.02	0.01	0	0	0	0
	276-01-0104	0	0	0	0	0	0
10 µg older adults	276-01-0273	0	0.28	0	0	0	0
	276-01-0287	0.3	0.25	0.02	0.01	0.02	0.01
	276-01-0288	0.01	0	0	0	0	0
	276-01-0289	1.46	1.3	0.06	0.05	0.08	0.07
	276-01-0291	0.16	0.15	0	0	0.01	0
	276-01-0292	0	0	0	0	0	0
	276-01-0298	0	0	0	0	0	0
	276-01-0320	0.9	0.51	0.03	0.02	0.03	0.04
	276-02-0211	0	0	0	0	0	0

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0.1	0.1	0	0	0	0
	276-02-0234	0	0	0	0	0.01	0
	276-02-0236	0	0	0	0	0	0
	276-02-0237	0	0	0	0	0	0
	276-02-0238	0.04	0	0	0	0.01	0
	276-02-0241	0	0.01	0	0	0	0
	276-02-0242	0.01	0.01	0	0	0	0
30 µg older adults	276-01-0350	0	0	0	0	0	0
	276-01-0352	0.02	0.02	0	0	0	0
	276-01-0353	0.02	0.01	0	0	0.02	0.01
	276-01-0358	0	0	0	0	0	0
	276-01-0360	0.01	0.03	0	0	0	0
	276-01-0361	0	0	0	0	0	0
	276-01-0362	0	0	0	0	0	0
	276-01-0363	0.14	0.14	0	0	0	0
	276-01-0364	0.01	0.01	0	0	0	0.01
	276-01-0365	0	0.04	0	0	0	0
	276-01-0366	0.01	0	0	0	0	0.01

Appendix 10: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1+2

Table 9-7: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1+2

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0.01	0	0.01	0.01	0.04	0	0
	276-01-0023	0.01	0.03	0	0.02	0.01	0.05	0	0
	276-01-0025	0	0.01	0	0	0	0.02	0	0
	276-01-0033	0	0.15	0	0.09	0	0.17	0	0.01
	276-01-0040	0.03	0	0.01	0.01	0.02	0.01	0	0
	276-01-0041	0.02	0.11	0	0.06	0	0.11	0	0
	276-01-0042	0	0.03	0	0	0	0.02	0	0
	276-01-0045	0.01	0.01	0	0	0.01	0.02	0	0
	276-01-0048	0	0	0	0	0.01	0.01	0	0.01
	276-01-0052	0	0	0	0	0	0.01	0	0
3 µg	276-01-0170	0.01	0.02	0.01	0.01	0.01	0.03	0	0.01
	276-01-0194	0	0.05	0	0.02	0.01	0.06	0	0.01
	276-01-0198	0	0.07	0	0.03	0.01	0.08	0	0.01
	276-01-0204	0	0.01	0	0	0.01	0.02	0	0
	276-01-0209	0	0.07	0	0.04	0	0.13	0	0.01
	276-01-0212	0.01	0.04	0	0.02	0.02	0.04	0	0
	276-01-0221	0	0	0	0	0.01	0.01	0	0
	276-01-0224	0	0.06	0	0.04	0.01	0.07	0	0.01
	276-01-0225	0	0.07	0	0.05	0.01	0.13	0	0.02
	276-01-0226	0	0.01	0	0	0	0.02	0	0
10 µg	276-01-0003	0	0.03	0	0.01	0	0.07	0	0
	276-01-0004	0	0	0	0.01	0	0.02	0.01	0
	276-01-0005	0.01	0.01	0	0.01	0	0.04	0.03	0
	276-01-0006	0	0.06	0	0.03	0	0.06	0	0.01
	276-01-0007	0.01	0	0	0	0.01	0.02	0	0
	276-01-0008	0.01	0.05	0	0.05	0	0.16	0	0.01
	276-01-0009	0	0.01	0	0.01	0	0.01	0	0
	276-01-0011	0	0.01	0	0.01	0	0.02	0	0
	276-01-0017	0	0.2	0	0.22	0.01	0.36	0	0
	276-01-0019	0.02	0.05	0	0.01	0	0.06	0	0
20 µg	276-01-0151	0	0.03	0	0.02	0	0.04	0	0
	276-01-0171	0.03	0.27	0.02	0.15	0.02	0.38	0.01	0
	276-01-0172	0	0	0	0	0	0	0	0
	276-01-0173	0.01	0.2	0.01	0.11	0.02	0.25	0	0.01
	276-01-0178	0.01	0.01	0.01	0.01	0.01	0.02	0	0
	276-01-0197	0.01	0.02	0	0.01	0	0.03	0	0
30 µg	276-01-0016	0	0.02	0	0	0	0.01	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
	276-01-0020	0	0.03	0	0.01	0.01	0.03	0	0
	276-01-0021	0	0	0	0.01	0	0.02	0	0.01
	276-01-0028	0	0.01	0	0.01	0	0.02	0	0
	276-01-0031	0	0.04	0	0.02	0	0.11	0	0.01
	276-01-0032	0	0	0.01	0.02	0.01	0.03	0	0
	276-01-0034	0	0	0	0.01	0	0.01	0.01	0
	276-01-0037	0	0.08	0	0.02	0	0.07	0	0
	276-01-0038	0	0	0	0.02	0.01	0.03	0	0
	276-01-0039	0	0.05	0	0.03	0	0.07	0	0
	276-01-0043	0.03	0.06	0	0.03	0	0.06	0	0.01
	276-01-0047	0	0.02	0	0	0	0.02	0	0
50 µg	276-01-0049	0	0.09	0	0.07	0	0.12	0	0.01
	276-01-0055	0	0.14	0	0.05	0	0.14	0	0.01
	276-01-0056	0	0.11	0	0.03	0	0.1	0	0
	276-01-0057	0	0	0	0	0.01	0.02	0	0
	276-01-0059	0.01	0.04	0	0.04	0	0.08	0	0
	276-01-0060	0	0.03	0	0.01	0	0.04	0	0.01
	276-01-0068	0.02	0.07	0	0.04	0	0.1	0	0
	276-01-0070	0.01	0.01	0	0.01	0	0.03	0	0
	276-01-0073	0	0.12	0	0.08	0.01	0.25	0	0.01
60 µg	276-01-0066	0	0	0	0.02	0.02	0.09	0	0
	276-01-0075	0.13	0	0	0.01	0.01	0.02	0.01	0
	276-01-0076	0.04	0	0	0.01	0.01	0.05	0.01	0
	276-01-0078	0.02	0	0	0.01	0.01	0.03	0.01	0.01
	276-01-0083	0	0.04	0	0	0	0.02	0	0
	276-01-0085	0.01	0	0	0.01	0.01	0.05	0	0
	276-01-0089	0	0	0	0	0.01	0.03	0	0
	276-01-0093	0	0	0	0	0	0.01	0	0
	276-01-0096	0	0	0	0	0	0.01	0	0
	276-01-0103	0.04	0.01	0.01	0.01	0.01	0.07	0	0
	276-01-0104	0	0.04	0	0	0	0.02	0	0
10 µg older adults	276-01-0273	0	0.03	0	0.01	0	0.03	0	0.01
	276-01-0287	0.28	0.3	0.04	0.06	0.05	0.09	0	0.01
	276-01-0288	0.04	0.06	0.02	0.02	0.02	0.06	0.01	0
	276-01-0289	0	0	0	0	0	0.02	0.01	0
	276-01-0291	0	0	0	0.01	0	0.02	0	0.01
	276-01-0292	0	0.03	0	0.01	0	0.03	0	0.01
	276-01-0298	0	0.05	0	0.03	0	0.06	0	0.01
	276-01-0320	0	0.02	0	0.02	0	0.03	0	0
	276-02-0211	0	0.02	0	0.01	0	0.03	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0	0.05	0	0.01	0	0.02	0.01	0
	276-02-0234	0	0.02	0	0.01	0	0.01	0	0
	276-02-0236	0	0.01	0	0	0	0.01	0	0
	276-02-0237	0	0.1	0	0.06	0	0.1	0	0.01
	276-02-0238	0	0.16	0	0.08	0	0.15	0	0.01
	276-02-0241	0	0.04	0	0.03	0.01	0.06	0.01	0
	276-02-0242	0	0.01	0	0.01	0	0.03	0	0
30 µg older adults	276-01-0350	0	0.09	0	0	0	0.02	0.01	0
	276-01-0352	0	0.02	0	0.01	0	0.01	0	0
	276-01-0353	0	0.03	0	0.01	0	0.03	0	0.01
	276-01-0358	0	0.09	0	0.01	0	0.07	0	0
	276-01-0360	0	0.07	0	0	0	0.04	0	0.01
	276-01-0361	0	0	0	0	0	0	0.01	0.01
	276-01-0362	0	0.03	0	0	0	0.01	0	0.01
	276-01-0363	0	0	0	0	0	0	0	0
	276-01-0364	0	0	0	0	0	0	0	0.07
	276-01-0365	0	0.03	0	0	0	0.02	0	0
	276-01-0366	0	0.02	0	0	0	0.01	0	0

Appendix 11: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1+2

Table 9-8: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1+2

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0	0.01	0	0	0	0.01
	276-01-0023	0	0.06	0	0.01	0	0.01
	276-01-0025	0	0.01	0	0	0	0
	276-01-0033	0	3.03	0	0.04	0	0.08
	276-01-0040	0.04	0	0	0	0	0
	276-01-0041	0.06	0.35	0	0.01	0	0.01
	276-01-0042	0.17	0.05	0	0	0	0.01
	276-01-0045	0	0	0	0	0	0
	276-01-0048	0	0	0	0	0	0
	276-01-0052	0.07	0.05	0	0	0	0
3 µg	276-01-0170	0.03	0.05	0	0	0	0
	276-01-0194	0.02	0.47	0	0.01	0	0.01
	276-01-0198	0.01	0.05	0	0	0	0
	276-01-0204	0.01	0	0	0	0	0
	276-01-0209	0.01	0.88	0	0.02	0	0.05
	276-01-0212	0.23	4.63	0.04	0.16	0.04	0.24
	276-01-0221	0	0.01	0	0	0	0
	276-01-0224	0.01	0.34	0	0.02	0	0.03
	276-01-0225	0	0.84	0	0.05	0	0.11
	276-01-0226	0	0	0	0	0	0
10 µg	276-01-0003	0	0.01	0	0	0	0
	276-01-0004	0	1.26	0.01	0.11	0.01	0.26
	276-01-0005	0.06	0	0	0	0	0
	276-01-0006	0.07	0.37	0.01	0.01	0.01	0.01
	276-01-0007	0.02	0.01	0	0	0	0
	276-01-0008	0.89	0.6	0.01	0.01	0.01	0.02
	276-01-0009	0	0.02	0	0	0	0
	276-01-0011	0.07	0.1	0	0	0.01	0
	276-01-0017	0	2.51	0	0.07	0	0.22
	276-01-0019	0.06	0.69	0	0.01	0.01	0.04
20 µg	276-01-0151	0.03	0.63	0	0.02	0.01	0.03
	276-01-0171	0.04	1.17	0	0.01	0	0.03
	276-01-0172	0	0	0	0	0	0
	276-01-0173	0	2.12	0	0.01	0	0.04
	276-01-0178	0	0.04	0	0	0	0.01
	276-01-0197	0	0.12	0	0	0	0
30 µg	276-01-0016	0	0.6	0	0	0.02	0

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
	276-01-0020	0	0.02	0	0	0	0
	276-01-0021	0	0	0	0	0.03	0.02
	276-01-0028	0	0.2	0	0	0	0.01
	276-01-0031	0	0.16	0	0	0	0
	276-01-0032	0	0.27	0	0	0	0.01
	276-01-0034	0.03	0.18	0	0	0	0.01
	276-01-0037	0	0.14	0	0	0	0
	276-01-0038	0	0	0	0	0	0
	276-01-0039	0	0.15	0	0	0	0
	276-01-0043	0.38	0.71	0	0.01	0	0.02
	276-01-0047	0.02	0.05	0	0	0	0
50 µg	276-01-0049	0.01	1.39	0	0.01	0	0.02
	276-01-0055	0.05	3.18	0	0.08	0	0.16
	276-01-0056	0	1.1	0	0	0	0.01
	276-01-0057	0	0	0	0	0	0.01
	276-01-0059	0	0.09	0	0	0	0.01
	276-01-0060	0	0.04	0	0	0	0
	276-01-0068	0.09	0.95	0	0	0	0.01
	276-01-0070	0.02	0.07	0	0	0	0
	276-01-0073	0	1.96	0	0	0	0.02
60 µg	276-01-0066	0	0	0	0	0	0
	276-01-0075	0.04	0	0	0	0	0.01
	276-01-0076	0.05	0.07	0	0	0	0.01
	276-01-0078	0	0	0	0	0	0
	276-01-0083	0	0	0	0	0	0
	276-01-0085	0	0	0	0	0	0
	276-01-0089	0	0	0	0	0	0
	276-01-0093	0	0.02	0	0	0	0.01
	276-01-0096	0	0	0	0	0	0
	276-01-0103	0	0.03	0	0	0	0
	276-01-0104	0	0	0	0	0	0
10 µg older adults	276-01-0273	0	0.52	0	0.01	0	0.02
	276-01-0287	0.25	2.55	0.01	0.07	0.01	0.1
	276-01-0288	0.01	0.76	0	0.01	0	0.02
	276-01-0289	1.79	1.5	0.09	0.07	0.11	0.08
	276-01-0291	0.14	0.17	0	0	0	0.01
	276-01-0292	0	0.35	0	0	0.01	0.01
	276-01-0298	0.01	5.64	0	0.04	0	0.05
	276-01-0320	0.92	1.11	0.05	0.03	0.05	0.04
	276-02-0211	0	0.14	0	0	0.01	0
	276-02-0220	0.11	0.16	0.01	0.01	0.01	0.02

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
20 µg older adults	276-02-0234	0.01	0.03	0	0	0.01	0.01
	276-02-0236	0	0.01	0	0	0	0
	276-02-0237	0.01	0.14	0	0.01	0	0.02
	276-02-0238	0.07	0.27	0	0.01	0	0.01
	276-02-0241	0	1.21	0	0	0.01	0
	276-02-0242	0	0.04	0	0.01	0	0.01
30 µg older adults	276-01-0350	0.02	0.08	0	0	0	0
	276-01-0352	0	0.09	0	0	0	0
	276-01-0353	0	0.03	0	0	0.01	0.01
	276-01-0358	0.01	0.56	0	0	0	0
	276-01-0360	0	1.98	0	0	0	0
	276-01-0361	0	0	0	0	0	0
	276-01-0362	0	0.25	0	0	0.01	0.01
	276-01-0363	0.14	0.29	0	0	0	0.01
	276-01-0364	0	0.05	0	0	0	0.01
	276-01-0365	0	0.64	0	0	0	0.01
	276-01-0366	0.05	0.07	0	0	0	0

Appendix 12: Frequency of cytokine-producing CD4+ T cells in response to CEFX

Table 9-9: Frequency of cytokine-producing CD4+ T cells in response to CEFX

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0.01	0.05	0.01	0.04	0.03	0.05	0	0
	276-01-0023	0.03	0	0.02	0.01	0.06	0.03	0.01	0
	276-01-0025	0.02	0.01	0.02	0.01	0.04	0.04	0	0
	276-01-0033	0.08	0.04	0.06	0.03	0.08	0.04	0.01	0.01
	276-01-0040	0.02	0	0.01	0.01	0.04	0.04	0	0
	276-01-0041	0.09	0.26	0	0.03	0	0.04	0.01	0.03
	276-01-0042	0.03	0.07	0.01	0.01	0.03	0.01	0	0
	276-01-0045	0.05	0.03	0.04	0.02	0.05	0.04	0	0.01
	276-01-0048	0.03	0.04	0.02	0.03	0.03	0.04	0	0
	276-01-0052	0.01	0.02	0.01	0.02	0.04	0.04	0	0
3 µg	276-01-0170	0.06	0.07	0.05	0.05	0.1	0.11	0.01	0.01
	276-01-0194	0.06	0.03	0.05	0.03	0.07	0.04	0	0
	276-01-0198	0.1	0.04	0.09	0.04	0.13	0.07	0	0
	276-01-0204	0.04	0.04	0.04	0.04	0.13	0.13	0.01	0.02
	276-01-0209	0.06	0.04	0.04	0.03	0.1	0.07	0.02	0.02
	276-01-0212	0.7	0.65	0.15	0.14	0.2	0.17	0.04	0.06
	276-01-0221	0.06	0.07	0.04	0.06	0.06	0.08	0	0
	276-01-0224	0.06	0.08	0.05	0.07	0.09	0.11	0.01	0.01
	276-01-0225	0.04	0.05	0.04	0.04	0.06	0.06	0	0
	276-01-0226	0.1	0.11	0.06	0.08	0.08	0.1	0	0
10 µg	276-01-0003	0.01	0.02	0	0.01	0.01	0.02	0	0
	276-01-0004	0	0.03	0.01	0.01	0.02	0.02	0	0
	276-01-0005	0.13	0.1	0.07	0.08	0.08	0.1	0	0
	276-01-0006	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0
	276-01-0007	0.01	0	0.01	0.01	0.05	0.04	0	0.02
	276-01-0008	0.03	0	0.01	0.01	0.02	0.02	0	0
	276-01-0009	0	0.04	0.01	0.03	0.11	0.09	0	0
	276-01-0011	0.03	0.03	0.03	0.03	0.07	0.06	0	0
	276-01-0017	1.49	1.48	0.56	0.45	0.6	0.46	0	0.02
	276-01-0019	0.01	0	0.01	0.01	0.04	0.03	0	0
20 µg	276-01-0151	0	0.01	0.01	0.01	0.01	0.01	0	0
	276-01-0171	0.13	0.08	0.08	0.07	0.11	0.1	0	0
	276-01-0172	0.04	0.05	0.03	0.04	0.05	0.06	0	0.01
	276-01-0173	0.1	0.07	0.08	0.08	0.13	0.13	0	0
	276-01-0178	0.09	0.06	0.07	0.04	0.12	0.09	0	0
	276-01-0197	0.07	0.03	0.05	0.02	0.08	0.04	0	0
30 µg	276-01-0016	0.02	0	0.07	0	0.08	0	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
	276-01-0020	0.03	0.05	0.03	0.03	0.04	0.04	0	0
	276-01-0021	0	0	0.01	0.01	0.02	0.02	0	0.01
	276-01-0028	0	0	0.01	0	0.03	0.01	0	0
	276-01-0031	0	0.04	0.02	0.02	0.21	0.17	0.05	0.04
	276-01-0032	0	0	0.04	0.02	0.07	0.05	0	0
	276-01-0034	0	0	0.03	0.02	0.02	0.04	0.01	0.01
	276-01-0037	0	0.01	0.01	0.01	0.02	0.03	0.02	0
	276-01-0038	0	0	0.02	0.01	0.05	0.02	0	0
	276-01-0039	0.03	0.05	0.02	0.04	0.05	0.06	0	0
	276-01-0043	0.06	0.08	0.02	0.04	0.04	0.06	0	0.01
	276-01-0047	0	0.02	0.01	0	0.02	0.02	0	0
50 µg	276-01-0049	0.01	0	0	0.01	0.01	0.01	0	0.16
	276-01-0055	0.05	0	0.04	0.01	0.07	0.03	0	0
	276-01-0056	0.02	0.03	0.03	0.01	0.04	0.03	0	0
	276-01-0057	0.02	0	0.02	0	0.03	0.01	0	0
	276-01-0059	0.01	0	0.02	0.02	0.03	0.04	0	0
	276-01-0060	0.02	0.04	0.02	0.02	0.03	0.04	0	0
	276-01-0068	0.05	0.02	0.02	0.01	0.03	0.03	0	0
	276-01-0070	0.01	0.02	0.01	0.01	0.03	0.03	0	0
	276-01-0073	0.05	0.01	0.03	0.02	0.04	0.04	0	0
60 µg	276-01-0066	0.01	0	0.03	0.02	0.06	0.04	0	0
	276-01-0075	0.17	0.09	0.05	0.05	0.07	0.07	0.02	0.01
	276-01-0076	0.1	0.05	0.05	0.04	0.06	0.05	0.01	0.01
	276-01-0078	0.06	0	0.02	0.03	0.02	0.04	0.02	0.12
	276-01-0083	0	0	0.02	0.02	0.09	0.06	0.01	0
	276-01-0085	0.05	0.04	0.02	0.02	0.03	0.02	0	0.01
	276-01-0089	0	0.03	0.01	0.02	0.06	0.11	0	0
	276-01-0093	0	0	0.01	0.01	0.02	0.02	0	0
	276-01-0096	0.02	0	0.01	0.02	0.03	0.03	0	0
	276-01-0103	0.17	0.06	0.04	0.04	0.07	0.06	0.01	0
	276-01-0104	0	0.01	0.01	0.01	0.05	0.02	0	0
10 µg older adults	276-01-0273	0.02	0.02	0.02	0.02	0.02	0.02	0	0
	276-01-0287	0	0	0.03	0.03	0.06	0.07	0.01	0.01
	276-01-0288	0.1	0.1	0.06	0.07	0.07	0.08	0	0
	276-01-0289	0	0	0	0	0.01	0.01	0.01	0
	276-01-0291	0.29	0.15	0.05	0.04	0.08	0.05	0.01	0.01
	276-01-0292	0.04	0.03	0.02	0.02	0.03	0.03	0	0
	276-01-0298	0.03	0.02	0.02	0.02	0.04	0.03	0.01	0
	276-01-0320	0.15	0.12	0.06	0.05	0.07	0.06	0.01	0.01
	276-02-0211	0.04	0.02	0.02	0	0.02	0.01	0.01	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	0.03	0.02	0.03	0.01	0.04	0.04	0.01	0.01
	276-02-0234	1.22	0.77	0.4	0.24	0.41	0.25	0.03	0.02
	276-02-0236	0.01	0.01	0.01	0.01	0.02	0.01	0	0
	276-02-0237	0.01	0	0	0	0.01	0.01	0	0
	276-02-0238	0.06	0.03	0.04	0.02	0.06	0.03	0.01	0
	276-02-0241	0.08	0.04	0.06	0.04	0.17	0.1	0.05	0.04
	276-02-0242	0.01	0.01	0.01	0	0.01	0.01	0.01	0
30 µg older adults	276-01-0350	0	0	0	0	0.01	0.01	0	0
	276-01-0352	0.07	0.04	0.06	0.03	0.08	0.04	0.01	0.01
	276-01-0353	0.07	0.05	0.04	0.03	0.06	0.05	0.02	0.01
	276-01-0358	0.02	0.01	0	0	0.01	0.01	0	0
	276-01-0360	0.04	0.03	0.01	0.01	0.03	0.03	0.01	0
	276-01-0361	0	0	0	0	0	0	0	0
	276-01-0362	0	0.01	0	0	0	0	0	0
	276-01-0363	0.02	0.01	0.01	0.01	0.02	0.01	0	0
	276-01-0364	0.01	0	0	0	0.01	0.01	0	0
	276-01-0365	0.01	0	0	0	0.05	0.05	0	0
	276-01-0366	0.01	0.01	0.01	0	0.02	0.02	0	0

Appendix 13: Frequency of cytokine-producing CD8+ T cells in response to CEFX

Table 9-10: Frequency of cytokine-producing CD8+ T cells in response to CEFX

	Cytokine	CD8+ IFNγ+	CD8+ IFNγ+	CD8+ IFNγ+ IL-2+	CD8+ IFNγ+ IL-2+	CD8+ IL-2+	CD8+ IL-2+
Dose	Subject ID	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0.07	0.16	0.01	0.04	0.03	0.06
	276-01-0023	0.76	0.4	0.04	0.03	0.05	0.04
	276-01-0025	0.17	0.16	0.07	0.07	0.11	0.09
	276-01-0033	1.36	0.79	0.11	0.06	0.18	0.08
	276-01-0040	0.17	0.28	0.02	0.06	0.03	0.08
	276-01-0041	0.36	0.84	0.03	0.09	0.05	0.14
	276-01-0042	5.53	8.9	0.04	0.08	0.07	0.11
	276-01-0045	0.26	0.16	0.05	0.02	0.07	0.03
	276-01-0048	0.15	0.18	0.03	0.04	0.05	0.05
	276-01-0052	0.34	0.38	0.08	0.11	0.1	0.15
3 µg	276-01-0170	0.99	0.95	0.2	0.21	0.33	0.32
	276-01-0194	0.81	0.53	0.31	0.16	0.41	0.22
	276-01-0198	0.37	0.21	0.08	0.05	0.12	0.07
	276-01-0204	2.18	2.18	0.27	0.25	0.35	0.31
	276-01-0209	1.21	1.48	0.21	0.23	0.28	0.3
	276-01-0212	1.27	1.62	0.33	0.31	0.42	0.41
	276-01-0221	0.14	0.13	0.06	0.04	0.07	0.06
	276-01-0224	0.48	0.65	0.07	0.13	0.11	0.17
	276-01-0225	1.53	2.19	0.48	0.62	0.76	0.93
	276-01-0226	2.34	2.54	0.45	0.42	0.63	0.65
10 µg	276-01-0003	0.05	0.06	0	0.01	0	0.01
	276-01-0004	1.24	2.1	0.24	0.49	0.53	1.07
	276-01-0005	0.57	0.39	0.1	0.12	0.13	0.18
	276-01-0006	0.29	0.6	0.05	0.08	0.06	0.1
	276-01-0007	0.33	0.3	0.02	0.02	0.03	0.04
	276-01-0008	1.22	1.05	0.06	0.03	0.1	0.06
	276-01-0009	0.12	0.41	0.01	0.04	0.03	0.05
	276-01-0011	0.21	0.25	0.07	0.06	0.1	0.09
	276-01-0017	0.65	0.9	0.09	0.1	0.16	0.17
	276-01-0019	0.79	0.42	0.16	0.06	0.21	0.12
20 µg	276-01-0151	0.86	1.13	0.14	0.14	0.2	0.24
	276-01-0171	3.09	3.33	0.17	0.18	0.29	0.32
	276-01-0172	1.42	1.79	0.12	0.18	0.21	0.28
	276-01-0173	1.24	1.16	0.12	0.13	0.18	0.19
	276-01-0178	0.63	0.51	0.18	0.11	0.24	0.14
	276-01-0197	0.65	0.59	0.14	0.13	0.18	0.17
30 µg	276-01-0016	0.1	0.33	0.06	0.07	0.15	0.14

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0020	0.44	0.25	0.06	0.04	0.09	0.07
	276-01-0021	0	0.1	0.02	0.03	0.05	0.07
	276-01-0028	0.08	0.11	0.03	0.07	0.07	0.1
	276-01-0031	0	0.23	0	0.03	0.01	0.04
	276-01-0032	1.01	0.96	0.11	0.13	0.2	0.19
	276-01-0034	0.85	1.13	0.09	0.11	0.07	0.14
	276-01-0037	0.45	0.19	0.05	0.05	0.07	0.06
	276-01-0038	0.81	1.11	0.12	0.21	0.15	0.3
	276-01-0039	0.53	0.93	0.02	0.05	0.04	0.09
	276-01-0043	1.33	1.81	0.2	0.43	0.31	0.56
	276-01-0047	0.24	0.29	0.01	0.02	0.02	0.04
50 µg	276-01-0049	0.11	0.01	0.04	0.02	0.06	0
	276-01-0055	0.49	0.21	0.04	0.02	0.07	0.04
	276-01-0056	0.03	0.05	0	0	0	0.01
	276-01-0057	0.06	0	0.02	0.01	0.03	0.01
	276-01-0059	0	0	0.01	0.02	0.01	0.02
	276-01-0060	0.08	0.06	0.02	0.03	0.02	0.03
	276-01-0068	0.12	0.12	0	0	0	0.01
	276-01-0070	0.21	0.31	0.06	0.09	0.09	0.11
	276-01-0073	0.13	0	0.02	0.01	0.02	0.02
60 µg	276-01-0066	0.7	0.54	0.15	0.12	0.27	0.17
	276-01-0075	0.09	0.14	0.02	0.03	0.03	0.05
	276-01-0076	0.92	0.76	0.21	0.24	0.29	0.31
	276-01-0078	1.3	1.82	0.23	0.4	0.31	0.57
	276-01-0083	0.32	0.26	0.07	0.03	0.11	0.06
	276-01-0085	0.03	0.05	0.01	0.02	0.01	0.02
	276-01-0089	0.1	0.34	0.02	0.06	0.02	0.08
	276-01-0093	0.08	0.06	0.03	0.04	0.03	0.07
	276-01-0096	0.38	0.36	0.06	0.04	0.1	0.07
	276-01-0103	0.21	0.26	0.07	0.05	0.08	0.07
	276-01-0104	0.04	0	0.03	0	0.04	0
10 µg older adults	276-01-0273	0.47	0.53	0.12	0.1	0.15	0.13
	276-01-0287	8.01	8.09	2.33	2.05	2.82	2.52
	276-01-0288	0.42	0.44	0.08	0.09	0.1	0.1
	276-01-0289	3.42	2.54	0.82	0.56	1.11	0.77
	276-01-0291	2.55	1.82	1.14	0.78	1.4	0.99
	276-01-0292	0.58	0.56	0.09	0.11	0.13	0.14
	276-01-0298	0.01	0	0	0	0	0
	276-01-0320	2.29	1.11	0.64	0.36	0.79	0.47
	276-02-0211	0.38	0.1	0.14	0.03	0.17	0.04

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	9.56	8.22	1.19	0.77	1.78	1.17
	276-02-0234	2.35	1.53	0.42	0.33	0.65	0.44
	276-02-0236	1.76	1.33	0.47	0.29	0.61	0.4
	276-02-0237	0.53	0.47	0.21	0.2	0.27	0.32
	276-02-0238	8.18	3.92	0.24	0.23	0.35	0.35
	276-02-0241	3.61	1.91	0.99	0.65	1.3	0.8
	276-02-0242	1.99	1.5	0.22	0.1	0.29	0.18
30 µg older adults	276-01-0350	0.02	0.03	0	0	0	0.02
	276-01-0352	0.34	0.36	0.13	0.12	0.17	0.18
	276-01-0353	4.35	3.26	1.03	0.6	1.4	0.9
	276-01-0358	10.76	14.17	0.05	0.1	0.12	0.18
	276-01-0360	0.15	0.14	0	0	0	0.01
	276-01-0361	3.37	3.46	0.06	0.1	0.11	0.21
	276-01-0362	0.32	0.21	0.01	0.04	0.02	0.05
	276-01-0363	1.3	1.88	0.03	0.03	0.07	0.12
	276-01-0364	0.1	0	0.01	0	0.02	0.01
	276-01-0365	0.07	0.12	0	0	0.01	0.01
	276-01-0366	0.1	0.04	0.01	0	0.03	0.02

Appendix 14: Frequency of cytokine-producing CD4+ T cells in response to anti-CD3

Table 9-11: Frequency of cytokine-producing CD4+ T cells in response to anti-CD3

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	0.59	0.85	0.07	0.1	0.63	0.64	0.11	0.05
	276-01-0023	6.35	3.37	0.72	0.43	5.15	4.16	0.39	0.11
	276-01-0025	0.34	0.33	0.21	0.19	2.79	3.01	0.22	0
	276-01-0033	3.89	4.05	0.66	0.43	2.07	1.19	0.37	0.11
	276-01-0040	2.72	3.4	0.32	0.49	1.95	2.84	0.08	0.1
	276-01-0041	1.29	2.48	0.18	0.37	0.86	1.87	0.16	0.25
	276-01-0042	1.6	2.32	0.39	0.2	2.55	0.92	0.06	0.13
	276-01-0045	0.35	0.17	0.08	0.05	0.7	0.58	0.06	0.02
	276-01-0048	0.7	0.98	0.29	0.35	2.25	2.79	0.08	0.09
	276-01-0052	0.45	0.29	0.2	0.13	1.54	1.29	0.03	0.02
3 µg	276-01-0170	2.73	1.05	0.24	0.09	2.31	1.21	0.17	0.1
	276-01-0194	0.26	0.35	0.09	0.12	1.76	1.38	0	0.02
	276-01-0198	1.24	1	0.56	0.46	5.39	4.17	0.09	0.1
	276-01-0204	3.2	4.07	0.65	0.73	4.44	4.91	0.19	0.34
	276-01-0209	0.73	1.04	0.2	0.26	1.79	2.71	0.08	0.18
	276-01-0212	5.58	8.08	1.31	1.46	4.9	5.45	0.64	1.04
	276-01-0221	0.91	1.39	0.12	0.15	0.81	1.21	0.06	0.06
	276-01-0224	0.44	0.91	0.24	0.34	2.01	2.32	0.16	0.23
	276-01-0225	0.21	0.28	0.08	0.08	1.27	1.33	0.1	0.07
	276-01-0226	0.41	0.74	0.08	0.14	0.61	0.78	0.06	0.08
10 µg	276-01-0003	0.63	0.83	0.15	0.16	1.25	1.06	0.08	0.04
	276-01-0004	0.38	0.83	0.24	0.35	1.25	1.65	0.04	0.01
	276-01-0005	0.61	0.48	0.14	0.14	1.09	1.38	0.06	0.04
	276-01-0006	1.14	1	0.13	0.16	1.07	1	0.07	0.04
	276-01-0007	2.17	0.83	0.83	0.24	5.86	2.26	0.26	0.11
	276-01-0008	0.24	0.1	0.04	0.03	0.49	0.5	0.05	0.03
	276-01-0009	0.17	0.24	0.08	0.12	2.09	1.73	0.06	0.02
	276-01-0011	0.72	1	0.2	0.26	2.31	1.72	0.18	0.12
	276-01-0017	5.71	4.88	1.57	1.23	6.81	4.61	0.13	0.1
	276-01-0019	0.18	0.11	0.05	0.05	0.52	1.19	0.02	0.02
20 µg	276-01-0151	0.01	0.05	0.01	0.02	1.21	1.81	0.31	0.43
	276-01-0171	0.21	0.69	0.06	0.32	0.98	2.91	0.03	0.04
	276-01-0172	0.15	0.39	0.04	0.17	0.57	1.54	0	0.01
	276-01-0173	3.69	3.14	0.99	0.99	5.07	6.08	0.13	0.11
	276-01-0178	0.47	0.47	0.23	0.22	2.57	2.75	0.06	0.09
	276-01-0197	0.13	0.12	0.05	0.04	0.96	0.94	0.02	0.03
30 µg	276-01-0016	0.05	0.07	0.1	0.1	0.88	0.82	0.06	0.06

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
	276-01-0020	0.6	0.62	0.14	0.23	1.08	1.72	0.03	0.03
	276-01-0021	0.05	0.17	0.09	0.13	0.66	0.8	0	0.04
	276-01-0028	0.19	0.3	0.08	0.1	1.31	1.48	0.06	0.04
	276-01-0031	0.11	0.14	0.07	0.03	1.81	0.86	0.34	0.13
	276-01-0032	0.58	0.36	0.43	0.29	2	1.53	0.06	0.07
	276-01-0034	0.26	0.8	0.08	0.15	1.94	0.98	0.08	0.04
	276-01-0037	5.92	3.53	0.59	0.79	2.41	3.85	0.18	0.15
	276-01-0038	0.33	0.41	0.2	0.22	1.53	1.75	0.13	0.04
	276-01-0039	0.77	0.65	0.18	0.19	2.02	2.17	0.08	0
	276-01-0043	4.22	4.53	0.99	1.08	5.54	4.03	0.45	0.23
	276-01-0047	1.63	1.11	0.45	0.24	3.37	2.09	0.25	0.08
50 µg	276-01-0049	0.48	0.57	0.25	0.19	2.96	2.01	0.06	0.02
	276-01-0055	0.68	0.94	0.19	0.23	3.13	2.81	0.19	0.18
	276-01-0056	1	0.53	0.24	0.15	2.5	1.73	0.27	0.11
	276-01-0057	0.26	0.08	0.12	0.07	1.74	1.27	0.17	0.06
	276-01-0059	0.34	0.85	0.18	0.43	2.15	3.29	0.03	0.05
	276-01-0060	0.81	2	0.38	0.98	2.4	4.53	0.08	0.08
	276-01-0068	0.6	1.02	0.12	0.27	0.95	2.24	0.12	0.21
	276-01-0070	0.44	0.91	0.27	0.49	2.7	3.84	0.22	0.2
	276-01-0073	0.79	0.96	0.22	0.44	1.92	3.5	0.22	0.16
60 µg	276-01-0066	0.72	0.71	0.52	0.44	4.5	4.81	0.13	0.13
	276-01-0075	0.5	0.19	0.1	0.08	0.69	0.82	0.03	0.09
	276-01-0076	1.43	0.91	0.66	0.43	4.12	3.94	0.34	0.39
	276-01-0078	13.57	10.58	0.94	0.79	1.5	1.42	0.47	0.94
	276-01-0083	1.92	2.17	0.85	0.54	6.65	4.3	0.53	0.33
	276-01-0085	0.29	0.3	0.11	0.13	1.44	2.05	0.09	0.16
	276-01-0089	0.62	0.99	0.31	0.36	2.87	3.27	0.05	0.05
	276-01-0093	0.22	0.2	0.1	0.08	1.43	1.14	0.06	0.06
	276-01-0096	1.84	2.95	0.17	0.19	1.25	1.25	0.05	0.04
	276-01-0103	1.45	0.73	0.41	0.24	3.03	2.64	0.31	0.11
	276-01-0104	0.72	0.29	0.3	0.13	2.59	1.39	0.08	0.05
10 µg older adults	276-01-0273	1.18	0.83	0.38	0.29	3.44	2.3	0.25	0.13
	276-01-0287	10.02	7.67	1.16	0.96	1.67	1.68	0.08	0.11
	276-01-0288	3.76	3	0.78	0.57	1.8	1.59	0.35	0.22
	276-01-0289	16.11	14.85	1.95	1.65	2.48	2.22	0.61	0.59
	276-01-0291	2.41	2.01	0.33	0.33	1.54	1.46	0.11	0.11
	276-01-0292	2.13	2.47	0.4	0.5	1.95	2.27	0.15	0.12
	276-01-0298	0.2	0.32	0.06	0.11	1.08	1.29	0.33	0.28
	276-01-0320	4.4	3.84	0.94	0.68	1.82	1.12	0.23	0.29
	276-02-0211	0.41	0.24	0.14	0.06	0.92	0.6	0.11	0.07
	276-02-0220	5.29	3.43	1.57	0.88	5.07	3.41	0.85	0.48

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
20 µg older adults	276-02-0234	2.8	2.09	0.78	0.63	4.29	3.14	0.19	0.1
	276-02-0236	0.43	0.27	0.15	0.08	1.98	1.68	0.11	0.08
	276-02-0237	0.07	0.15	0.02	0.05	0.33	0.7	0.08	0.15
	276-02-0238	0.7	0.45	0.14	0.16	1.45	1.13	0.06	0.07
	276-02-0241	3.7	2.63	1.09	0.68	5.67	2.53	1.21	0.8
	276-02-0242	29.13	31.12	6.59	4.88	8.1	5.88	0.67	0.38
30 µg older adults	276-01-0350	0.21	0.24	0.03	0.04	0.39	0.52	0.03	0.07
	276-01-0352	1.32	0.85	0.54	0.44	4.88	4.1	0.16	0.13
	276-01-0353	1.91	1.4	0.59	0.38	1.83	1.74	0.15	0.16
	276-01-0358	0.21	0.17	0.05	0.02	1.14	0.43	0.1	0.04
	276-01-0360	1.11	0.87	0.3	0.33	1.32	1.29	0.05	0
	276-01-0361	2.21	1.41	0.05	0.04	0.48	0.19	0.04	0.02
	276-01-0362	2.59	2.27	0.01	0.03	0.25	0.24	0.06	0.07
	276-01-0363	3.58	2.26	0.03	0.01	0.65	0.1	0.02	0
	276-01-0364	0.13	0.11	0.05	0.02	1.25	0.63	0.06	0.04
	276-01-0365	0.16	0.24	0.04	0.06	1.01	1.59	0.05	0.04
	276-01-0366	0.12	0.07	0.02	0.01	1.21	1.01	0.11	0.04

Appendix 15: Frequency of cytokine-producing CD8+ T cells in response to anti-CD3

Table 9-12: Frequency of cytokine-producing CD8+ T cells in response to anti-CD3

	Cytokine	CD8+ IFNγ+	CD8+ IFNγ+	CD8+ IFNγ+ IL-2+	CD8+ IFNγ+ IL-2+	CD8+ IL-2+	CD8+ IL-2+
Dose	Subject ID	V1	V5	V1	V5	V1	V5
1 µg	276-01-0018	3.78	4.07	0.16	0.2	0.35	0.45
	276-01-0023	34.02	26.12	1.42	0.94	2.76	1.95
	276-01-0025	5.08	4.77	0.57	0.56	1.61	1.72
	276-01-0033	12.53	10.94	0.84	0.45	1.6	0.72
	276-01-0040	16.38	16.75	0.92	1.1	1.73	2.44
	276-01-0041	7.92	11.59	0.22	0.5	0.51	1.07
	276-01-0042	9.13	14.86	0.13	0.22	0.31	0.43
	276-01-0045	2.03	2.06	0.23	0.2	0.5	0.39
	276-01-0048	3.32	3.49	0.55	0.45	1.23	1.04
	276-01-0052	5.14	5.17	0.94	0.71	5.36	4.11
3 µg	276-01-0170	12.61	7.48	0.93	0.67	1.82	1.29
	276-01-0194	2.36	2.63	0.4	0.31	1.27	0.88
	276-01-0198	6.14	5.01	1.08	0.74	2.4	1.63
	276-01-0204	18.07	19.17	1.59	1.52	3.41	3.09
	276-01-0209	4.85	8.28	0.79	1.19	1.91	2.4
	276-01-0212	9.33	9.81	1.07	0.75	2.23	1.73
	276-01-0221	11.27	15.31	0.6	0.6	1.04	1.12
	276-01-0224	1.66	3	0.13	0.2	0.48	0.62
	276-01-0225	8.08	9.26	0.63	0.68	2.29	2.12
	276-01-0226	3.53	4.61	0.4	0.57	0.75	0.93
10 µg	276-01-0003	3.98	5.68	0.4	0.39	1.34	1.12
	276-01-0004	7.07	7.97	1.71	2.57	5.99	9.14
	276-01-0005	8.4	8.72	0.74	1.14	5.2	4.9
	276-01-0006	8.65	8.97	0.5	0.67	1.16	1.62
	276-01-0007	6.51	3.42	0.78	0.32	1.81	0.81
	276-01-0008	24.74	19.2	0.27	0.26	0.51	0.59
	276-01-0009	1.11	2.15	0.2	0.3	3.72	2.69
	276-01-0011	22.27	35.43	2.04	4.43	4.8	8.25
	276-01-0017	10.21	8.49	1.76	1.21	4.53	2.87
	276-01-0019	6.18	6.29	0.46	0.34	3.26	5.98
20 µg	276-01-0151	4.15	7.44	0.63	0.53	1.4	1.4
	276-01-0171	15.21	15.96	0.51	0.65	0.97	1.26
	276-01-0172	12.22	15.1	0.43	0.75	0.84	1.39
	276-01-0173	14.18	12.94	0.82	1.06	1.95	2.35
	276-01-0178	5.07	4.37	1.03	0.81	2.75	2.32
	276-01-0197	6.68	5.14	0.41	0.42	1.04	0.98
30 µg	276-01-0016	5.54	6.59	0.08	0.1	0.4	0.41

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	Subject ID	V1	V5	V1	V5	V1	V5
	276-01-0020	3.57	2.78	0.26	0.36	0.62	0.73
	276-01-0021	2.4	2.14	0.09	0.15	0.38	0.46
	276-01-0028	1.55	1.81	0.26	0.4	0.66	0.92
	276-01-0031	5.75	5.7	0.45	0.17	1.26	0.56
	276-01-0032	4.47	3.82	0.35	0.23	0.91	0.98
	276-01-0034	4.92	7.69	0.6	0.46	3.76	1.3
	276-01-0037	31.69	30.5	1.56	1.86	2.53	2.57
	276-01-0038	17.86	20.93	1.03	1.84	2.22	3.66
	276-01-0039	10.47	12.19	0.38	0.71	0.82	1.39
	276-01-0043	19.57	20.68	1.25	1.55	2.34	2.34
	276-01-0047	15.48	15.03	0.38	0.25	0.83	0.54
50 µg	276-01-0049	4.04	2.89	0.51	0.4	1.98	1.82
	276-01-0055	8.42	5.6	1.04	0.61	3.86	2.86
	276-01-0056	3.05	2.9	0.34	0.27	0.78	0.56
	276-01-0057	7.16	4.36	0.77	0.43	1.74	1.14
	276-01-0059	7.04	8.65	0.51	0.97	1.05	1.59
	276-01-0060	4.15	8.12	1.02	2.15	4.19	6.36
	276-01-0068	6.53	7.76	0.33	0.47	0.66	1.04
	276-01-0070	7.23	9.53	0.81	1.03	2.81	2.91
	276-01-0073	2.92	4.74	0.23	0.54	0.62	1.09
60 µg	276-01-0066	7.43	6.82	1.52	1.23	3.62	2.99
	276-01-0075	5.29	6.12	0.33	0.36	0.6	0.7
	276-01-0076	11.11	9.3	1.75	1.63	6.93	7.88
	276-01-0078	33.95	38	1.14	1.4	1.61	2.32
	276-01-0083	11.19	10.14	1.53	0.88	3.28	1.93
	276-01-0085	2.2	3.12	0.34	0.3	0.84	0.89
	276-01-0089	5.43	9.92	0.68	0.56	2.71	1.43
	276-01-0093	6.23	6.88	0.42	0.4	1.33	1.44
	276-01-0096	18.04	23.27	0.22	0.22	0.5	0.49
	276-01-0103	6.99	6.95	0.58	0.49	1.22	1.08
	276-01-0104	6.44	3.12	0.67	0.59	2.69	2.77
10 µg older adults	276-01-0273	6.88	7.91	0.42	0.41	1.83	1.24
	276-01-0287	39.72	38.37	6.72	5.37	9.04	7.23
	276-01-0288	18.95	19.57	1.9	1.61	2.77	2.39
	276-01-0289	29.68	27.27	3.37	2.44	6.57	4.8
	276-01-0291	23.05	18.87	2.45	2.14	6.35	7.38
	276-01-0292	27.19	28.23	2.65	2.93	4.05	4.38
	276-01-0298	11.33	11.19	2.84	2.45	3.63	3.21
	276-01-0320	35.58	26.3	3.23	2.66	5.02	4.41
	276-02-0211	20.17	15.09	1.51	1.09	4.32	3.48

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
20 µg older adults	276-02-0220	31.43	26.56	2.59	1.59	5.32	3.76
	276-02-0234	13.58	9.71	1.51	1.53	6.48	5.98
	276-02-0236	5.35	4.16	1.19	0.76	3.55	2.96
	276-02-0237	1.6	2.01	0.41	0.37	1.2	1.66
	276-02-0238	9.95	4.31	0.74	0.5	1.66	1.3
	276-02-0241	25.15	20.97	3.01	2.5	6.35	4.26
	276-02-0242	10.76	9.33	1.41	0.63	2.94	2.08
30 µg older adults	276-01-0350	3.46	2.77	0.01	0.01	0.68	0.77
	276-01-0352	7.61	9.4	0.93	0.89	2.02	2.35
	276-01-0353	8.74	9.32	1.18	0.89	2.81	2.06
	276-01-0358	5.21	7.72	0.05	0.09	0.79	0.41
	276-01-0360	1.77	2.23	0.05	0.02	0.27	0.17
	276-01-0361	10.44	8.15	0.03	0.12	0.8	0.36
	276-01-0362	20.22	25.87	0.02	0.05	0.11	0.16
	276-01-0363	10.6	6.71	0.05	0.02	0.29	0.14
	276-01-0364	4.01	5.07	0.14	0.2	0.45	0.67
	276-01-0365	1.87	3.15	0.09	0.12	0.77	1.02
	276-01-0366	1.38	1.62	0.08	0.14	2.62	2.24

Appendix 16: Frequency of cytokine-producing CD4+ T cells in reference samples in response to CEFX and anti-CD3 stimulation

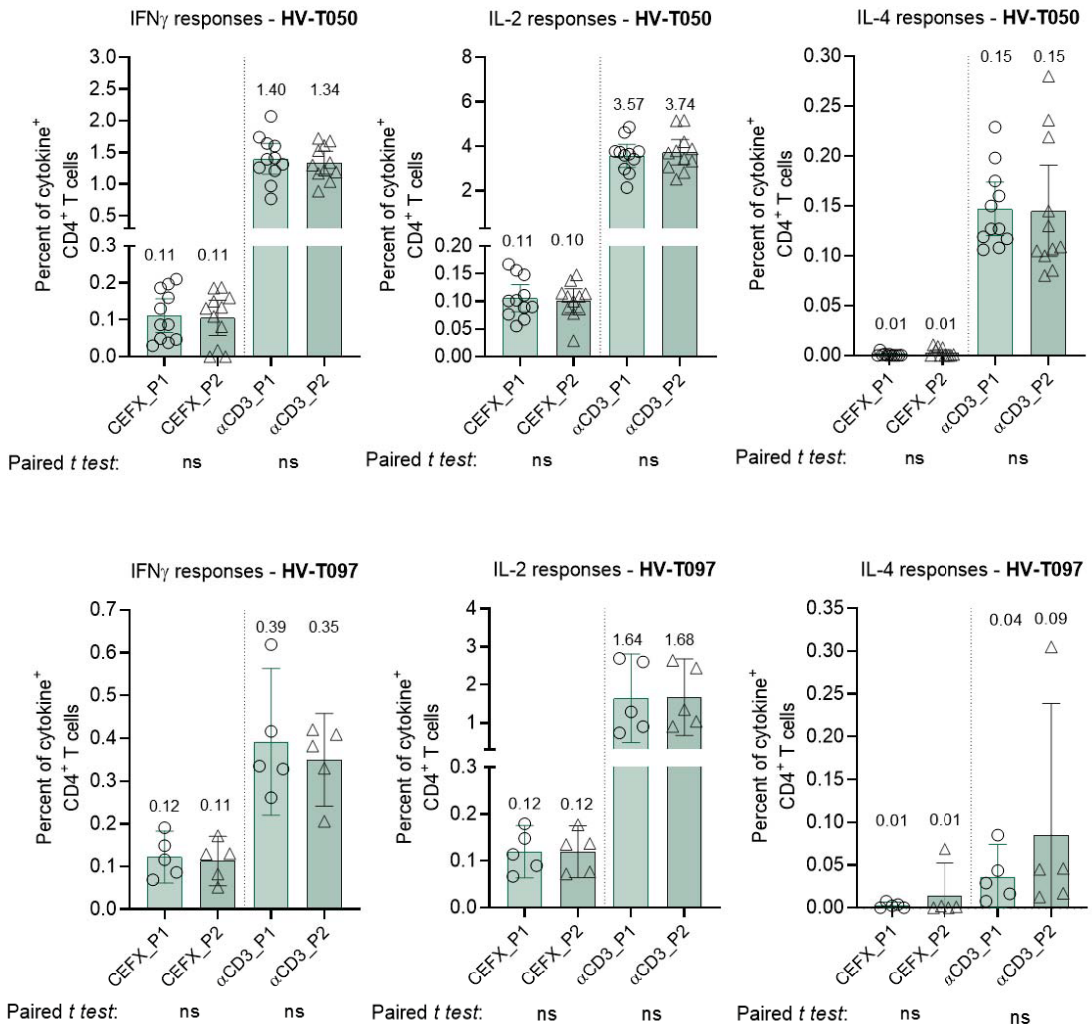

Figure 9.4: Frequency of cytokine-producing CD4+ T cells (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4+ T cells in response to CEFX and anti-CD3 stimulation

PBMCs from healthy volunteers (HV-T050 (n 11 batches) and HV-T097 (n 5 batches)) served as in-house reference assay controls and were stimulated in parallel to study subjects' PBMC samples. One reference sample row was included on each assay plate to control for intra- and inter-assay variability. The PBMC material available from one donor was not sufficient to cover all subject screenings in this report. Hence, a bridging experiment to a second PBMC (HV-T097) donor was performed during the reported study dates. Bar charts show arithmetic means with 95% CI for CEFX and anti-CD3 stimulation. Circles and triangles depict individual data points from one assay plate, respectively. Numbers located above the bars are the arithmetic mean fractions. No significant differences in the frequency of cytokine-producing CD4+ T cells were obtained among paired samples (P1 plate 1, P2 plate 2, paired t-test (two-tailed), ns not significant).

Appendix 17: Frequency of cytokine-producing CD8+ T cells in reference samples in response to CEFX and anti-CD3 stimulation

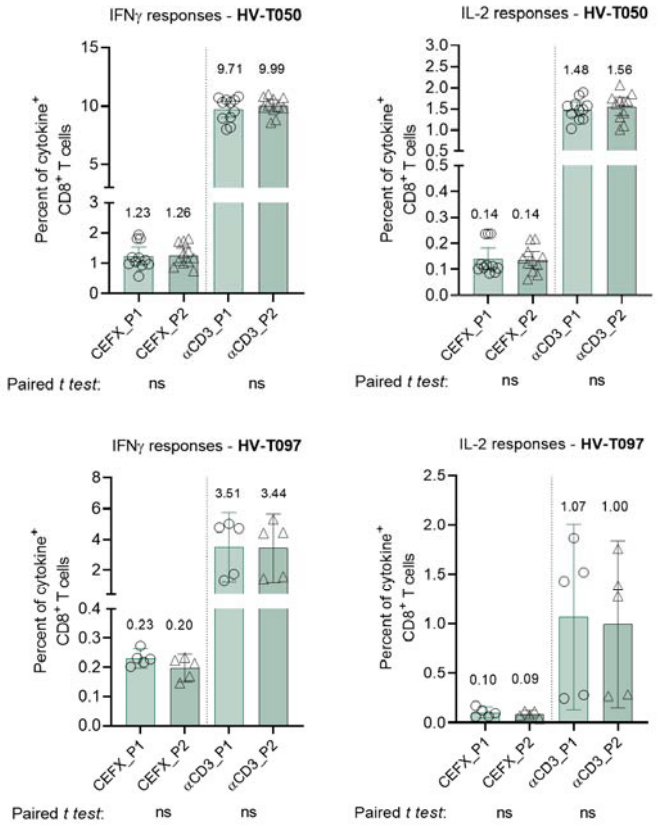

Figure 9.5: Frequency of cytokine-producing CD8+ T cells (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells in response to CEFX and anti-CD3 stimulation

PBMCs from healthy volunteers (HV-T050 (n 11 batches) and HV-T097 (n 5 batches)) served as in-house reference assay controls and were stimulated in parallel to study subjects' PBMC samples. One reference sample row was included on each assay plate to control for intra- and inter-assay variability. The PBMC material available from one donor was not sufficient to cover all subject screenings in this report. Hence, a bridging experiment to a second PBMC (HV-T097) donor was performed during the reported study dates. Bar charts show arithmetic means with 95% CI for CEFX and anti-CD3 stimulation. Circles and triangles depict individual data points from one assay plate, respectively. Numbers located above the bars are the arithmetic mean fractions. No significant differences in the frequency of cytokine-producing CD4+ T cells were obtained among paired samples (P1 plate 1, P2 plate 2, paired t-test (two-tailed), ns not significant).

Appendix 18: Thawing recovery and viability of reference samples

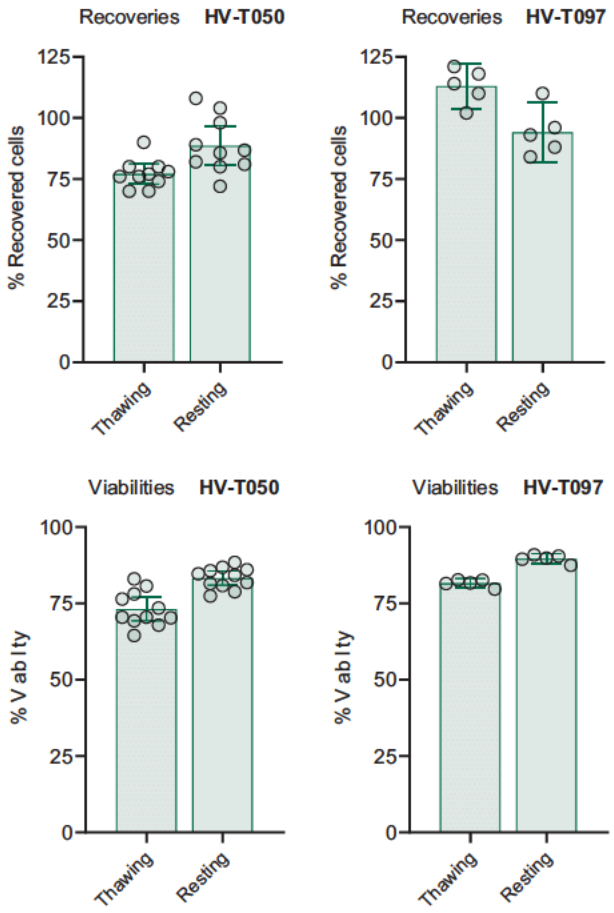

Figure 9.6: Thawing recovery and viability of PBMCs from reference samples

PBMCs from healthy volunteers (HV-T050 (n 11 batches) and HV-T097 (n 5 batches)) served as in-house reference assay controls and were processed in parallel to study subjects' PBMC samples for each performed assay run. The PBMC material available from one donor was not sufficient to cover all subject screenings in this report. Bar charts show arithmetic means with 95% CI for PBMC recovery (upper panel) and viability (lower panel) after thawing and resting. Circles depict individual measurements. The recovery rates after thawing and resting as well as PBMC viability were comparable between the different batches for both healthy volunteer donors.

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R&D STUDY REPORT No. R-20-0241

ANALYSIS OF THE TH1/2 CYTOKINE PROFILE OF BNT162B2-SPECIFIC CD4$^+$ AND CD8$^+$ T CELLS FROM PARTICIPANTS IN THE BNT162-01 TRIAL

(INTERIM REPORT FOR 79 SUBJECTS)

Version 03
Date: 19 MAR 2021

Reported by Isabel Vogler

Test item: Overlapping peptide pools representing different portions of the wild-type sequence of the SARS-CoV-2 S protein

Key words: BNT162-01 clinical study, intracellular cytokine staining, COVID-19

This R&D report consists of 97 pages.

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LIST OF ABBREVIATIONS

aa	Amino acid
BD	Becton Dickinson
BNT162b	BNT162 RNA vaccine utilizing nucleoside modified messenger RNA
CD	Cluster of differentiation
COVID-19	Coronavirus disease 2019
DMSO	Dimethyl sulfoxide
DS&BA	Data Science and Biomarker Analysis Unit
FACS	Fluorescence-activated cell sorting
HCS	Human convalescent sample
ICS	Intracellular cytokine staining
IL	Interleukin
IFNγ	Interferon gamma
JPT	Jerini Peptide Technologies
ns	Not significant
OLP	Overlapping peptide
PBMC	Peripheral blood mononuclear cell
QA	Quality assurance
RBD	Receptor-binding domain
R&D	Research and development
S protein	SARS-CoV-2 spike protein
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SOP	Standard operating procedure
Th1/Th2	Type 1/2 helper T cells
V	Visit

RESPONSIBILITIES

Person responsible for the study:	Isabel Vogler	22MAR2021
	Dr. Isabel Vogler; Director Immunogenicity Testing; BioNTech SE	Date
Author:	Isabel Vogler	22MAR2021
	Dr. Isabel Vogler; Director Immunogenicity Testing; BioNTech SE	Date
Reviewer:	Jasmin Quandt	22 MAR 2021
	Dr. Jasmin Quandt; Scientist Immunogenicity Testing; BioNTech SE	Date
QA representative:	(b) (6)	22MAR 2021
	BioNTech SE	Date

Meaning of the signatures:

Person responsible for the study: I am responsible for the content of the R&D report and confirm that it represents an accurate record of the results. This study was performed according to the SOPs and methods as well as the rules and regulations described in the report.

Author: I am the author of this document.

Reviewer: I reviewed the R&D report and confirm that this document complies with the scientific and technical standards and requirements.

QA representative: I confirm that this document complies with the relevant quality assurance requirements.

1 SUMMARY

Within the clinical trial BNT162-01, a continuous immune monitoring program was performed to analyze subjects' immune responses against vaccine-encoded antigens specific to the SARS-CoV-2 spike (S) protein and/or receptor-binding domain (RBD).

The objective of this study was to assess the T helper type 1 (Th1; IFNγ and IL-2) and Th2 (IL-4) cytokine profile of T cells specific to defined proteins/protein domains of SARS-CoV-2 as a result of two immunizations with doses ranging between 1 to 30 µg BNT162b2 using intracellular cytokine staining (ICS).

Peripheral blood mononuclear cell (PBMC) fractions isolated from blood of study subjects collected at baseline (pre-vaccination) and 29±3 days after the primary immunization with BNT162b2 were analyzed. This interim report includes data for a total of 79 study subjects at Day 29:

- Adults aged 18 to 55 years per dose cohort: 1 µg (n=8), 3 µg (n=9), 10 µg (n=11), 20 µg (n=11), and 30 µg (n=11).
- Older adults aged 56 to 85 years per dose cohort: 10 µg (n=11), 20 µg (n=9), and 30 µg (n=9).

The functionality and polarization of vaccine-induced SARS-CoV-2 S-specific T cells were assessed by intracellular accumulation of cytokines IFNγ, IL-2, and IL-4 in response to stimulation with overlapping peptides representing the full-length sequence of the vaccine-encoded RBD and the wild-type SARS-CoV-2 S protein. For bench-marking, PBMCs from 18 virologically confirmed, convalescent COVID-19 patients were used.

To assess the persistence of cell-mediated immune responses, PBMCs collected at 43±4 days, 85±7 days, and/or 184±9 days after the primary immunization (21, 63, and/or 162 days post-boost, respectively) were analyzed. This interim report includes data for a total of 41 subjects with sufficient PBMC material available at Days 43, 85, and 184:

- Adults aged 18 to 55 years per dose cohort: 10 µg (n=2), 20 µg (n=11), and 30 µg (n=10).
- Older adults aged 56 to 85 years per dose cohort: 10 µg: (n=4), 20 µg (n=7), and 30 µg (n=7).

Two doses of BNT162b2 (dose range 1 to 30 µg), induced vaccine-specific T-cell responses in both age groups analyzed. Testing for SARS-CoV-2 S protein-specific T-cell responses was performed with two different peptide pools – S pool 1 comprising overlapping peptides from the N-terminal region of the S protein (which is not equivalent to structural domains) and S pool 2 comprising C-terminal regions of the S protein. S-specific $CD4^+$ T-cell responses analyzed in 79 subjects vaccinated with

BNT162b2 are characterized by a Th1 cytokine profile secreting IFNγ, or IL-2, or both at Day 29.

Almost no Th2 cytokine IL-4 secreting T cells were detectable in response to S peptide sub-pool stimulations (mean fractions: 0.01% and 0.02% of antigen-specific circulating $CD4^+$ T cells in the 20 and 30 µg adult cohort, respectively; separate stimulation with S protein sub-pool 1 and sub-pool 2). S-specific $CD8^+$ T cells secreted IFNγ in 65 of the 79 analyzed subjects at Day 29 (adults: 43 of 50 subjects and older adults: 22 of 29 subjects) and also IL-2 secreting $CD8^+$ T cells were detectable. Fractions of S-specific $IFN\gamma^+$ $CD8^+$ T cells targeting the N-terminal domain of the S protein reached up to 1.24% of total peripheral blood $CD8^+$ T cells in the 20 and 30 µg adult cohort and up to 1.57% in the 30 µg older adult cohort on Day 29. Pre-existing $CD8^+$ T-cell responses against the C-terminal region of the S protein were detected in 17 of 79 vaccinated subjects (range: 0.07 – 5.59% IFNγ-producing $CD8^+$ T cells). In 5 of 17 subjects, these pre-existing responses were slightly amplified upon vaccination.

Overall, the mean fractions of S-specific $CD4^+$ and $CD8^+$ T cells were substantially higher at Day 29 (e.g., the S protein pool 1 IFNγ $CD8^+$ response of 30 µg vaccinated subjects was 12.5-fold higher) than that observed in 18 patients who recovered from COVID-19. Importantly, for the clinically targeted 30 µg dose cohort, the cytokine responses elicited after vaccination with BNT162b2 in older adults was mostly identical in response pattern and intensity with that of the 18 to 55 years of age cohort. For the majority of study subjects, the strong S-specific $IFN\gamma^+$ and $IL\text{-}2^+CD8^+$ and Th1 $CD4^+$ T-cell responses contracted by Day 43 (3 weeks post-boost) and plateaued at a lower level towards Day 85 (9 weeks post-boost). This observation held true for all dose cohorts analyzed with varying response magnitudes between individuals. For the adult subjects, the cell-mediated immune responses remained detectable until Day 184 (23 weeks post-boost). Day 184 PBMC material from the older adult subjects was not yet available at the time of this interim report. The impact of a SARS-CoV-2 infection on the persistence of vaccine-induced immune responses cannot be evaluated since the study subjects were not monitored for an infection on a regular basis during the course of this study.

BNT162b2-induced T-cell responses, especially for $CD8^+$ T cells, were not limited to the RBD, and pronounced and distinct T cell recognition of non-RBD regions of the S protein were observed indicating a polyvalent immune recognition of multiple independent MHC I and II epitopes across the entire S protein.

BNT162b2 induced poly-functional and pro-inflammatory $CD4^+/CD8^+$ T-cell responses in almost all subjects persisting in the majority of subjects for up to 6 months after the first vaccination. The Th1 polarization of the helper T-cell response was characterized by a robust IFNγ/IL-2 and only minor IL-4 production upon antigen-specific (wild-type SARS-CoV-2 S protein peptide pools) re-stimulation which was still observed, although with a reduced magnitude, at later time points.

The data cut-off date for this interim report is 02 MAR 2021.

Isabel Vogler	22 MAR 2021
Responsible Person: Dr. Isabel Vogler; Director Immunogenicity Testing; BioNTech SE	Date

2 GENERAL INFORMATION

2.1 Sponsor and Test Facility

BioNTech SE
An der Goldgrube 12
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Germany

2.2 Participating Sponsor Personnel

Responsible person: (as defined in SOP-100-024)	Dr. Isabel Vogler Director Immunogenicity Testing
Author:	Dr. Isabel Vogler Director Immunogenicity Testing
Experimenter: planning, execution, documentation, final analysis	Dr. Jasmin Quandt Scientist Immunogenicity Testing
Experimenter: planning, final analysis	Dr. Isabel Vogler Director Immunogenicity Testing
Experimenter: planning, execution, documentation, analysis	Rebecca Schulz Research Specialist Immunogenicity Testing
Experimenter: planning, execution, documentation, analysis	Belinda Mehlhase Research Specialist Immunogenicity Testing
Experimenter: execution, documentation	Silvia Wessel Research Associate Immunogenicity Testing
Experimenter: planning, execution, documentation, analysis	Cora Ecker Research Specialist Immunogenicity Testing
Experimenter: planning, execution, documentation, analysis	Kathrin Schmoldt Research Specialist Immunogenicity Testing
Experimenter: Execution, documentation, analysis	Magdalena Fierek Research Specialist Immunogenicity Testing
Experimenter: Execution, documentation, analysis	Petra Adams-Quack Specialist Flow Cytometry Core Facility
Experimenter: execution	Louisa-Marie Schmid Intern

2.3 Study Dates

Start of experiments: 22 JUL 2020

Completion of experiments: 25 FEB 2021

2.4 Guidelines and Regulations

All experiments are executed in accordance with the existing standard operating procedures and described processes from BioNTech SE. Applicable documents are listed below.

- SOP-010-098 Zellzählgerät CASY TTT
- SOP-010-103, Geräteanweisung BD FACSVerse - Flow Cytometry Core Facility
- SOP-030-041 Auftauen von Zellen
- SOP-030-100 Aufarbeitung von PBMCs und Plasma aus Vollblut - Biosampling
- SOP-100-003 Archiving of Paper-Based Documents

2.5 Changes and Deviations

Not applicable. There is no formal R&D plan available.

2.6 Documentation and Archive

Study plans and reports are stored and archived according to SOP-100-003.

Raw data and evaluated data are saved at

- Test item sequence lists (delivery list) of peptide preparations including purity, amount and peptide content were saved at: \\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06_Biomarker\00_Overview\02_Summary_of_analyses\01_Documents\JPT\Bestellung in Apr2020

- Raw data (FACS data) were saved at: \\isicfs101\rndrawdata\WKSBNT950\9391
- Experimental data were saved at: \\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_Biomarker_clinical_data\ICS with respective batch folders …… BNT162b2_batch11_10µg_30µg_11082020
- Flow Cytometry analysis files were saved at: \\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_Biomarker_clinical_data\ICS\BNT162b2_batchX_X\FACS data

- Files transferred to DS&BA Unit for each analyzed batch were saved at: \\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_ Biomarker_clinical_data\ICS\BNT162b2_batchX_X\FACS data\post_box
- Lab book entries can be found in lab book #1966 (pages 90-102, 128-179, and 191-200), #2021 (pages 1-2, 14-24, 55-65, 78-105, 128-139, and 152-200), #2022 (pages 1-4, 136-147, 172-200) and #2165 (pages 1-7, 46-139)

3 INTRODUCTION

3.1 Background

Within the clinical trial BNT162-01, a continuous immune monitoring program was performed to analyze participants' immune responses against vaccine-encoded antigens specific to the SARS-CoV-2 S protein or RBD including enzyme-linked immunosorbent assay (ELISA), *ex vivo* enzyme-linked immunosorbent spot (ELISpot), and intracellular cytokine staining (ICS).

3.2 Objectives

The objective of this study was to assess the Th1 (IFNγ and IL-2) and Th2 (IL-4) cytokine profile of T cells specific to defined proteins/protein domains of SARS-CoV-2 as a result of immunization with BNT162b2. In the presented third version of this report, subject cohorts of both young and older individuals immunized with BNT162b2 were monitored for the persistence of T-cell responses until Day 184 after first vaccination.

3.3 Study Design

Peripheral blood mononuclear cell (PBMC) fractions isolated from blood of study subjects collected at baseline (pre-vaccination) and 29±3 days after the primary immunization (post-vaccination) with BNT162b2 were analyzed by ICS (this interim report: n=79 in total; adults: 1 µg cohort: n=8, 3 µg cohort: n=9, 10 µg cohort: n=10, 20 µg cohort: n=11, and 30 µg cohort: n=11; older adults: 10 µg cohort: n=11, 20 µg cohort: n=9, and 30 µg cohort: n=9). In addition, PBMCs collected at 43±4 days, 85±7 days, and 184±9 days after the primary immunization were analyzed by ICS to monitor the persistence of the cell-mediated immune responses (this interim report: n=41 in total; adults: 10 µg cohort: n=0, 2, and 2; 20 µg cohort: n=11, 11, and 10; and 30 µg cohort: n=9, 10, and 10 at 43 days, 85 days, and 184 days, respectively). Study subjects with insufficient PBMC material for all cell-based assays were not analyzed by ICS. For bench-marking, PBMCs from recovered COVID-19 patients were used. PBMCs isolated from healthy volunteer leukapheresis samples served as in-house reference samples (intra- and inter-assay controls). Assay control sample bridging was performed in one experiment.

PBMCs were stimulated with overlapping peptides representing different portions of the wild-type sequence of the SARS-CoV-2 S protein; namely N-terminal pools 'S pool 1' (amino acids [aa] 1-643) and 'RBD' (aa 1-16 fused to aa 327-528 of the S protein), and the C-terminal 'S pool 2' (aa 633-1273), and stained with fluorescently labeled antibodies detecting lineage markers (CD3, CD4, and CD8) and cytokine-specific antibodies (IFNγ, IL-2, and IL-4). After the staining procedure, cells were analyzed on a flow cytometer to measure the frequency of vaccine antigen-specific Th1 and Th2 $CD4^+$ T cells as well as cytotoxic $CD8^+$ T cells. Lastly, the results

generated with pre- and post-primary vaccination samples of each subject were compared individually to identify the induction, expansion, and persistence of cellular immune responses and to characterize their Th1 and Th2 balance after vaccination in adult and older adult cohorts.

4 MATERIALS AND METHODS

4.1 Test Item

Test items were overlapping peptide (OLP) pools representing different portions of the wild-type sequence of the SARS-CoV-2 S protein, namely N-terminal pools 'S pool 1' (aa 1-643) and 'RBD' (aa 1-16 fused to aa 327-528 of the S protein), and the C-terminal 'S pool 2' (aa 633-1273).

Peptide Formulation

Freeze-dried peptide preparations were purchased from JPT Peptide Technologies GmbH and were of a purity of >90% (HPLC purified, ISO PLUS specification). Peptides were delivered as pepmixes (pre-pooled OLPs with 0.025 mg/peptide) for SARS-CoV-2 RBD (refer to Table 4-1), SARS-CoV-2_FL-S-Protein 'S pool 1' (SARS-COV-2_FL-S-PROTEIN_1 – SARS-COV-2_FL-S-PROTEIN_158), and SARS-CoV-2_FL-S-Protein 'S pool 2' (SARS-COV-2_FL-S-PROTEIN 159 – SARS-COV-2_FL-S-PROTEIN_315) (refer to Table 4-2). Pepmixes were dissolved in dimethyl sulfoxide (DMSO) to 0.5 mg/mL/peptide and stored at -80°C until use. The test items were used at a final dilution of 2 µg/mL/peptide for PBMC stimulations.

Table 4-1: Overview of single OLPs contained in SARS-CoV-2 RBD pepmix

JPT#	Sequence	Peptide name
43224_001	H-MFVFLVLLPLVSSQC-OH	SARS-COV-2_RBD_1
43224_002	H-LVLLPLVSSQCVVRF-OH	SARS-COV-2_RBD_2
43224_003	H-PLVSSQCVVRFPNIT-OH	SARS-COV-2_RBD_3
43224_004	H-SQCVVRFPNITNLCP-OH	SARS-COV-2_RBD_4
43224_005	H-VRFPNITNLCPFGEV-OH	SARS-COV-2_RBD_5
43224_006	H-NITNLCPFGEVFNAT-OH	SARS-COV-2_RBD_6
43224_007	H-LCPFGEVFNATRFAS-OH	SARS-COV-2_RBD_7
43224_008	H-GEVFNATRFASVYAW-OH	SARS-COV-2_RBD_8
43224_009	H-NATRFASVYAWNRKR-OH	SARS-COV-2_RBD_9
43224_010	H-FASVYAWNRKRISNC-OH	SARS-COV-2_RBD_10
43224_011	H-YAWNRKRISNCVADY-OH	SARS-COV-2_RBD_11
43224_012	H-RKRISNCVADYSVLY-OH	SARS-COV-2_RBD_12
43224_013_W1	H-SNCVADYSVLYNSAS-OH	SARS-COV-2_RBD_13
43224_014_W3	H-ADYSVLYNSASFSTF-OH	SARS-COV-2_RBD_14
43224_015	H-VLYNSASFSTFKCYG-OH	SARS-COV-2_RBD_15
43224_016	H-SASFSTFKCYGVSPT-OH	SARS-COV-2_RBD_16
43224_017	H-STFKCYGVSPTKLND-OH	SARS-COV-2_RBD_17
43224_018	H-CYGVSPTKLNDLCFT-OH	SARS-COV-2_RBD_18
43224_019	H-SPTKLNDLCFTNVYA-OH	SARS-COV-2_RBD_19
43224_020_W1	H-LNDLCFTNVYADSFV-OH	SARS-COV-2_RBD_20
43224_021_W2	H-CFTNVYADSFVIRGD-OH	SARS-COV-2_RBD_21

JPT#	Sequence	Peptide name
43224_022	H-VYADSFVIRGDEVRQ-OH	SARS-COV-2_RBD_22
43224_023	H-SFVIRGDEVRQIAPG-OH	SARS-COV-2_RBD_23
43224_024	H-RGDEVRQIAPGQTGK-OH	SARS-COV-2_RBD_24
43224_025	H-VRQIAPGQTGKIADY-OH	SARS-COV-2_RBD_25
43224_026	H-APGQTGKIADYNYKL-OH	SARS-COV-2_RBD_26
43224_027	H-TGKIADYNYKLPDDF-OH	SARS-COV-2_RBD_27
43224_028	H-ADYNYKLPDDFTGCV-OH	SARS-COV-2_RBD_28
43224_029	H-YKLPDDFTGCVIAWN-OH	SARS-COV-2_RBD_29
43224_030_W1	H-DDFTGCVIAWNSNNL-OH	SARS-COV-2_RBD_30
43224_031	H-GCVIAWNSNNLDSKV-OH	SARS-COV-2_RBD_31
43224_032	H-AWNSNNLDSKVGGNY-OH	SARS-COV-2_RBD_32
43224_033	H-NNLDSKVGGNYNYLY-OH	SARS-COV-2_RBD_33
43224_034	H-SKVGGNYNYLYRLFR-OH	SARS-COV-2_RBD_34
43224_035	H-GNYNYLYRLFRKSNL-OH	SARS-COV-2_RBD_35
43224_036	H-YLYRLFRKSNLKPFE-OH	SARS-COV-2_RBD_36
43224_037	H-LFRKSNLKPFERDIS-OH	SARS-COV-2_RBD_37
43224_038	H-SNLKPFERDISTEIY-OH	SARS-COV-2_RBD_38
43224_039	H-PFERDISTEIYQAGS-OH	SARS-COV-2_RBD_39
43224_040_W1	H-DISTEIYQAGSTPCN-OH	SARS-COV-2_RBD_40
43224_041	H-EIYQAGSTPCNGVEG-OH	SARS-COV-2_RBD_41
43224_042	H-AGSTPCNGVEGFNCY-OH	SARS-COV-2_RBD_42
43224_043	H-PCNGVEGFNCYFPLQ-OH	SARS-COV-2_RBD_43
43224_044	H-VEGFNCYFPLQSYGF-OH	SARS-COV-2_RBD_44
43224_045	H-NCYFPLQSYGFQPTN-OH	SARS-COV-2_RBD_45
43224_046	H-PLQSYGFQPTNGVGY-OH	SARS-COV-2_RBD_46
43224_047	H-YGFQPTNGVGYQPYR-OH	SARS-COV-2_RBD_47
43224_048	H-PTNGVGYQPYRVVVL-OH	SARS-COV-2_RBD_48
43224_049	H-VGYQPYRVVVLSFEL-OH	SARS-COV-2_RBD_49
43224_050_W2	H-PYRVVVLSFELLHAP-OH	SARS-COV-2_RBD_50
43224_051	H-VVLSFELLHAPATVC-OH	SARS-COV-2_RBD_51
43224_052	H-SFELLHAPATVCGPK-OH	SARS-COV-2_RBD_52

Table 4-2: Overview of single OLPs contained in SARS-CoV-2_FL-S-Protein pool 1 and pool 2

Pool	JPT-#	Sequence	Peptide name
1	43224_053_W1	H-MFVFLVLLPLVSSQC-OH	SARS-COV-2_FL-S-PROTEIN_1
	43224_054	H-LVLLPLVSSQCVNLT-OH	SARS-COV-2_FL-S-PROTEIN_2
	43224_055	H-PLVSSQCVNLTTRTQ-OH	SARS-COV-2_FL-S-PROTEIN_3
	43224_056	H-SQCVNLTTRTQLPPA-OH	SARS-COV-2_FL-S-PROTEIN_4
	43224_057	H-NLTTRTQLPPAYTNS-OH	SARS-COV-2_FL-S-PROTEIN_5
	43224_058	H-RTQLPPAYTNSFTRG-OH	SARS-COV-2_FL-S-PROTEIN_6
	43224_059	H-PPAYTNSFTRGVYYP-OH	SARS-COV-2_FL-S-PROTEIN_7
	43224_060	H-TNSFTRGVYYPDKVF-OH	SARS-COV-2_FL-S-PROTEIN_8

Pool	JPT-#	Sequence	Peptide name
	43224_061	H-TRGVYYPDKVFRSSV-OH	SARS-COV-2_FL-S-PROTEIN_9
	43224_062	H-YYPDKVFRSSVLHST-OH	SARS-COV-2_FL-S-PROTEIN_10
	43224_063	H-KVFRSSVLHSTQDLF-OH	SARS-COV-2_FL-S-PROTEIN_11
	43224_064	H-SSVLHSTQDLFLPFF-OH	SARS-COV-2_FL-S-PROTEIN_12
	43224_065	H-HSTQDLFLPFFSNVT-OH	SARS-COV-2_FL-S-PROTEIN_13
	43224_066	H-DLFLPFFSNVTWFHA-OH	SARS-COV-2_FL-S-PROTEIN_14
	43224_067	H-PFFSNVTWFHAIHVS-OH	SARS-COV-2_FL-S-PROTEIN_15
	43224_068	H-NVTWFHAIHVSGTNG-OH	SARS-COV-2_FL-S-PROTEIN_16
	43224_069	H-FHAIHVSGTNGTKRF-OH	SARS-COV-2_FL-S-PROTEIN_17
	43224_070	H-HVSGTNGTKRFDNPV-OH	SARS-COV-2_FL-S-PROTEIN_18
	43224_071	H-TNGTKRFDNPVLPFN-OH	SARS-COV-2_FL-S-PROTEIN_19
	43224_072	H-KRFDNPVLPFNDGVY-OH	SARS-COV-2_FL-S-PROTEIN_20
	43224_073	H-NPVLPFNDGVYFAST-OH	SARS-COV-2_FL-S-PROTEIN_21
	43224_074	H-PFNDGVYFASTEKSN-OH	SARS-COV-2_FL-S-PROTEIN_22
	43224_075	H-GVYFASTEKSNIIRG-OH	SARS-COV-2_FL-S-PROTEIN_23
	43224_076	H-ASTEKSNIIRGWIFG-OH	SARS-COV-2_FL-S-PROTEIN_24
	43224_077	H-KSNIIRGWIFGTTLD-OH	SARS-COV-2_FL-S-PROTEIN_25
	43224_078	H-IRGWIFGTTLDSKTQ-OH	SARS-COV-2_FL-S-PROTEIN_26
	43224_079	H-IFGTTLDSKTQSLLI-OH	SARS-COV-2_FL-S-PROTEIN_27
	43224_080_W2	H-TLDSKTQSLLIVNNA-OH	SARS-COV-2_FL-S-PROTEIN_28
	43224_081	H-KTQSLLIVNNATNVV-OH	SARS-COV-2_FL-S-PROTEIN_29
	43224_082_W1	H-LLIVNNATNVVIKVC-OH	SARS-COV-2_FL-S-PROTEIN_30
	43224_083_W1	H-NNATNVVIKVCEFQF-OH	SARS-COV-2_FL-S-PROTEIN_31
	43224_084_W1	H-NVVIKVCEFQFCNDP-OH	SARS-COV-2_FL-S-PROTEIN_32
	43224_085	H-KVCEFQFCNDPFLGV-OH	SARS-COV-2_FL-S-PROTEIN_33
	43224_086	H-FQFCNDPFLGVYYHK-OH	SARS-COV-2_FL-S-PROTEIN_34
	43224_087	H-NDPFLGVYYHKNNKS-OH	SARS-COV-2_FL-S-PROTEIN_35
	43224_088	H-LGVYYHKNNKSWMES-OH	SARS-COV-2_FL-S-PROTEIN_36
	43224_089	H-YHKNNKSWMESEFRV-OH	SARS-COV-2_FL-S-PROTEIN_37
	43224_090	H-NKSWMESEFRVYSSA-OH	SARS-COV-2_FL-S-PROTEIN_38
	43224_091a	H-MESEFRVYSSANNCT-OH	SARS-COV-2_FL-S-PROTEIN_39
	43224_092a	H-FRVYSSANNCTFEYV-OH	SARS-COV-2_FL-S-PROTEIN_40
	43224_093	H-SSANNCTFEYVSQPF-OH	SARS-COV-2_FL-S-PROTEIN_41
	43224_094a	H-NCTFEYVSQPFLMDL-OH	SARS-COV-2_FL-S-PROTEIN_42
	43224_095	H-EYVSQPFLMDLEGKQ-OH	SARS-COV-2_FL-S-PROTEIN_43
	43224_096	H-QPFLMDLEGKQGNFK-OH	SARS-COV-2_FL-S-PROTEIN_44
	43224_097	H-MDLEGKQGNFKNLRE-OH	SARS-COV-2_FL-S-PROTEIN_45
	43224_098	H-GKQGNFKNLREFVFK-OH	SARS-COV-2_FL-S-PROTEIN_46
	43224_099	H-NFKNLREFVFKNIDG-OH	SARS-COV-2_FL-S-PROTEIN_47
	43224_100	H-LREFVFKNIDGYFKI-OH	SARS-COV-2_FL-S-PROTEIN_48
	43224_101	H-VFKNIDGYFKIYSKH-OH	SARS-COV-2_FL-S-PROTEIN_49
	43224_102	H-IDGYFKIYSKHTPIN-OH	SARS-COV-2_FL-S-PROTEIN_50
	43224_103	H-FKIYSKHTPINLVRD-OH	SARS-COV-2_FL-S-PROTEIN_51
	43224_104	H-SKHTPINLVRDLPQG-OH	SARS-COV-2_FL-S-PROTEIN_52

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	43224_105	H-PINLVRDLPQGFSAL-OH	SARS-COV-2_FL-S-PROTEIN_53
	43224_106	H-VRDLPQGFSALEPLV-OH	SARS-COV-2_FL-S-PROTEIN_54
	43224_107	H-PQGFSALEPLVDLPI-OH	SARS-COV-2_FL-S-PROTEIN_55
	43224_108	H-SALEPLVDLPIGINI-OH	SARS-COV-2_FL-S-PROTEIN_56
	43224_109	H-PLVDLPIGINITRFQ-OH	SARS-COV-2_FL-S-PROTEIN_57
	43224_110	H-LPIGINITRFQTLLA-OH	SARS-COV-2_FL-S-PROTEIN_58
	43224_111	H-INITRFQTLLALHRS-OH	SARS-COV-2_FL-S-PROTEIN_59
	43224_112	H-RFQTLLALHRSYLTP-OH	SARS-COV-2_FL-S-PROTEIN_60
	43224_113	H-LLALHRSYLTPGDSS-OH	SARS-COV-2_FL-S-PROTEIN_61
	43224_114	H-HRSYLTPGDSSSGWT-OH	SARS-COV-2_FL-S-PROTEIN_62
	43224_115	H-LTPGDSSSGWTAGAA-OH	SARS-COV-2_FL-S-PROTEIN_63
	43224_116a	H-DSSSGWTAGAAAYYV-OH	SARS-COV-2_FL-S-PROTEIN_64
	43224_117a	H-GWTAGAAAYYVGYLQ-OH	SARS-COV-2_FL-S-PROTEIN_65
	43224_118	H-GAAAYYVGYLQPRTF-OH	SARS-COV-2_FL-S-PROTEIN_66
	43224_119	H-YYVGYLQPRTFLLKY-OH	SARS-COV-2_FL-S-PROTEIN_67
	43224_120	H-YLQPRTFLLKYNENG-OH	SARS-COV-2_FL-S-PROTEIN_68
	43224_121	H-RTFLLKYNENGTITD-OH	SARS-COV-2_FL-S-PROTEIN_69
	43224_122	H-LKYNENGTITDAVDC-OH	SARS-COV-2_FL-S-PROTEIN_70
	43224_123_W1	H-ENGTITDAVDCALDP-OH	SARS-COV-2_FL-S-PROTEIN_71
	43224_124	H-ITDAVDCALDPLSET-OH	SARS-COV-2_FL-S-PROTEIN_72
	43224_125_W1	H-VDCALDPLSETKCTL-OH	SARS-COV-2_FL-S-PROTEIN_73
	43224_126	H-LDPLSETKCTLKSFT-OH	SARS-COV-2_FL-S-PROTEIN_74
	43224_127	H-SETKCTLKSFTVEKG-OH	SARS-COV-2_FL-S-PROTEIN_75
	43224_128	H-CTLKSFTVEKGIYQT-OH	SARS-COV-2_FL-S-PROTEIN_76
	43224_129	H-SFTVEKGIYQTSNFR-OH	SARS-COV-2_FL-S-PROTEIN_77
	43224_130	H-EKGIYQTSNFRVQPT-OH	SARS-COV-2_FL-S-PROTEIN_78
	43224_131	H-YQTSNFRVQPTESIV-OH	SARS-COV-2_FL-S-PROTEIN_79
	43224_132	H-NFRVQPTESIVRFPN-OH	SARS-COV-2_FL-S-PROTEIN_80
	43224_133	H-QPTESIVRFPNITNL-OH	SARS-COV-2_FL-S-PROTEIN_81
	43224_134	H-SIVRFPNITNLCPFG-OH	SARS-COV-2_FL-S-PROTEIN_82
	43224_135	H-FPNITNLCPFGEVFN-OH	SARS-COV-2_FL-S-PROTEIN_83
	43224_136	H-TNLCPFGEVFNATRF-OH	SARS-COV-2_FL-S-PROTEIN_84
	43224_137	H-PFGEVFNATRFASVY-OH	SARS-COV-2_FL-S-PROTEIN_85
	43224_138_W1	H-VFNATRFASVYAWNR-OH	SARS-COV-2_FL-S-PROTEIN_86
	43224_139	H-TRFASVYAWNRKRIS-OH	SARS-COV-2_FL-S-PROTEIN_87
	43224_140	H-SVYAWNRKRISNCVA-OH	SARS-COV-2_FL-S-PROTEIN_88
	43224_141_W1	H-WNRKRISNCVADYSV-OH	SARS-COV-2_FL-S-PROTEIN_89
	43224_142	H-RISNCVADYSVLYNS-OH	SARS-COV-2_FL-S-PROTEIN_90
	43224_143_W1	H-CVADYSVLYNSASFS-OH	SARS-COV-2_FL-S-PROTEIN_91
	43224_144	H-YSVLYNSASFSTFKC-OH	SARS-COV-2_FL-S-PROTEIN_92
	43224_145a	H-YNSASFSTFKCYGVS-OH	SARS-COV-2_FL-S-PROTEIN_93
	43224_146	H-SFSTFKCYGVSPTKL-OH	SARS-COV-2_FL-S-PROTEIN_94
	43224_147	H-FKCYGVSPTKLNDLC-OH	SARS-COV-2_FL-S-PROTEIN_95
	43224_148	H-GVSPTKLNDLCFTNV-OH	SARS-COV-2_FL-S-PROTEIN_96

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	43224_149	H-TKLNDLCFTNVYADS-OH	SARS-COV-2_FL-S-PROTEIN_97
	43224_150_W1	H-DLCFTNVYADSFVIR-OH	SARS-COV-2_FL-S-PROTEIN_98
	43224_151	H-TNVYADSFVIRGDEV-OH	SARS-COV-2_FL-S-PROTEIN_99
	43224_152	H-ADSFVIRGDEVRQIA-OH	SARS-COV-2_FL-S-PROTEIN_100
	43224_153	H-VIRGDEVRQIAPGQT-OH	SARS-COV-2_FL-S-PROTEIN_101
	43224_154	H-DEVRQIAPGQTGKIA-OH	SARS-COV-2_FL-S-PROTEIN_102
	43224_155	H-QIAPGQTGKIADYNY-OH	SARS-COV-2_FL-S-PROTEIN_103
	43224_156	H-GQTGKIADYNYKLPD-OH	SARS-COV-2_FL-S-PROTEIN_104
	43224_157	H-KIADYNYKLPDDFTG-OH	SARS-COV-2_FL-S-PROTEIN_105
	43224_158a	H-YNYKLPDDFTGCVIA-OH	SARS-COV-2_FL-S-PROTEIN_106
	43224_159_W2	H-LPDDFTGCVIAWNSN-OH	SARS-COV-2_FL-S-PROTEIN_107
	43224_160	H-FTGCVIAWNSNNLDS-OH	SARS-COV-2_FL-S-PROTEIN_108
	43224_161	H-VIAWNSNNLDSKVGG-OH	SARS-COV-2_FL-S-PROTEIN_109
	43224_162	H-NSNNLDSKVGGNYNY-OH	SARS-COV-2_FL-S-PROTEIN_110
	43224_163	H-LDSKVGGNYNYLYRL-OH	SARS-COV-2_FL-S-PROTEIN_111
	43224_164	H-VGGNYNYLYRLFRKS-OH	SARS-COV-2_FL-S-PROTEIN_112
	43224_165_W1	H-YNYLYRLFRKSNLKP-OH	SARS-COV-2_FL-S-PROTEIN_113
	43224_166	H-YRLFRKSNLKPFERD-OH	SARS-COV-2_FL-S-PROTEIN_114
	43224_167	H-RKSNLKPFERDISTE-OH	SARS-COV-2_FL-S-PROTEIN_115
	43224_168	H-LKPFERDISTEIYQA-OH	SARS-COV-2_FL-S-PROTEIN_116
	43224_169	H-ERDISTEIYQAGSTP-OH	SARS-COV-2_FL-S-PROTEIN_117
	43224_170_W1	H-STEIYQAGSTPCNGV-OH	SARS-COV-2_FL-S-PROTEIN_118
	43224_171	H-YQAGSTPCNGVEGFN-OH	SARS-COV-2_FL-S-PROTEIN_119
	43224_172_W1	H-STPCNGVEGFNCYFP-OH	SARS-COV-2_FL-S-PROTEIN_120
	43224_173a	H-NGVEGFNCYFPLQSY-OH	SARS-COV-2_FL-S-PROTEIN_121
	43224_174	H-GFNCYFPLQSYGFQP-OH	SARS-COV-2_FL-S-PROTEIN_122
	43224_175	H-YFPLQSYGFQPTNGV-OH	SARS-COV-2_FL-S-PROTEIN_123
	43224_176	H-QSYGFQPTNGVGYQP-OH	SARS-COV-2_FL-S-PROTEIN_124
	43224_177	H-FQPTNGVGYQPYRVV-OH	SARS-COV-2_FL-S-PROTEIN_125
	43224_178	H-NGVGYQPYRVVVLSF-OH	SARS-COV-2_FL-S-PROTEIN_126
	43224_179	H-YQPYRVVVLSFELLH-OH	SARS-COV-2_FL-S-PROTEIN_127
	43224_180	H-RVVVLSFELLHAPAT-OH	SARS-COV-2_FL-S-PROTEIN_128
	43224_181	H-LSFELLHAPATVCGP-OH	SARS-COV-2_FL-S-PROTEIN_129
	43224_182	H-LLHAPATVCGPKKST-OH	SARS-COV-2_FL-S-PROTEIN_130
	43224_183	H-PATVCGPKKSTNLVK-OH	SARS-COV-2_FL-S-PROTEIN_131
	43224_184_W1	H-CGPKKSTNLVKNKCV-OH	SARS-COV-2_FL-S-PROTEIN_132
	43224_185	H-KSTNLVKNKCVNFNF-OH	SARS-COV-2_FL-S-PROTEIN_133
	43224_186	H-LVKNKCVNFNFNGLT-OH	SARS-COV-2_FL-S-PROTEIN_134
	43224_187	H-KCVNFNFNGLTGTGV-OH	SARS-COV-2_FL-S-PROTEIN_135
	43224_188	H-FNFNGLTGTGVLTES-OH	SARS-COV-2_FL-S-PROTEIN_136
	43224_189	H-GLTGTGVLTESNKKF-OH	SARS-COV-2_FL-S-PROTEIN_137
	43224_190	H-TGVLTESNKKFLPFQ-OH	SARS-COV-2_FL-S-PROTEIN_138
	43224_191	H-TESNKKFLPFQQFGR-OH	SARS-COV-2_FL-S-PROTEIN_139
	43224_192	H-KKFLPFQQFGRDIAD-OH	SARS-COV-2_FL-S-PROTEIN_140

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	43224_193	H-PFQQFGRDIADTTDA-OH	SARS-COV-2_FL-S-PROTEIN_141
	43224_194	H-FGRDIADTTDAVRDP-OH	SARS-COV-2_FL-S-PROTEIN_142
	43224_195	H-IADTTDAVRDPQTLE-OH	SARS-COV-2_FL-S-PROTEIN_143
	43224_196	H-TDAVRDPQTLEILDI-OH	SARS-COV-2_FL-S-PROTEIN_144
	43224_197	H-RDPQTLEILDITPCS-OH	SARS-COV-2_FL-S-PROTEIN_145
	43224_198	H-TLEILDITPCSFGGV-OH	SARS-COV-2_FL-S-PROTEIN_146
	43224_199_W1	H-LDITPCSFGGVSVIT-OH	SARS-COV-2_FL-S-PROTEIN_147
	43224_200	H-PCSFGGVSVITPGTN-OH	SARS-COV-2_FL-S-PROTEIN_148
	43224_201	H-GGVSVITPGTNTSNQ-OH	SARS-COV-2_FL-S-PROTEIN_149
	43224_202	H-VITPGTNTSNQVAVL-OH	SARS-COV-2_FL-S-PROTEIN_150
	43224_203	H-GTNTSNQVAVLYQDV-OH	SARS-COV-2_FL-S-PROTEIN_151
	43224_204a	H-SNQVAVLYQDVNCTE-OH	SARS-COV-2_FL-S-PROTEIN_152
	43224_205	H-AVLYQDVNCTEVPVA-OH	SARS-COV-2_FL-S-PROTEIN_153
	43224_206	H-QDVNCTEVPVAIHAD-OH	SARS-COV-2_FL-S-PROTEIN_154
	43224_207	H-CTEVPVAIHADQLTP-OH	SARS-COV-2_FL-S-PROTEIN_155
	43224_208	H-PVAIHADQLTPTWRV-OH	SARS-COV-2_FL-S-PROTEIN_156
	43224_209	H-HADQLTPTWRVYSTG-OH	SARS-COV-2_FL-S-PROTEIN_157
	43224_210	H-LTPTWRVYSTGSNVF-OH	SARS-COV-2_FL-S-PROTEIN_158
2	43224_211	H-WRVYSTGSNVFQTRA-OH	SARS-COV-2_FL-S-PROTEIN_159
	43224_212	H-STGSNVFQTRAGCLI-OH	SARS-COV-2_FL-S-PROTEIN_160
	43224_213a	H-NVFQTRAGCLIGAEH-OH	SARS-COV-2_FL-S-PROTEIN_161
	43224_214	H-TRAGCLIGAEHVNNS-OH	SARS-COV-2_FL-S-PROTEIN_162
	43224_215	H-CLIGAEHVNNSYECD-OH	SARS-COV-2_FL-S-PROTEIN_163
	43224_216	H-AEHVNNSYECDIPIG-OH	SARS-COV-2_FL-S-PROTEIN_164
	43224_217	H-NNSYECDIPIGAGIC-OH	SARS-COV-2_FL-S-PROTEIN_165
	43224_218a	H-ECDIPIGAGICASYQ-OH	SARS-COV-2_FL-S-PROTEIN_166
	43224_219_W1	H-PIGAGICASYQTQTN-OH	SARS-COV-2_FL-S-PROTEIN_167
	43224_220	H-GICASYQTQTNSPRR-OH	SARS-COV-2_FL-S-PROTEIN_168
	43224_221	H-SYQTQTNSPRRARSV-OH	SARS-COV-2_FL-S-PROTEIN_169
	43224_222	H-QTNSPRRARSVASQS-OH	SARS-COV-2_FL-S-PROTEIN_170
	43224_223	H-PRRARSVASQSIIAY-OH	SARS-COV-2_FL-S-PROTEIN_171
	43224_224	H-RSVASQSIIAYTMSL-OH	SARS-COV-2_FL-S-PROTEIN_172
	43224_225a	H-SQSIIAYTMSLGAEN-OH	SARS-COV-2_FL-S-PROTEIN_173
	43224_226	H-IAYTMSLGAENSVAY-OH	SARS-COV-2_FL-S-PROTEIN_174
	43224_227	H-MSLGAENSVAYSNNS-OH	SARS-COV-2_FL-S-PROTEIN_175
	43224_228	H-AENSVAYSNNSIAIP-OH	SARS-COV-2_FL-S-PROTEIN_176
	43224_229	H-VAYSNNSIAIPTNFT-OH	SARS-COV-2_FL-S-PROTEIN_177
	43224_230	H-NNSIAIPTNFTISVT-OH	SARS-COV-2_FL-S-PROTEIN_178
	43224_231	H-AIPTNFTISVTTEIL-OH	SARS-COV-2_FL-S-PROTEIN_179
	43224_232_W1	H-NFTISVTTEILPVSM-OH	SARS-COV-2_FL-S-PROTEIN_180
	43224_233	H-SVTTEILPVSMTKTS-OH	SARS-COV-2_FL-S-PROTEIN_181
	43224_234a	H-EILPVSMTKTSVDCT-OH	SARS-COV-2_FL-S-PROTEIN_182
	43224_235_W4	H-VSMTKTSVDCTMYIC-OH	SARS-COV-2_FL-S-PROTEIN_183
	43224_236_W1	H-KTSVDCTMYICGDST-OH	SARS-COV-2_FL-S-PROTEIN_184

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	43224_237_W2	H-DCTMYICGDSTECSN-OH	SARS-COV-2_FL-S-PROTEIN_185
	43224_238a	H-YICGDSTECSNLLLQ-OH	SARS-COV-2_FL-S-PROTEIN_186
	43224_239	H-DSTECSNLLLQYGSF-OH	SARS-COV-2_FL-S-PROTEIN_187
	43224_240	H-CSNLLLQYGSFCTQL-OH	SARS-COV-2_FL-S-PROTEIN_188
	43224_241	H-LLQYGSFCTQLNRAL-OH	SARS-COV-2_FL-S-PROTEIN_189
	43224_242	H-GSFCTQLNRALTGIA-OH	SARS-COV-2_FL-S-PROTEIN_190
	43224_243	H-TQLNRALTGIAVEQD-OH	SARS-COV-2_FL-S-PROTEIN_191
	43224_244	H-RALTGIAVEQDKNTQ-OH	SARS-COV-2_FL-S-PROTEIN_192
	43224_245	H-GIAVEQDKNTQEVFA-OH	SARS-COV-2_FL-S-PROTEIN_193
	43224_246_W1	H-EQDKNTQEVFAQVKQ-OH	SARS-COV-2_FL-S-PROTEIN_194
	43224_247a	H-NTQEVFAQVKQIYKT-OH	SARS-COV-2_FL-S-PROTEIN_195
	43224_248	H-VFAQVKQIYKTPPIK-OH	SARS-COV-2_FL-S-PROTEIN_196
	43224_249	H-VKQIYKTPPIKDFGG-OH	SARS-COV-2_FL-S-PROTEIN_197
	43224_250	H-YKTPPIKDFGGFNFS-OH	SARS-COV-2_FL-S-PROTEIN_198
	43224_251	H-PIKDFGGFNFSQILP-OH	SARS-COV-2_FL-S-PROTEIN_199
	43224_252	H-FGGFNFSQILPDPSK-OH	SARS-COV-2_FL-S-PROTEIN_200
	43224_253	H-NFSQILPDPSKPSKR-OH	SARS-COV-2_FL-S-PROTEIN_201
	43224_254	H-ILPDPSKPSKRSFIE-OH	SARS-COV-2_FL-S-PROTEIN_202
	43224_255	H-PSKPSKRSFIEDLLF-OH	SARS-COV-2_FL-S-PROTEIN_203
	43224_256	H-SKRSFIEDLLFNKVT-OH	SARS-COV-2_FL-S-PROTEIN_204
	43224_257	H-FIEDLLFNKVTLADA-OH	SARS-COV-2_FL-S-PROTEIN_205
	43224_258	H-LLFNKVTLADAGFIK-OH	SARS-COV-2_FL-S-PROTEIN_206
	43224_259	H-KVTLADAGFIKQYGD-OH	SARS-COV-2_FL-S-PROTEIN_207
	43224_260	H-ADAGFIKQYGDCLGD-OH	SARS-COV-2_FL-S-PROTEIN_208
	43224_261	H-FIKQYGDCLGDIAAR-OH	SARS-COV-2_FL-S-PROTEIN_209
	43224_262	H-YGDCLGDIAARDLIC-OH	SARS-COV-2_FL-S-PROTEIN_210
	43224_263	H-LGDIAARDLICAQKF-OH	SARS-COV-2_FL-S-PROTEIN_211
	43224_264	H-AARDLICAQKFNGLT-OH	SARS-COV-2_FL-S-PROTEIN_212
	43224_265	H-LICAQKFNGLTVLPP-OH	SARS-COV-2_FL-S-PROTEIN_213
	43224_266	H-QKFNGLTVLPPLLTD-OH	SARS-COV-2_FL-S-PROTEIN_214
	43224_267	H-GLTVLPPLLTDEMIA-OH	SARS-COV-2_FL-S-PROTEIN_215
	43224_268	H-LPPLLTDEMIAQYTS-OH	SARS-COV-2_FL-S-PROTEIN_216
	43224_269	H-LTDEMIAQYTSALLA-OH	SARS-COV-2_FL-S-PROTEIN_217
	43224_270_W1	H-MIAQYTSALLAGTIT-OH	SARS-COV-2_FL-S-PROTEIN_218
	43224_271_W1	H-YTSALLAGTITSGWT-OH	SARS-COV-2_FL-S-PROTEIN_219
	43224_272_W1	H-LLAGTITSGWTFGAG-OH	SARS-COV-2_FL-S-PROTEIN_220
	43224_273	H-TITSGWTFGAGAALQ-OH	SARS-COV-2_FL-S-PROTEIN_221
	43224_274	H-GWTFGAGAALQIPFA-OH	SARS-COV-2_FL-S-PROTEIN_222
	43224_275	H-GAGAALQIPFAMQMA-OH	SARS-COV-2_FL-S-PROTEIN_223
	43224_276	H-ALQIPFAMQMAYRFN-OH	SARS-COV-2_FL-S-PROTEIN_224
	43224_277	H-PFAMQMAYRFNGIGV-OH	SARS-COV-2_FL-S-PROTEIN_225
	43224_278	H-QMAYRFNGIGVTQNV-OH	SARS-COV-2_FL-S-PROTEIN_226
	43224_279	H-RFNGIGVTQNVLYEN-OH	SARS-COV-2_FL-S-PROTEIN_227
	43224_280	H-IGVTQNVLYENQKLI-OH	SARS-COV-2_FL-S-PROTEIN_228

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	43224_281	H-QNVLYENQKLIANQF-OH	SARS-COV-2_FL-S-PROTEIN_229
	43224_282	H-YENQKLIANQFNSAI-OH	SARS-COV-2_FL-S-PROTEIN_230
	43224_283	H-KLIANQFNSAIGKIQ-OH	SARS-COV-2_FL-S-PROTEIN_231
	43224_284	H-NQFNSAIGKIQDSLS-OH	SARS-COV-2_FL-S-PROTEIN_232
	43224_285	H-SAIGKIQDSLSSTAS-OH	SARS-COV-2_FL-S-PROTEIN_233
	43224_286	H-KIQDSLSSTASALGK-OH	SARS-COV-2_FL-S-PROTEIN_234
	43224_287	H-SLSSTASALGKLQDV-OH	SARS-COV-2_FL-S-PROTEIN_235
	43224_288	H-TASALGKLQDVVNQN-OH	SARS-COV-2_FL-S-PROTEIN_236
	43224_289	H-LGKLQDVVNQNAQAL-OH	SARS-COV-2_FL-S-PROTEIN_237
	43224_290_W1	H-QDVVNQNAQALNTLV-OH	SARS-COV-2_FL-S-PROTEIN_238
	43224_291	H-NQNAQALNTLVKQLS-OH	SARS-COV-2_FL-S-PROTEIN_239
	43224_292	H-QALNTLVKQLSSNFG-OH	SARS-COV-2_FL-S-PROTEIN_240
	43224_293	H-TLVKQLSSNFGAISS-OH	SARS-COV-2_FL-S-PROTEIN_241
	43224_294	H-QLSSNFGAISSVLND-OH	SARS-COV-2_FL-S-PROTEIN_242
	43224_295	H-NFGAISSVLNDILSR-OH	SARS-COV-2_FL-S-PROTEIN_243
	43224_296	H-ISSVLNDILSRLDKV-OH	SARS-COV-2_FL-S-PROTEIN_244
	43224_297	H-LNDILSRLDKVEAEV-OH	SARS-COV-2_FL-S-PROTEIN_245
	43224_298	H-LSRLDKVEAEVQIDR-OH	SARS-COV-2_FL-S-PROTEIN_246
	43224_299	H-DKVEAEVQIDRLITG-OH	SARS-COV-2_FL-S-PROTEIN_247
	43224_300	H-AEVQIDRLITGRLQS-OH	SARS-COV-2_FL-S-PROTEIN_248
	43224_301a	H-IDRLITGRLQSLQTY-OH	SARS-COV-2_FL-S-PROTEIN_249
	43224_302	H-ITGRLQSLQTYVTQQ-OH	SARS-COV-2_FL-S-PROTEIN_250
	43224_303	H-LQSLQTYVTQQLIRA-OH	SARS-COV-2_FL-S-PROTEIN_251
	43224_304_W1	H-QTYVTQQLIRAAEIR-OH	SARS-COV-2_FL-S-PROTEIN_252
	43224_305a	H-TQQLIRAAEIRASAN-OH	SARS-COV-2_FL-S-PROTEIN_253
	43224_306	H-IRAAEIRASANLAAT-OH	SARS-COV-2_FL-S-PROTEIN_254
	43224_307	H-EIRASANLAATKMSE-OH	SARS-COV-2_FL-S-PROTEIN_255
	43224_308	H-SANLAATKMSECVLG-OH	SARS-COV-2_FL-S-PROTEIN_256
	43224_309	H-AATKMSECVLGQSKR-OH	SARS-COV-2_FL-S-PROTEIN_257
	43224_310_W1	H-MSECVLGQSKRVDFC-OH	SARS-COV-2_FL-S-PROTEIN_258
	43224_311a	H-VLGQSKRVDFCGKGY-OH	SARS-COV-2_FL-S-PROTEIN_259
	43224_312	H-SKRVDFCGKGYHLMS-OH	SARS-COV-2_FL-S-PROTEIN_260
	43224_313	H-DFCGKGYHLMSFPQS-OH	SARS-COV-2_FL-S-PROTEIN_261
	43224_314	H-KGYHLMSFPQSAPHG-OH	SARS-COV-2_FL-S-PROTEIN_262
	43224_315	H-LMSFPQSAPHGVVFL-OH	SARS-COV-2_FL-S-PROTEIN_263
	43224_316	H-PQSAPHGVVFLHVTY-OH	SARS-COV-2_FL-S-PROTEIN_264
	43224_317	H-PHGVVFLHVTYVPAQ-OH	SARS-COV-2_FL-S-PROTEIN_265
	43224_318	H-VFLHVTYVPAQEKNF-OH	SARS-COV-2_FL-S-PROTEIN_266
	43224_319	H-VTYVPAQEKNFTTAP-OH	SARS-COV-2_FL-S-PROTEIN_267
	43224_320	H-PAQEKNFTTAPAICH-OH	SARS-COV-2_FL-S-PROTEIN_268
	43224_321	H-KNFTTAPAICHDGKA-OH	SARS-COV-2_FL-S-PROTEIN_269
	43224_322	H-TAPAICHDGKAHFPR-OH	SARS-COV-2_FL-S-PROTEIN_270
	43224_323	H-ICHDGKAHFPREGVF-OH	SARS-COV-2_FL-S-PROTEIN_271
	43224_324	H-GKAHFPREGVFVSNG-OH	SARS-COV-2_FL-S-PROTEIN_272

Pool	JPT-#	Sequence	Peptide name
	43224_325	H-FPREGVFVSNGTHWF-OH	SARS-COV-2_FL-S-PROTEIN_273
	43224_326	H-GVFVSNGTHWFVTQR-OH	SARS-COV-2_FL-S-PROTEIN_274
	43224_327	H-SNGTHWFVTQRNFYE-OH	SARS-COV-2_FL-S-PROTEIN_275
	43224_328	H-HWFVTQRNFYEPQII-OH	SARS-COV-2_FL-S-PROTEIN_276
	43224_329	H-TQRNFYEPQIITTDN-OH	SARS-COV-2_FL-S-PROTEIN_277
	43224_330a	H-FYEPQIITTDNTFVS-OH	SARS-COV-2_FL-S-PROTEIN_278
	43224_331a	H-QIITTDNTFVSGNCD-OH	SARS-COV-2_FL-S-PROTEIN_279
	43224_332	H-TDNTFVSGNCDVVIG-OH	SARS-COV-2_FL-S-PROTEIN_280
	43224_333_W3	H-FVSGNCDVVIGIVNN-OH	SARS-COV-2_FL-S-PROTEIN_281
	43224_334_W2	H-NCDVVIGIVNNTVYD-OH	SARS-COV-2_FL-S-PROTEIN_282
	43224_335	H-VIGIVNNTVYDPLQP-OH	SARS-COV-2_FL-S-PROTEIN_283
	43224_336	H-VNNTVYDPLQPELDS-OH	SARS-COV-2_FL-S-PROTEIN_284
	43224_337	H-VYDPLQPELDSFKEE-OH	SARS-COV-2_FL-S-PROTEIN_285
	43224_338	H-LQPELDSFKEELDKY-OH	SARS-COV-2_FL-S-PROTEIN_286
	43224_339	H-LDSFKEELDKYFKNH-OH	SARS-COV-2_FL-S-PROTEIN_287
	43224_340	H-KEELDKYFKNHTSPD-OH	SARS-COV-2_FL-S-PROTEIN_288
	43224_341	H-DKYFKNHTSPDVDLG-OH	SARS-COV-2_FL-S-PROTEIN_289
	43224_342	H-KNHTSPDVDLGDISG-OH	SARS-COV-2_FL-S-PROTEIN_290
	43224_343a	H-SPDVDLGDISGINAS-OH	SARS-COV-2_FL-S-PROTEIN_291
	43224_344	H-DLGDISGINASVVNI-OH	SARS-COV-2_FL-S-PROTEIN_292
	43224_345	H-ISGINASVVNIQKEI-OH	SARS-COV-2_FL-S-PROTEIN_293
	43224_346	H-NASVVNIQKEIDRLN-OH	SARS-COV-2_FL-S-PROTEIN_294
	43224_347	H-VNIQKEIDRLNEVAK-OH	SARS-COV-2_FL-S-PROTEIN_295
	43224_348	H-KEIDRLNEVAKNLNE-OH	SARS-COV-2_FL-S-PROTEIN_296
	43224_349	H-RLNEVAKNLNESLID-OH	SARS-COV-2_FL-S-PROTEIN_297
	43224_350	H-VAKNLNESLIDLQEL-OH	SARS-COV-2_FL-S-PROTEIN_298
	43224_351	H-LNESLIDLQELGKYE-OH	SARS-COV-2_FL-S-PROTEIN_299
	43224_352	H-LIDLQELGKYEQYIK-OH	SARS-COV-2_FL-S-PROTEIN_300
	43224_353	H-QELGKYEQYIKWPWY-OH	SARS-COV-2_FL-S-PROTEIN_301
	43224_354	H-KYEQYIKWPWYIWLG-OH	SARS-COV-2_FL-S-PROTEIN_302
	43224_355	H-YIKWPWYIWLGFIAG-OH	SARS-COV-2_FL-S-PROTEIN_303
	43224_356	H-PWYIWLGFIAGLIAI-OH	SARS-COV-2_FL-S-PROTEIN_304
	43224_357_W2	H-WLGFIAGLIAIVMVT-OH	SARS-COV-2_FL-S-PROTEIN_305
	43224_358_W2	H-IAGLIAIVMVTIMLC-OH	SARS-COV-2_FL-S-PROTEIN_306
	43224_359_W2	H-IAIVMVTIMLCCMTS-OH	SARS-COV-2_FL-S-PROTEIN_307
	43224_360_W4	H-MVTIMLCCMTSCCSC-OH	SARS-COV-2_FL-S-PROTEIN_308
	43224_361_W3	H-MLCCMTSCCSCLKGC-OH	SARS-COV-2_FL-S-PROTEIN_309
	43224_362_W3	H-MTSCCSCLKGCCSCG-OH	SARS-COV-2_FL-S-PROTEIN_310
	43224_363_W2	H-CSCLKGCCSCGSCCK-OH	SARS-COV-2_FL-S-PROTEIN_311
	43224_364	H-KGCCSCGSCCKFDED-OH	SARS-COV-2_FL-S-PROTEIN_312
	43224_365	H-SCGSCCKFDEDDSEP-OH	SARS-COV-2_FL-S-PROTEIN_313
	43224_366_W1	H-CCKFDEDDSEPVLKG-OH	SARS-COV-2_FL-S-PROTEIN_314
	43224_367_W1	H-DEDDSEPVLKGVKLHYT-OH	SARS-COV-2_FL-S-PROTEIN_315

4.2 Control Item

As a control item (negative control group) peptide solvent DMSO was used for all analyzed vaccinated subjects.

As internal positive stimulation controls, CEFX Ultra SuperStim Pool (JPT) and anti-CD3 antibody were used for all analyzed vaccinated subjects.

4.3 Test System

PBMC fractions isolated from blood of study subjects and recovered COVID-19 patients.

Processing of Li-Heparin blood samples from study subjects 276-02-0XXX was performed at a contract laboratory (Precision for Medicine/Epiontis GmbH) according to the Laboratory Instructions Manual.

Processing of Li-Heparin blood samples from study subjects 276-01-0XXX, isolation of PBMCs from recovered COVID-19 patients and isolation of PBMCs from healthy volunteer leukapheresis samples was performed at the Biosampling Unit (BioNTech SE) or in the laboratories of the Biosampling Core Facility (BioNTech Manufacturing GmbH) as back up according to BioNTech standards (SOP-030-100). COVID-19 patients' blood samples were obtained from the Frankfurt University Hospital (Germany).

Table 4-3: Study subject material

V1: baseline before first vaccination; V5: 29±3 days after first vaccination

Subject number	Biosampling ID	Cohort (BNT162b2)	Visit	Collection date	Visit	Collection date
276-02-0153	B1620195	1 µg	V1	29-Jun-2020	V5	27-Jul-2020
276-02-0154	B1620196	1 µg	V1	29-Jun-2020	V5	27-Jul-2020
276-02-0157	B1620197	1 µg	V1	29-Jun-2020	V5	27-Jul-2020
276-02-0166	B1620200	1 µg	V1	29-Jun-2020	V5	27-Jul-2020
276-02-0158	B1620232	1 µg	V1	13-Jul-2020	V5	07-Aug-2020
276-02-0164	B1620233	1 µg	V1	13-Jul-2020	V5	10-Aug-2020
276-02-0171	B1620234	1 µg	V1	13-Jul-2020	V5	10-Aug-2020
276-02-0189	B1620276	1 µg	V1	28-Jul-2020	V5	25-Aug-2020
276-02-0192	B1620277	3 µg	V1	28-Jul-2020	V5	25-Aug-2020
276-02-0197	B1620278	3 µg	V1	28-Jul-2020	V5	25-Aug-2020
276-02-0185	B1620280	3 µg	V1	29-Jul-2020	V5	26-Aug-2020
276-02-0193	B1620281	3 µg	V1	29-Jul-2020	V5	26-Aug-2020
276-02-0194	B1620282	3 µg	V1	29-Jul-2020	V5	24-Aug-2020
276-02-0200	B1620285	3 µg	V1	30-Jul-2020	V5	28-Aug-2020
276-02-0195	B1620283	3 µg	V1	31-Jul-2020	V5	28-Aug-2020
276-02-0191	B1620284	3 µg	V1	06-Aug-2020	V5	03-Sep-2020
276-02-0201	B1620286	3 µg	V1	06-Aug-2020	V5	03-Sep-2020

Subject number	Biosampling ID	Cohort (BNT162b2)	Visit	Collection date	Visit	Collection date
276-02-0103	B1620130	10 µg	V1	15-Jun-2020	V5	13-Jul-2020
276-02-0101	B1620128	10 µg	V1	16-Jun-2020	V5	14-Jul-2020
276-02-0102	B1620129	10 µg	V1	16-Jun-2020	V5	14-Jul-2020
276-02-0104	B1620131	10 µg	V1	16-Jun-2020	V5	14-Jul-2020
276-02-0105	B1620132	10 µg	V1	16-Jun-2020	V5	14-Jul-2020
276-02-0110	B1620133	10 µg	V1	16-Jun-2020	V5	14-Jul-2020
276-02-0117	B1620160	10 µg	V1	18-Jun-2020	V5	13-Jul-2020
276-02-0118	B1620161	10 µg	V1	18-Jun-2020	V5	16-Jul-2020
276-02-0121	B1620162	10 µg	V1	18-Jun-2020	V5	16-Jul-2020
276-02-0111	B1620181	10 µg	V1	18-Jun-2020	V5	23-Jul-2020
276-02-0114	B1620158	10 µg	V1	18-Jun-2020	V5	16-Jul-2020
276-02-0156	B1620218	20 µg	V1	02-Jul-2020	V5	30-Jul-2020
276-02-0168	B1620217	20 µg	V1	01-Jul-2020	V5	29-Jul-2020
276-02-0172	B1620219	20 µg	V1	02-Jul-2020	V5	27-Jul-2020
276-02-0173	B1620220	20 µg	V1	02-Jul-2020	V5	30-Jul-2020
276-02-0174	B1620225	20 µg	V1	06-Jul-2020	V5	06-Aug-2020
276-02-0175	B1620221	20 µg	V1	06-Jul-2020	V5	05-Aug-2020
276-02-0177	B1620224	20 µg	V1	06-Jul-2020	V5	05-Aug-2020
276-02-0178	B1620223	20 µg	V1	06-Jul-2020	V5	05-Aug-2020
276-02-0179	B1620222	20 µg	V1	06-Jul-2020	V5	05-Aug-2020
276-02-0180	B1620235	20 µg	V1	13-Jul-2020	V5	10-Aug-2020
276-02-0183	B1620236	20 µg	V1	13-Jul-2020	V5	10-Aug-2020
276-02-0127	B1620179	30 µg	V1	22-Jun-2020	V5	20-Jul-2020
276-02-0149	B1620183	30 µg	V1	22-Jun-2020	V5	20-Jul-2020
276-02-0128	B1620180	30 µg	V1	23-Jun-2020	V5	21-Jul-2020
276-02-0137	B1620182	30 µg	V1	23-Jun-2020	V5	21-Jul-2020
276-02-0150	B1620184	30 µg	V1	23-Jun-2020	V5	21-Jul-2020
276-02-0155	B1620185	30 µg	V1	23-Jun-2020	V5	21-Jul-2020
276-02-0134	B1620189	30 µg	V1	25-Jun-2020	V5	23-Jul-2020
276-02-0142	B1620191	30 µg	V1	25-Jun-2020	V5	23-Jul-2020
276-02-0143	B1620192	30 µg	V1	25-Jun-2020	V5	23-Jul-2020
276-02-0144	B1620193	30 µg	V1	25-Jun-2020	V5	23-Jul-2020
276-02-0145	B1620194	30 µg	V1	25-Jun-2020	V5	23-Jul-2020
276-01-0261	B1620244	10 µg older adults	V1	14-Aug-2020	V5	11-Sep-2020
276-01-0263	B1620245	10 µg older adults	V1	14-Aug-2020	V5	11-Sep-2020
276-01-0265	B1620246	10 µg older adults	V1	18-Aug-2020	V5	15-Sep-2020
276-01-0267	B1620248	10 µg older adults	V1	18-Aug-2020	V5	15-Sep-2020
276-01-0268	B1620247	10 µg older adults	V1	18-Aug-2020	V5	15-Sep-2020
276-01-0269	B1620249	10 µg older adults	V1	18-Aug-2020	V5	15-Sep-2020

Subject number	Biosampling ID	Cohort (BNT162b2)	Visit	Collection date	Visit	Collection date
276-01-0275	B1620251	10 µg older adults	V1	20-Aug-2020	V5	17-Sep-2020
276-01-0276	B1620253	10 µg older adults	V1	20-Aug-2020	V5	17-Sep-2020
276-01-0277	B1620252	10 µg older adults	V1	20-Aug-2020	V5	17-Sep-2020
276-01-0279	B1620255	10 µg older adults	V1	20-Aug-2020	V5	17-Sep-2020
276-01-0299	B1620256	10 µg older adults	V1	20-Aug-2020	V5	17-Sep-2020
276-02-0216	B1620320	20 µg older adults	V1	25-Aug-2020	V5	22-Sep-2020
276-02-0223	B1620323	20 µg older adults	V1	26-Aug-2020	V5	13-Sep-2020
276-02-0215	B1620325	20 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-02-0221	B1620326	20 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-02-0224	B1620327	20 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-02-0226	B1620328	20 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-02-0229	B1620329	20 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-02-0233	B1620330	20 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-01-0306	B1620269	30 µg older adults	V1	01-Sep-2020	V5	29-Sep-2020
276-01-0316	B1620268	30 µg older adults	V1	01-Sep-2020	V5	01-Oct-2020
276-01-0314	B1620270	30 µg older adults	V1	02-Sep-2020	V5	30-Sep-2020
276-01-0324	B1620273	30 µg older adults	V1	02-Sep-2020	V5	30-Sep-2020
276-01-0272	B1620291	30 µg older adults	V1	04-Sep-2020	V5	30-Sep-2020
276-01-0303	B1620292	30 µg older adults	V1	04-Sep-2020	V5	30-Sep-2020
276-01-0308	B1620290	30 µg older adults	V1	04-Sep-2020	V5	30-Sep-2020
276-01-0319	B1620293	30 µg older adults	V1	04-Sep-2020	V5	30-Sep-2020
276-01-0323	B1620294	30 µg older adults	V1	04-Sep-2020	V5	30-Sep-2020

Older adults = 56 to 85 years of age

Table 4-4: Study subject material (Follow-up samples)

V6: 43±4 days after primary immunization; V8: 85±7 days after primary immunization; V9: 184±9 days after primary immunization; n/a (not applicable)

Subject number	Biosampling ID	Cohort (BNT162b2)	Visit	Collection date	Visit	Collection date	Visit	Collection date
276-02-0105	B1620132	10 µg	V6	n/a	V8	08-Sep-2020	V9	15-Dec-2020
276-02-0121	B1620162	10 µg	V6	n/a	V8	10-Sep-2020	V9	18-Dec-2020
276-02-0168	B1620217	20 µg	V6	12-Aug-2020	V8	23-Sep-2020	V9	04-Jan-2021
276-02-0156	B1620218	20 µg	V6	13-Aug-2020	V8	24-Sep-2020	V9	04-Jan-2021
276-02-0172	B1620219	20 µg	V6	13-Aug-2020	V8	24-Sep-2020	V9	04-Jan-2021

Subject number	Biosampling ID	Cohort (BNT162b2)	Visit	Collection date	Visit	Collection date	Visit	Collection date
276-02-0173	B1620220	20 µg	V6	13-Aug-2020	V8	24-Sep-2020	V9	04-Jan-2021
276-02-0174	B1620225	20 µg	V6	17-Aug-2020	V8	28-Sep-2020	V9	05-Jan-2021
276-02-0175	B1620221	20 µg	V6	17-Aug-2020	V8	28-Sep-2020	V9	05-Jan-2021
276-02-0177	B1620224	20 µg	V6	18-Aug-2020	V8	28-Sep-2020	V9	07-Jan-2021
276-02-0178	B1620223	20 µg	V6	17-Aug-2020	V8	28-Sep-2020	V9	05-Jan-2021
276-02-0179	B1620222	20 µg	V6	17-Aug-2020	V8	28-Sep-2020	V9	05-Jan-2021
276-02-0180	B1620235	20 µg	V6	24-Aug-2020	V8	05-Oct-2020	V9	12-Jan-2021
276-02-0183	B1620236	20 µg	V6	24-Aug-2020	V8	05-Oct-2020	V9	n/a
276-02-0127	B1620179	30 µg	V6	03-Aug-2020	V8	14-Sep-2020	V9	21-Dec-2020
276-02-0149	B1620183	30 µg	V6	03-Aug-2020	V8	16-Sep-2020	V9	22-Dec-2020
276-02-0128	B1620180	30 µg	V6	04-Aug-2020	V8	15-Sep-2020	V9	21-Dec-2020
276-02-0137	B1620182	30 µg	V6	04-Aug-2020	V8	15-Sep-2020	V9	21-Dec-2020
276-02-0150	B1620184	30 µg	V6	n/a	V8	21-Sep-2020	V9	21-Dec-2020
276-02-0134	B1620189	30 µg	V6	07-Aug-2020	V8	21-Sep-2020	V9	23-Dec-2020
276-02-0142	B1620191	30 µg	V6	06-Aug-2020	V8	17-Sep-2020	V9	21-Dec-2020
276-02-0143	B1620192	30 µg	V6	06-Aug-2020	V8	17-Sep-2020	V9	21-Dec-2020
276-02-0144	B1620193	30 µg	V6	06-Aug-2020	V8	17-Sep-2020	V9	21-Dec-2020
276-02-0145	B1620194	30 µg	V6	06-Aug-2020	V8	17-Sep-2020	V9	21-Dec-2020
276-01-0261	B1620244	10 µg older adults	V6	25-Sep-2020	V8	10-Nov-2020	V9	n/a
276-01-0265	B1620246	10 µg older adults	V6	29-Sep-2020	V8	10-Nov-2020	V9	n/a
276-01-0269	B1620249	10 µg older adults	V6	29-Sep-2020	V8	11-Nov-2020	V9	n/a
276-01-0279	B1620255	10 µg older adults	V6	01-Oct-2020	V8	13-Nov-2020	V9	n/a
276-02-0222	B1620322	20 µg older adults	V6	07-Oct-2020	V8	18-Nov-2020	V9	n/a
276-02-0223	B1620323	20 µg older adults	V6	07-Oct-2020	V8	18-Nov-2020	V9	n/a
276-02-0215	B1620325	20 µg older adults	V6	14-Oct-2020	V8	24-Nov-2020	V9	n/a
276-02-0221	B1620326	20 µg older adults	V6	13-Oct-2020	V8	24-Nov-2020	V9	n/a
276-02-0224	B1620327	20 µg older adults	V6	13-Oct-2020	V8	24-Nov-2020	V9	n/a
276-02-0229	B1620329	20 µg older adults	V6	13-Oct-2020	V8	24-Nov-2020	V9	n/a
276-02-0233	B1620330	20 µg older adults	V6	13-Oct-2020	V8	24-Nov-2020	V9	n/a
276-01-0306	B1620269	30 µg older adults	V6	13-Oct-2020	V8	25-Nov-2020	V9	n/a
276-01-0316	B1620268	30 µg older adults	V6	13-Oct-2020	V8	25-Nov-2020	V9	n/a
276-01-0314	B1620270	30 µg older adults	V6	13-Oct-2020	V8	25-Nov-2020	V9	n/a
276-01-0272	B1620291	30 µg older adults	V6	16-Oct-2020	V8	27-Nov-2020	V9	n/a
276-01-0308	B1620290	30 µg older adults	V6	16-Oct-2020	V8	27-Nov-2020	V9	n/a

Subject number	Biosampling ID	Cohort (BNT162b2)	Visit	Collection date	Visit	Collection date	Visit	Collection date
276-01-0319	B1620293	30 µg older adults	V6	16-Oct-2020	V8	27-Nov-2020	V9	n/a
276-01-0323	B1620294	30 µg older adults	V6	16-Oct-2020	V8	27-Nov-2020	V9	n/a

Table 4-5: Material from recovered COVID-19 patients

Clinical score 1: asymptomatic; 2: mild infection, 4-5: hospitalization was required

Subject number	Biosampling ID	Clinical score	Days after first diagnosis (PCR confirmed)	Collection date
051-488-594	RC000001	2	42	08-May-2020
090-457-059	RC000007	1	56	11-May-2020
566-228-753	RC000003	2	53	08-May-2020
675-155-166	RC000002	2	57	08-May-2020
194-881-889	RC000008	2	30	11-May-2020
330-696-901	RC000011	2	42	12-May-2020
390-644-567	RC000045	1	45	14-May-2020
416-996-055	RC000009	5	45	11-May-2020
453-078-861	RC000013	2	41	12-May-2020
484-881-737	RC000044	2	62	14-May-2020
507-380-282	RC000012	1	48	12-May-2020
526-024-091	RC000041	4	59	14-May-2020
543-431-342	RC000004	2	51	08-May-2020
648-618-598	RC000006	2	52	11-May-2020
856-710-398	RC000005	2	46	11-May-2020
938-269-939	RC000043	1	47	14-May-2020
963-850-946	RC000010	2	43	12-May-2020
986-087-577	RC000040	2	62	14-May-2020

Table 4-6: Healthy volunteer leukapheresis material

Subject number	Biosampling ID	Collection date
HV-T050	HV000058	20-Jun-2017
HV-T097	HV000090	09-May-2019

4.4 Materials

Table 4-7: Equipment

Device	Model	Manufacturer	Site
Cell counter	CASY TTT	OMNI Life Sciences	BioNTech SE
Flow cytometer	FACS Verse	BD	

Table 4-8: Software

Device	Model	Manufacturer	Software
Cell counter	CASY TTT	OMNI Life Sciences	CASY® Measure
Flow cytometer	FACS Verse	BD	BD FACSuite™

Table 4-9: Material and reagents used

Experimental step/materials	Product name	Manufacturer	Order number
Medium & supplements	CTL wash supplement 10×	CTL Immunospot	#CTLW-010-5
	OpTmizer™ T-Cell Expansion basal medium	Invitrogen	A10485-01
	OpTmizer™ T-Cell Expansion supplement	Invitrogen	A25761
	DNAse I	Roche	11284932001
	Dulbecco's phosphate-buffered saline (D-PBS)	Life Technologies	14190-169
	RPMI 1640 medium, GlutaMAX™ supplement	Life Technologies	61870-010
	Dimethyl sulfoxide for cell culture (DMSO)	AppliChem	A3672,0100
	CASYton	OMNI Life Sciences	5651808
	Brefeldin A (BD GolgiPlug™)	BD	555029
	Anti-human CD3, positive control (mAb CD3-2)	MABtech	Kit (3420-2APT-10)
Peptides	SARS-CoV-2 RBD pepmix (25 µg/peptide)	JPT	Custom order 43224 (Iso Plus grade)
	SARS-CoV-2 S protein pool 1 pepmix (25 µg/peptide)	JPT	Custom order 43224 (Iso Plus grade)
	SARS-CoV-2 S protein pool 2 pepmix (25 µg/peptide)	JPT	Custom order 43224 (Iso Plus grade)
	CEFX Ultra SuperStim Pool	JPT	PM-CEFX-2
ICS reagents	Fixation/Permeabilization Solution kit (250 tests)	BD	554714
	Ethylenediaminetetraacetic acid (EDTA) solution	Sigma-Aldrich	03690-100ML
	Fetal bovine serum (FBS)	Sigma	F7254
	Brilliant Stain Buffer	BD Horizon™	563794 (100 tests) 566349 (1,000 tests)
	Brilliant Stain Buffer Plus	BD Horizon™	566385 (1,000 tests)
	CD3 BV421 (clone: UCHT1)	BD	562426
	CD4 BV480 (clone: RPA-T4)	BD	746541
	CD8 BB515 (clone: RPA-T8)	BD	564526
	IFNγ PE-Cy7 (clone: B27)	BD	557643
	IFNγ BB700 (clone: B27)	BD	566394
	IL-4 APC (clone: MP4-25D2)	BD	554486
	IL-2 PE (clone: MO1-17H12)	BD	554566
	Fixable Viability Dye eFluor™ 780	eBioscience	65-0865-14

4.5 Methods

4.5.1 Sample Preparation

PBMCs were thawed according to SOP-030-041 and cell numbers were determined according to SOP-010-098 using the cell counter CASY TTT. Prior to peptide stimulations, PBMCs were rested for 4 hours at 37°C in OpTmizer medium supplemented with 2 µg/mL DNase I.

4.5.2 Peptide Stimulation

Stimulation of PBMCs was performed using pools of synthetic peptides representing different portions of the wild-type sequence of SARS-CoV-2 S protein, namely N-terminal pools 'S pool 1' (aa 1-643) and 'RBD' (aa 1-16 fused to aa 327-528 of the S protein), and the C-terminal 'S pool 2' (aa 633-1273). The peptide pools consisted of 15-mer overlapping peptides covering the whole length of the respective S protein portion with 11 aa overlap. The last peptide for the S pool 2 is a 17-mer.

After resting, PBMCs were harvested by centrifugation, resuspended in PBS, and counted using the cell counter CASY TTT. After counting samples were spun again and cell number was adjusted in OpTmizer medium to 10×10^6 PBMCs/mL. Afterwards PBMCs were restimulated in a round-bottom 96 well plate at 1×10^6 PBMCs/well with S pool 1, S pool 2 and RBD peptide pool (2 µg/mL/peptide; JPT Peptide Technologies) in the presence of GolgiPlug (BD) for 18 hours at 37°C. Negative controls were treated with DMSO-containing medium, positive controls were stimulated with anti-CD3 antibody (final dilution of 1:1,000) and CEFX pepmix (2 µg/mL/peptide).

4.5.3 Intracellular Cytokine Staining

ICS is a flow cytometry-based assay to detect the production and accumulation of cytokines intracellularly upon cell stimulation. After antigen-specific stimulation of PBMCs, protein transport inhibitors were added to retain the produced cytokines within the cells. Cells were then stained for viability (fixable viability dye eFluor™ 780; working concentrations were titrated lot specifically ranging between 1:5,000 – 1:2,000). In order to discriminate between antigen-specific CD4- and CD8-T-cell responses, fluorescently labeled antibodies for CD4, CD8, and CD3 were used for staining of extracellular surface markers (in flow buffer comprising D-PBS [Gibco] supplemented with 2% FBS [Sigma], 2 mM EDTA [Sigma-Aldrich]), and Brilliant Stain Buffer Plus [BD Horizon™, according to the manufacturer's instructions] or in Brilliant Stain Buffer [BD Horizon™]) for 20 minutes at 4°C (see Table 4-10). Next, PBMCs were fixed and subsequently permeabilized using the Cytofix/Cytoperm kit according to the manufacturer's instructions (BD Biosciences). Intracellular staining of CD4, CD8, CD3, and of produced cytokines was performed in Perm/Wash buffer supplemented with Brilliant Stain Buffer Plus (according to the manufacturer's instructions) for 30 minutes

at 4°C using fluorescently labeled, cytokine-specific antibodies detecting IFNγ, IL-2, and IL-4 (see Table 4-10). For acquisition, samples were resuspended in flow buffer.

In order to monitor the quality and assess the variance of the stainings, PBMCs isolated from healthy volunteer leukapheresis samples generated prior to the COVID-19 pandemic were used as in-house reference assay controls. Since the stimulation and staining of pre- and post-primary vaccination samples were performed on separate 96-well plates, one reference sample row was included on each plate to control for intra-assay variability. The PBMC material available from 1 donor was not sufficient to cover all subject screenings in this report. Hence, a bridging experiment to a 2nd PBMC donor was performed during the reported study dates. Furthermore, it became apparent, that in order to assure optimal staining conditions, reduce staining artifacts, and reduce unspecific background signals that it was favorable to include Brilliant Stain Buffer and Brilliant Stain Buffer Plus into the flow cytometric staining mixes for ICS. This was especially relevant when investigating older study subjects as a more frequent general immune activation was observed presenting itself in higher cytokine background signals. A test experiment was performed to assure that inclusion of Brilliant Stain Buffer formats into the flow cytometric staining mixes did not affect the frequencies of detected cytokine positive events in the generated flow data.

Results obtained for the reference samples can be found in the appendix (Appendix 16, Appendix 17, and Appendix 18).

Table 4-10: Antibody dilutions used for surface marker and intracellular cytokine staining

IFNγ BB700 antibody was used for ICS with subject material; IFNγ PE-Cy7(*) antibody was used for PBMC material from recovered COVID-19 patients

Specificity	Host, reactivity	Dilution	Location
CD3	mouse anti-human	1:250	extracellular/intracellular
CD4	mouse anti-human	1:50	extracellular/intracellular
CD8	mouse anti-human	1:100	extracellular/intracellular
IFNγ	mouse anti-human	1:250 (BB700) 1:50 (PE-Cy7)*	intracellular
IL-2	rat anti-human	1:10	intracellular
IL-4	rat anti-human	1:500	intracellular

4.5.4 Data Acquisition and Analysis

After the staining procedure, cells were analyzed on a flow cytometer to measure the frequency of vaccine antigen-specific Th1 and Th2 $CD4^+$ T cells as well as cytotoxic $CD8^+$ T cells. Lastly, the results generated with pre- and post-primary vaccination samples of each subject were compared individually to identify the induction/expansion of cellular immune responses and to characterize their Th1 and Th2 balance after vaccination.

Samples were acquired utilizing a FACSVerse cytometer (BD Biosciences) and analyzed with FlowJo software version 10.6.2 (FlowJo LLC, BD Biosciences) for CD4

and CD8 cytokine-producing T cells (IFNγ, IL-2, and IL-4). The gating strategy used is shown in Figure 9.1.

A performance qualification check (PQC) was performed daily using CS&T beads to monitor the performance of the BD FACS Verse flow cytometer.

4.5.5 Data Transfer to DS&BA

Respective data (sample information .xlxs-formatted file and data .XML-formatted file exported from FlowJo analysis workspaces) were transferred to the DS & BM Unit, processed, and uploaded to a Spotfire data platform. Stimulation-specific cytokine production was background corrected by subtraction of values obtained with DMSO-containing medium samples (representing the negative assay controls).

4.5.6 Statistical Analysis

All statistical analyses were performed using GraphPad Prism software version 9.0.0.

5 RESULTS

Th1- and Th2-specific cytokines in CD4+ and CD8+ T cells from 79 BNT162b2-vaccinated subjects were measured via intracellular cytokine staining followed by flow cytometry analysis. The disposition and the analysis set of subjects is described in Table 5-1. Exemplary flow cytometry pseudo-color plots are shown in Figure 5.1.

Table 5-1: Subject disposition and analysis set

ICS analysis: Values indicate number of subjects for whom ICS analysis was performed

Cohort	BNT162b2 vaccinated		ICS analysis				
	Prime	Booster	Day 1	Day 29±3	Day 43±4	Day 85±7	Day 184±9
1 µg	12	11	8	8	0	0	0
3 µg	12	12	9	9	0	0	0
10 µg	12	11	11	11	0	2	2
20 µg	12	12	11	11	11	11	10
30 µg	12	12	11	11	9	10	10
10 µg (56-85 years)	12	12	11	11	4	4	0
20 µg (56-85 years)	12	12	9	9	7	7	0
30 µg (56-85 years)	12	12	9	9	7	7	0

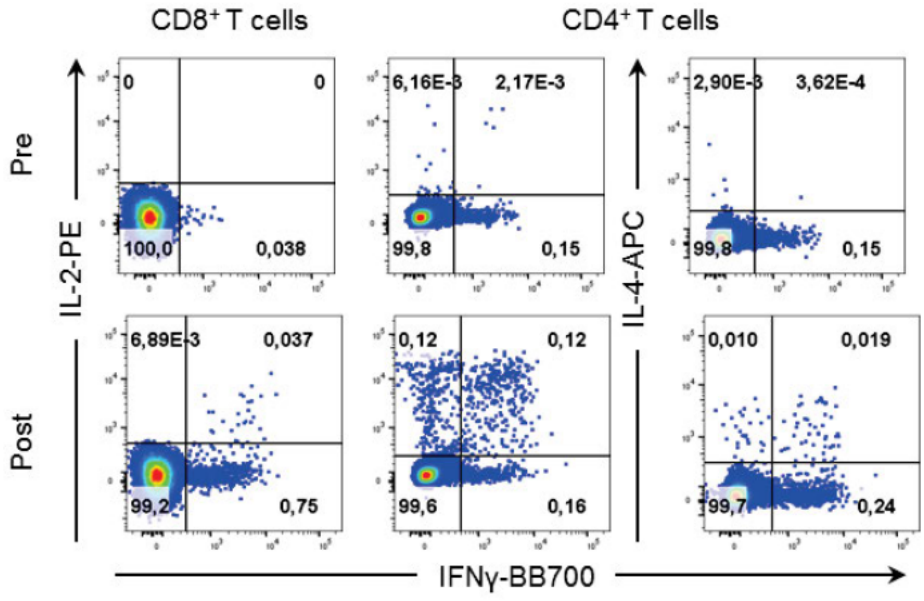

Figure 5.1: Exemplary pseudo-color flow cytometry plots of cytokine-producing CD4+ and CD8+ T cells from a 30 µg cohort subject

Numbers within the plots indicate the frequency of cytokine-producing T cells in %.

5.1 Characterization of vaccine-induced CD4+ T-cell responses

S-specific CD4+ T-cell responses analyzed in 50 adult subjects (18 to 55 years of age) and 29 older adult subjects (56 to 85 years of age) vaccinated with two doses of BNT162b2 are characterized by a Th1 cytokine profile secreting IFNγ, IL-2, or both (Figure 5.2, Figure 5.3, Figure 5.6 for adults, and Figure 5.4, Figure 5.5, Figure 5.7 for older adults). Importantly, only minor amounts of the Th2 cytokine IL-4 are produced in response to S protein pool 1 and S protein pool 2 stimulations (mean fraction: 0.01% and 0.02% of antigen-specific circulating CD4+ T cells in the 20 and 30 µg adult cohorts, respectively, Figure 5.6, and mean fraction: 0.02% and 0.01% of antigen-specific circulating CD4+ T cells in the 20 and 30 µg older adult cohorts, respectively, Figure 5.7). The mean fraction of CD4 cytokine-producing T cells in the BNT162b2-vaccinated subjects was substantially higher in the 10, 20, and 30 µg cohorts of both age groups than that observed in 18 patients who recovered from COVID-19 (Figure 5.6 for adults and Figure 5.7 for older adults). The mean fraction of cytokine-producing CD4+ T cells was comparable between S protein pool 1 and pool 2 peptide stimulations. Of note, 1 of the tested study subjects from the 20 µg cohort displayed a strong pre-existing CD4+ T-cell response against S protein pool 2 prior vaccination which was amplified in terms of IL-2 producing CD4+ T cells upon vaccination. No pre-existing CD4+ T-cell responses against S protein pool 1 were detectable.

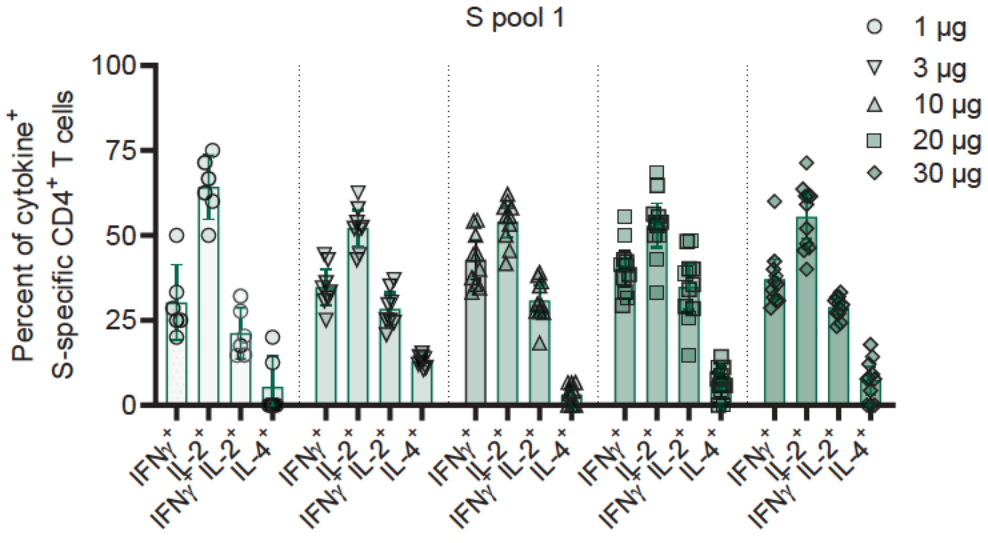

Figure 5.2: S-specific CD4+ T cells producing the indicated cytokines in response to S protein pool 1 as a fraction of total cytokine-producing S-specific CD4+ T cells (1 to 30 µg adult cohorts)

Bar charts show arithmetic means with 95% confidence interval (CI) at Day 29 after first vaccination (7 days after second vaccination). Cytokine production was calculated by summing up the fractions of all CD4+ T cells positive for either IFNγ, IL-2, or IL-4, setting this sum to 100% and calculating the fraction of each specific cytokine-producing subset thereof. Two subjects from the 1 µg cohort, 1 subject from the 3 µg cohort, and 1 subject from the 10 µg cohort were excluded from this analysis (frequency of total cytokine-producing CD4+ T cells <0.03%).

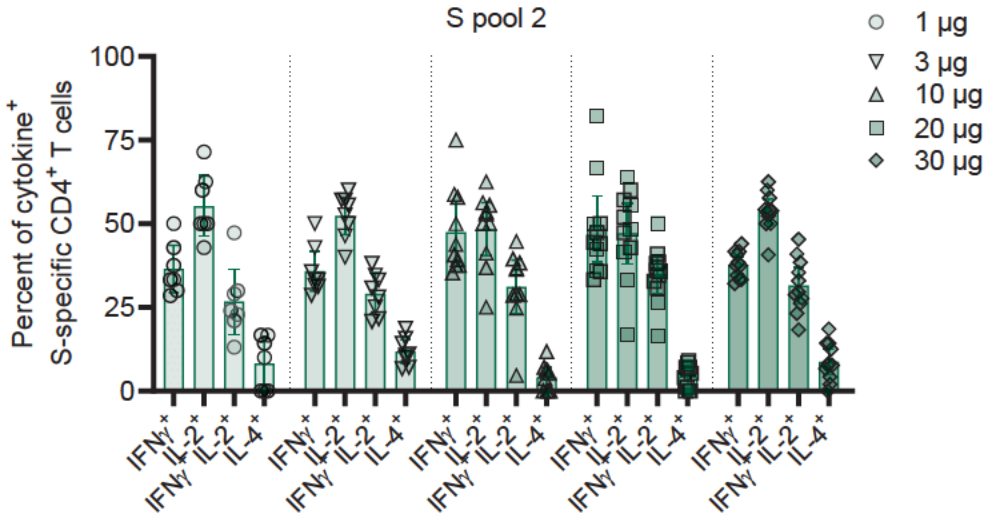

Figure 5.3: S-specific CD4⁺ T cells producing the indicated cytokines in response to S protein pool 2 as a fraction of total cytokine-producing S-specific CD4⁺ T cells (1 to 30 µg adult cohorts)

Bar charts show arithmetic means with 95% CI at Day 29 after first vaccination (7 days after second vaccination. Cytokine production was calculated by summing up the fractions of all CD4⁺ T cells positive for either IFNγ, IL-2, or IL-4, setting this sum to 100% and calculating the fraction of each specific cytokine-producing subset thereof. One subject from the 1 µg cohort, 1 subject from the 3 µg cohort, and 1 subject from the 10 µg cohort were excluded from this analysis (frequency of total cytokine-producing CD4⁺ T cells <0.03%).

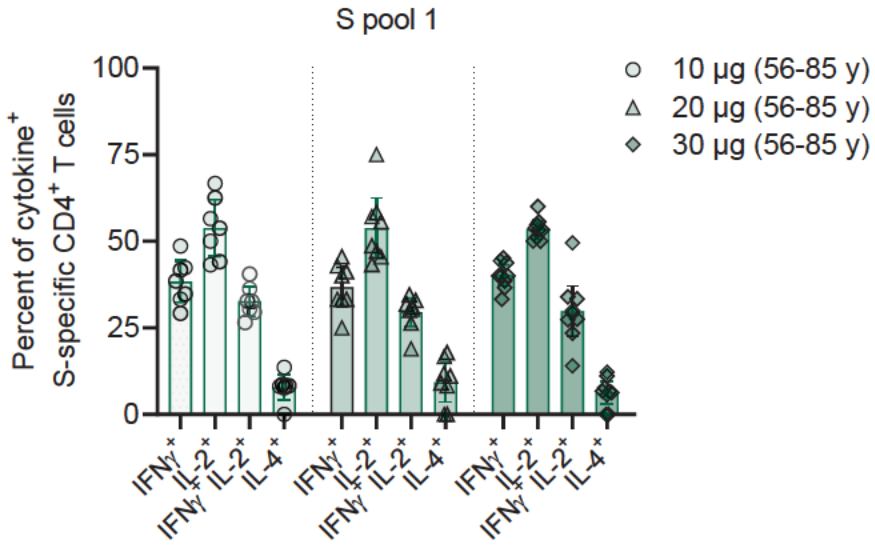

Figure 5.4: S-specific CD4⁺ T cells producing the indicated cytokines in response to S protein pool 1 as a fraction of total cytokine-producing S-specific CD4⁺ T cells (10 to 30 µg older adult cohorts, 56-85 years (y) of age)

Bar charts show arithmetic means with 95% CI at Day 29 after first vaccination (7 days after second vaccination. Cytokine production was calculated by summing up the fractions of all CD4⁺ T cells positive for either IFNγ, IL-2, or IL-4, setting this sum to 100%, and calculating the fraction of each specific cytokine-producing subset thereof. Four subjects from the 10 µg cohort and 1 subject from the 20 µg cohort were excluded from this analysis (frequency of total cytokine-producing CD4⁺ T cells <0.03%).

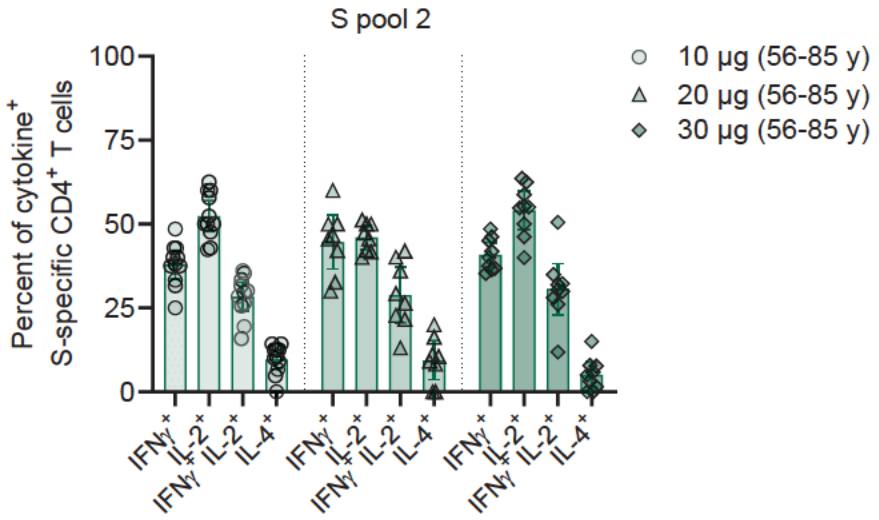

Figure 5.5: S-specific CD4+ T cells producing the indicated cytokines in response to S protein pool 2 as a fraction of total cytokine-producing S-specific CD4+ T cells (10 to 30 µg older adult cohorts, 56-85 years (y) of age)

Bar charts show arithmetic means with 95% CI at Day 29 after first vaccination (7 days after second vaccination. Cytokine production was calculated by summing up the fractions of all CD4+ T cells positive for either IFNγ, IL-2, or IL-4, setting this sum to 100%, and calculating the fraction of each specific cytokine-producing subset thereof. One subject from the 20 µg cohort was excluded from this analysis (frequency of total cytokine-producing CD4+ T cells <0.03%).

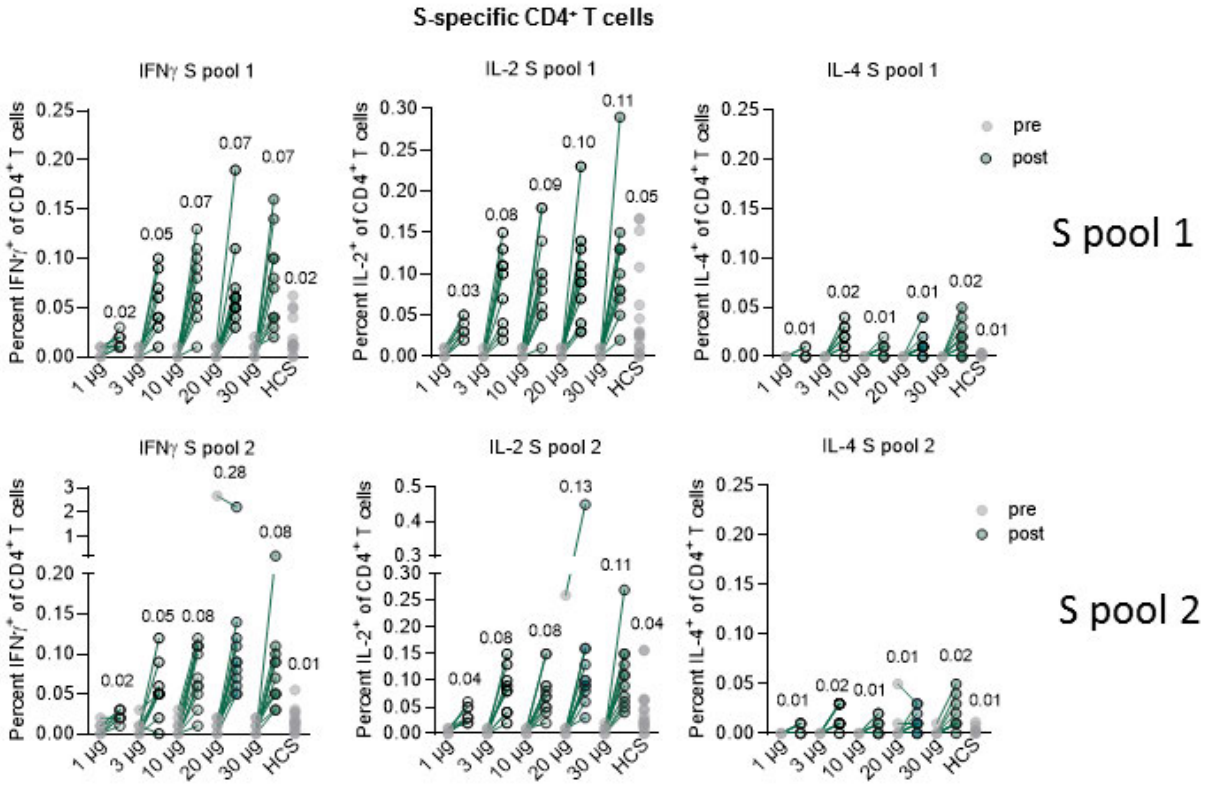

Figure 5.6: S-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (1 to 30 µg adult cohorts)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample; pre: baseline before first vaccination, post: 29±3 days after first vaccination. HCS samples were analyzed using the IFNγ PE Cy7 ICS panel.

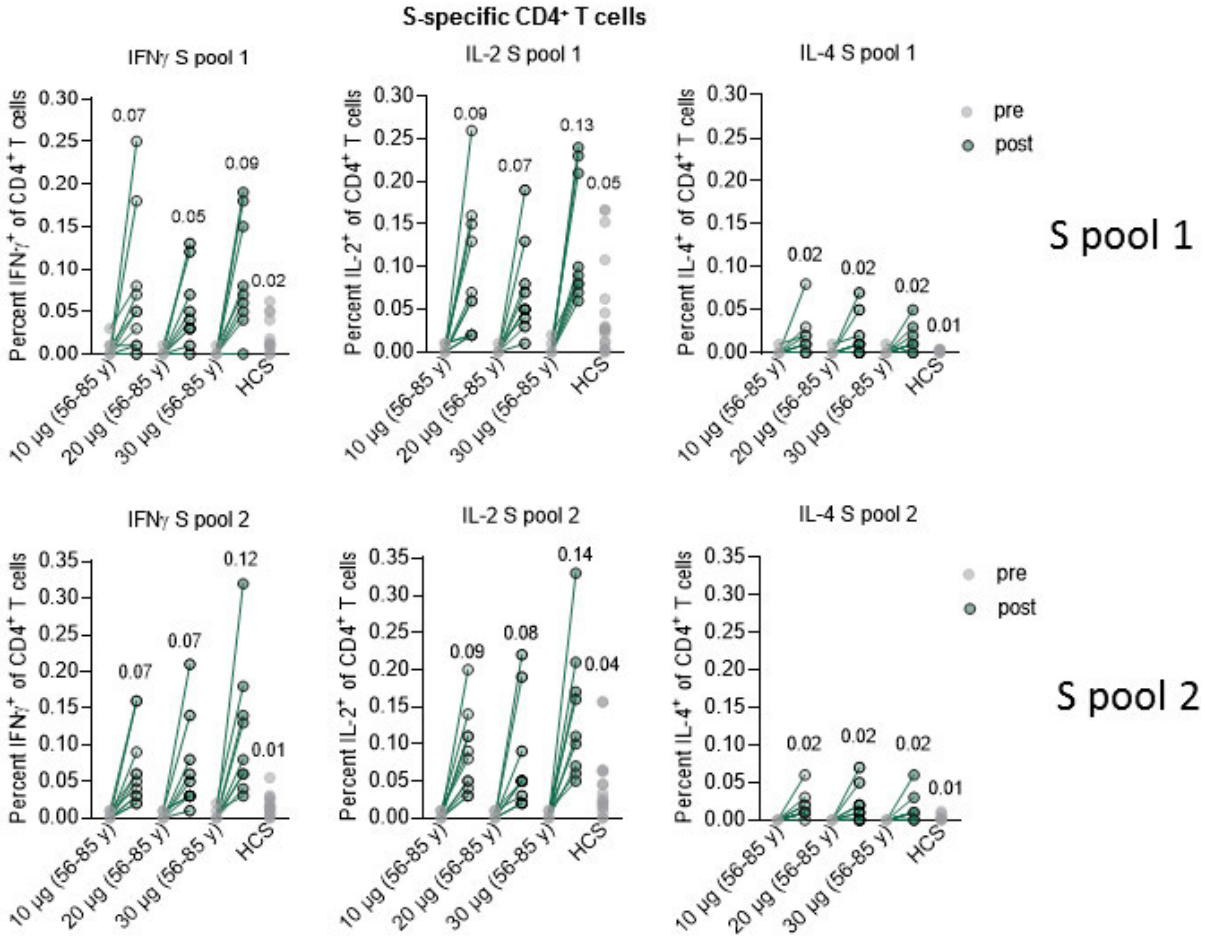

Figure 5.7: S-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (10 to 30 µg older adult cohorts, 56-85 years of age)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample; pre: baseline before first vaccination, post: 29±3 days after first vaccination. HCS samples were analyzed using the IFNγ PE Cy7 ICS panel.

The CD4⁺ T cell cytokine production elicited by S protein pool 1 and pool 2 (covering the wild-type SARS-CoV-2 S protein) stimulations was more pronounced than the IFNγ and IL-2 recall responses toward the RBD peptide pool (Figure 5.8 for adult and Figure 5.9 for older adult subjects), which only comprises one domain of the entire S protein. As for the S protein pool 1, no pre-existing RBD-specific CD4⁺ T-cell responses were detectable.

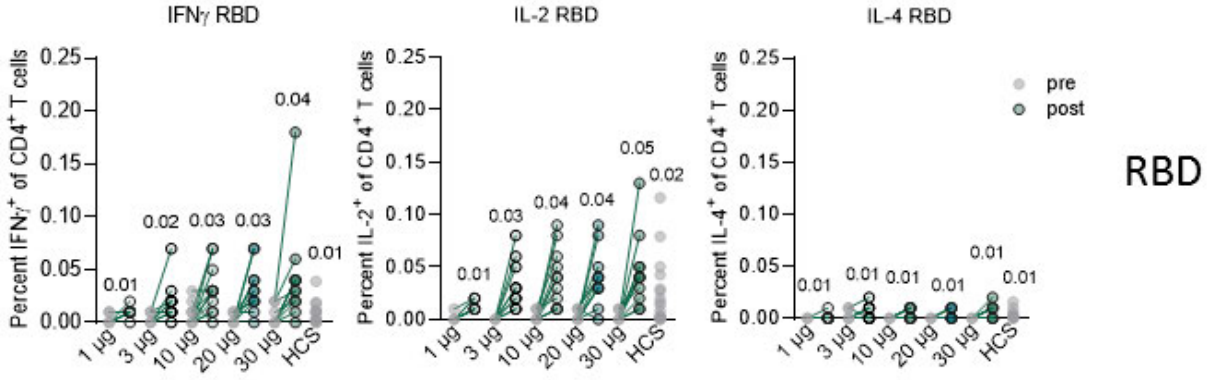

Figure 5.8: RBD-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (1 to 30 µg adult cohorts)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample; pre: baseline before first vaccination, post: 29±3 days after first vaccination. HCS samples were analyzed using the IFNγ PE Cy7 ICS panel.

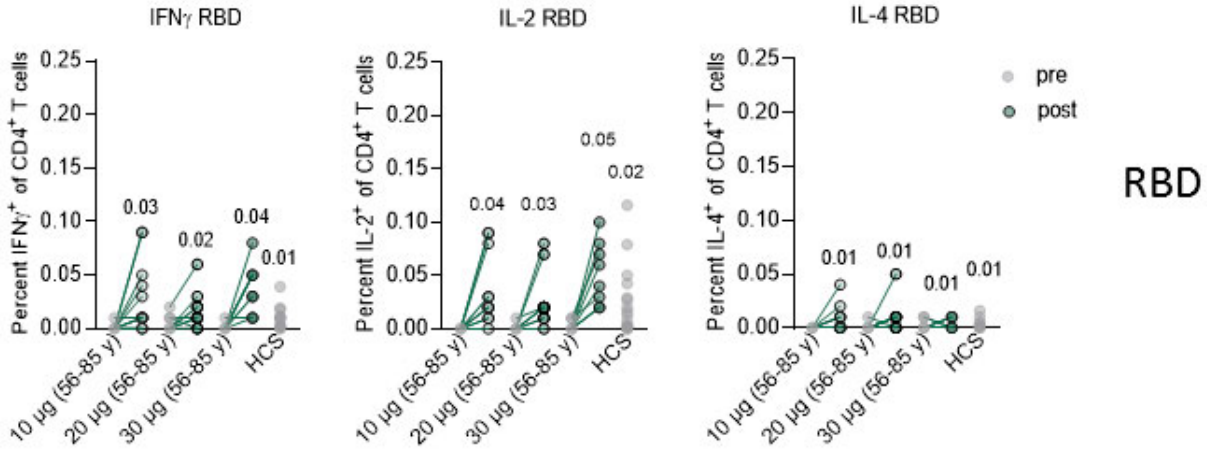

Figure 5.9: RBD-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (10 to 30 µg older adult cohorts, 56-85 years of age)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample; pre: baseline before first vaccination, post: 29±3 days after first vaccination. HCS samples were analyzed using the IFNγ PE Cy7 ICS panel.

5.2 Characterization of vaccine-induced CD8⁺ T-cell responses

Vaccine-induced, S-specific CD8⁺ T cells secreted IFNγ in the majority of analyzed subjects in response to S protein pool 1 and pool 2 stimulation (adults: 43 of 50 subjects and older adults: 22 of 29 subjects) and lower levels of IL-2 secreting CD8⁺ T cells were detectable. Fractions of S-specific IFNγ⁺ CD8⁺ T cells targeting the N-terminal domain of the S protein reached up to 0.96% of total peripheral blood CD8⁺

T cells in the 30 µg adult cohort and up to 1.57% in the 30 µg older adult cohort. The mean fraction of S-specific CD8⁺ T cells was substantially higher in both age groups tested than that observed in 18 patients who recovered from COVID-19 (Figure 5.10 for adult and Figure 5.11 for older adult subjects). Pre-existing CD8⁺ T-cell responses against the C-terminal region of the S protein were detected in 17 of 79 vaccinated subjects (range: 0.07 – 5.59% IFNγ-producing CD8⁺ T cells). These pre-existing responses were slightly amplified upon vaccination in 5 of 17 cases. No pre-existing CD8⁺ T-cell responses against S protein pool 1 were detectable.

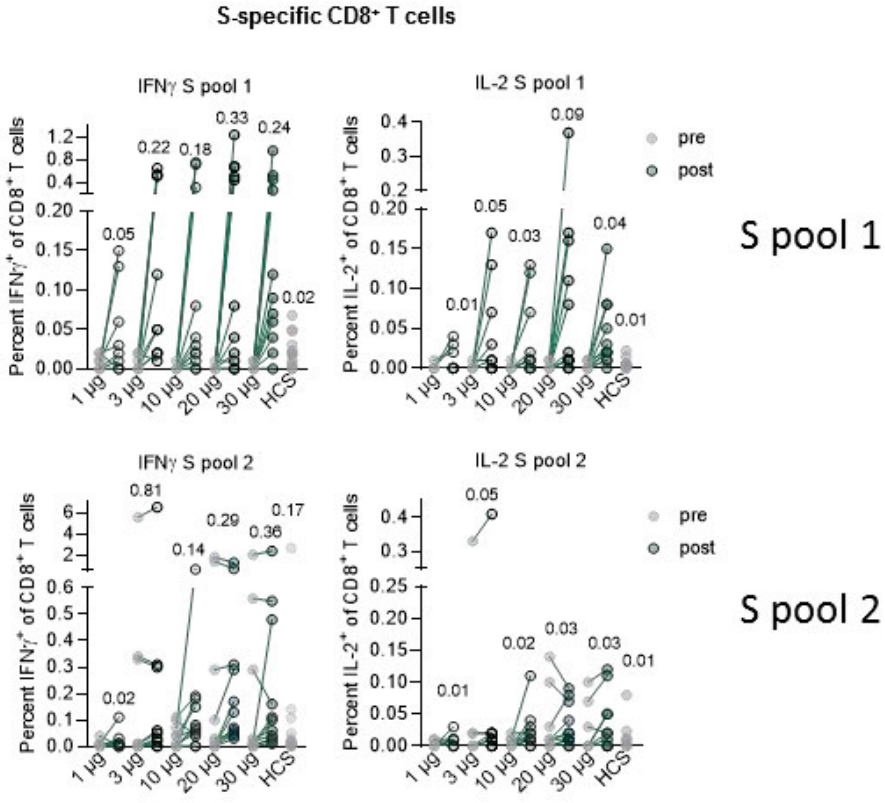

Figure 5.10: S-specific CD8⁺ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8⁺ T cells (1 to 30 µg adult cohorts)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample. pre: baseline before first vaccination, post: 29±3 days after first vaccination, HCS samples were analyzed using the IFNγ PE Cy7 ICS panel.

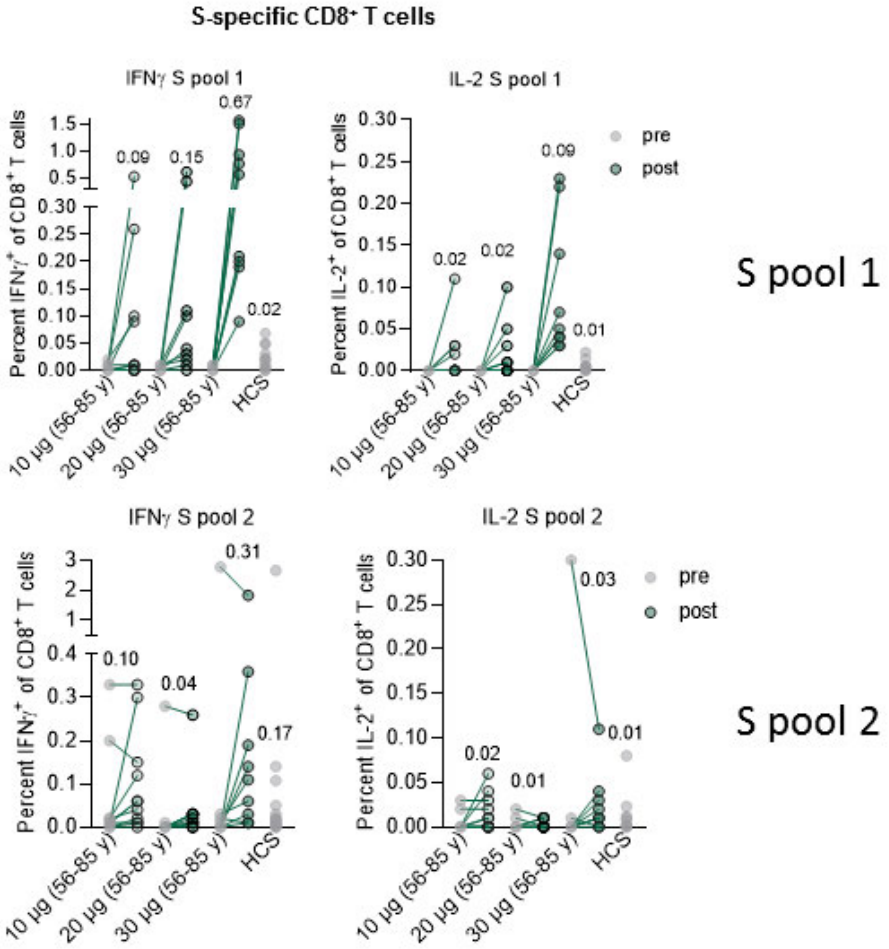

Figure 5.11: S-specific CD8⁺ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8⁺ T cells (10 to 30 µg older adult cohorts, 56-85 years of age)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample. pre: baseline before first vaccination, post: 29±3 days after first vaccination, HCS samples were analyzed using the IFNγ PE Cy7 ICS panel.

Stimulation with the entire S protein comprising peptide pools 1 and 2 yielded substantially stronger CD8⁺ IFNγ and IL-2 cytokine responses after vaccination than stimulation with the smaller RBD peptide pool. As for CD4⁺ T cells, no pre-existing CD8⁺ responses against the RBD were detectable (Figure 5.12 for adult and Figure 5.13 for older adult subjects).

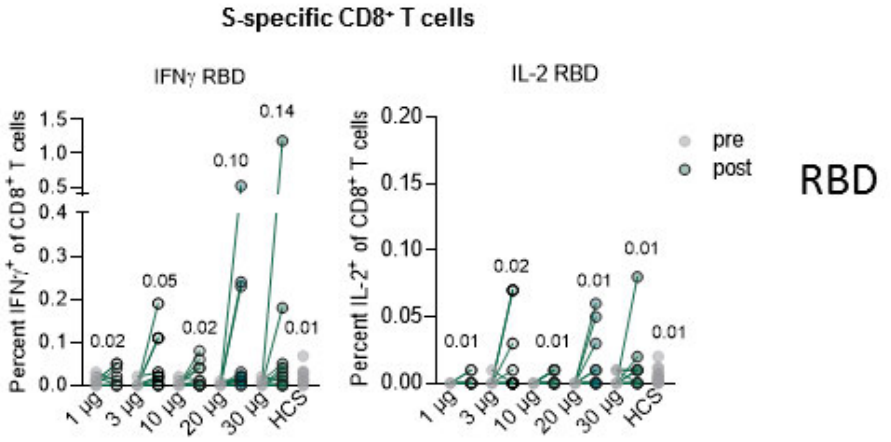

Figure 5.12: RBD-specific CD8+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells (1 to 30 µg adult cohorts)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample. pre: baseline before first vaccination, post: 29±3 days after first vaccination, HCS samples were analyzed using the IFNγ PE Cy7 ICS panel

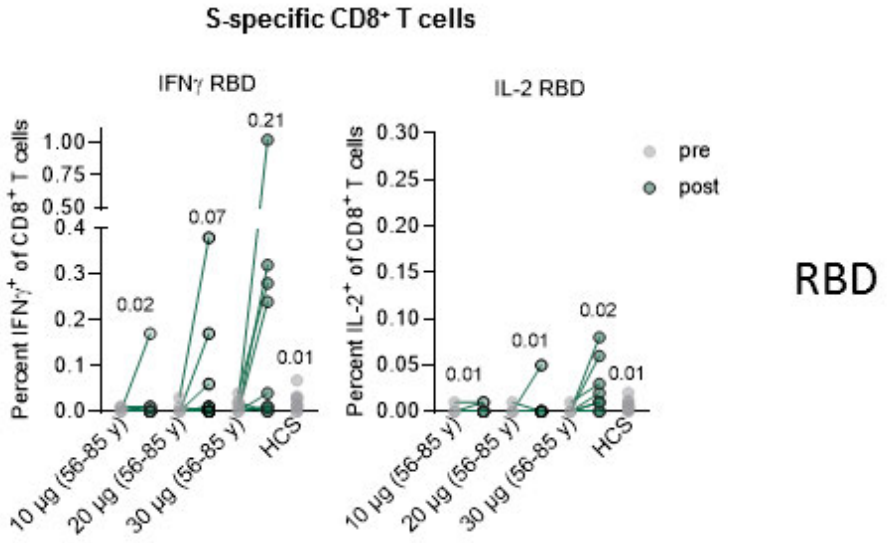

Figure 5.13: RBD-specific CD8+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells (10 to 30 µg older adult cohorts, 56-85 years of age)

Numbers located above the circles are the arithmetic mean fractions. HCS: human convalescent sample. pre: baseline before first vaccination, post: 29±3 days after first vaccination, HCS samples were analyzed using the IFNγ PE Cy7 ICS panel

In addition to the data presentation provided above, CD4 and CD8 cytokine data obtained on Day 29 were plotted for all vaccinated subjects from the 1 to 30 µg adult cohorts as Box-Whisker plots. These data plots can be found in the appendix (Figure 9.2 and Figure 9.3). A Box-Whisker Plot for the older adult cohorts can be found in Section 5.3.

5.3 Comparison of vaccine-induced T-cell responses in two age groups

Vaccine-induced S-protein-specific $CD4^+$ T-cell responses among subjects from the different age groups were directly compared (adult cohorts: 18 to 55 years and older adult cohorts: 56 to 85 years). No significant differences in cytokine responses following S pool 1 and S pool 2 stimulations were observed (Figure 5.14). For all dose cohorts, in particular the 30 µg dose cohort, CD4 cytokine responses elicited by immunization with BNT162b2 show the same intensity in adults and older adults.

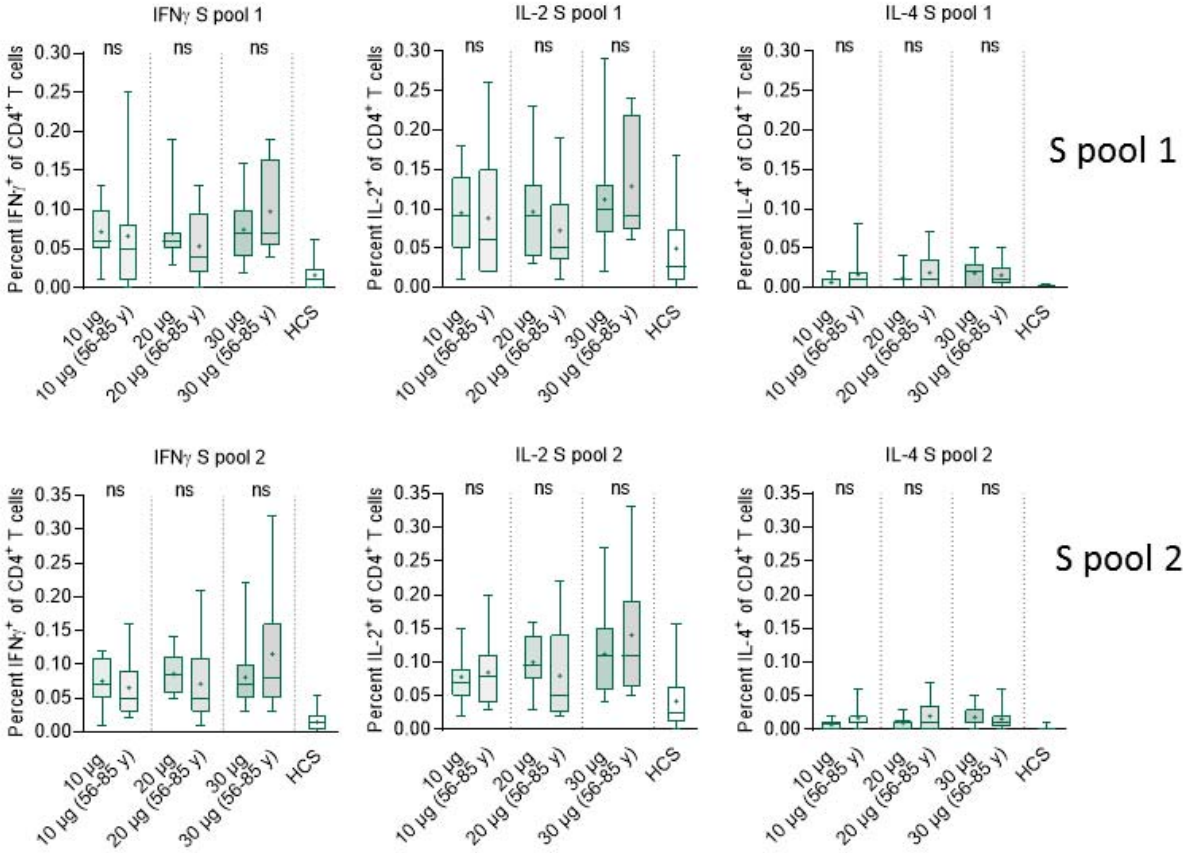

Figure 5.14: S-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (10 to 30 µg cohorts, 18-55 years (y) vs. 56-85 years of age)

Data are plotted for vaccinated subjects (cohorts: 10, 20, and 30 µg for both age groups) from Day 29, with data points for subjects with a pre-existing S pool 2 T-cell response excluded in the lower row (20 µg cohort: n=1). 18-55 y: green-filled plots, 56-85 y: gray-filled plots; HCS: human convalescent sample (n=18); Mann-Whitney test, ns = not significant; Box-Whisker plots indicating the min and max values, lines in the boxes indicate the median values, + indicates the mean values.

Similar to the CD4 responses described above, for the 30 µg dose cohort the CD8 cytokine responses after immunization with BNT162b2 in older adults was comparable to those of the 18-55 years of age group (Figure 5.15). The IFNγ responses against the S pool 1 of the older adults even exceeded that of the younger adult group. However, the significance indicated here was mostly driven by 2 strong-responding study subjects (1.51 and 1.57% IFNγ producing CD8⁺ T cells). Whereas there are no significant differences observed for the 10 µg dose cohorts, the adult outperforms the older adult group in the 20 µg dose cohort for the responses against S pool 2.

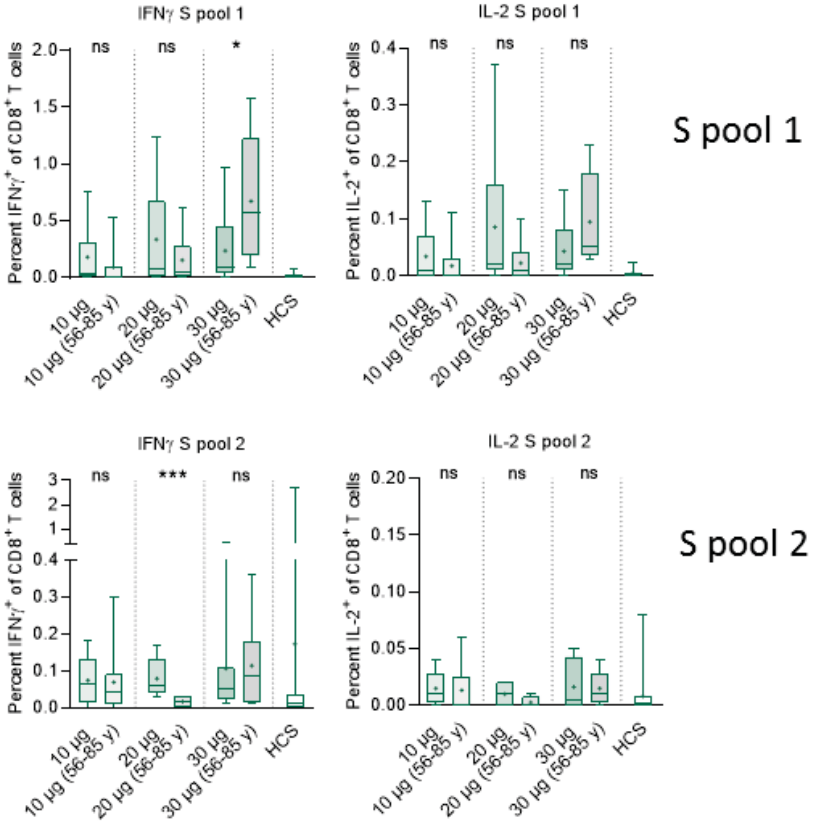

Figure 5.15: S-specific CD8⁺ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8⁺ T cells (10 to 30 µg cohorts, 18-55 years (y) vs. 56-85 years of age)

Cytokine data are plotted for vaccinated subjects (cohorts: 10, 20, and 30 µg for both age groups) from Day 29, with data points for subjects with a pre-existing S pool 2 T-cell response excluded in the lower row (cohort 20 µg adult: n=4, cohorts 10 µg, and 30 µg adults: n=3 each;10 µg older adults: n=2, 20 µg older adults and 30 µg older adults: n=1 each). 18-55 y: green-filled plots, 56-85 y: gray-filled plots; HCS: human convalescent sample (n=18); Mann-Whitney test, ns = not significant, * p<0.05, *** p<0.001; Box-Whisker plots indicating the min and max values, lines in the boxes indicate the median values, + indicates the mean values.

Data generated for combined SARS-CoV-2 S protein pool 1+2 stimulations as well as positive control stimulations (CEFX and anti-CD3) are not shown. Data can be found in the appendix.

5.4 Persistence of cell-mediated immune responses

To assess the persistence of cell-mediated immune responses in subjects vaccinated with two doses of BNT162b2, PBMCs were collected at Day 43 (3 weeks after the boost), Day 85 (9 weeks after the boost), and/or Day 184 (23 weeks after the boost) after the first vaccination. S-specific CD4⁺ and CD8⁺ T-cell responses were analyzed

by ICS in a subset of 23 adult subjects (18 to 55 years of age) and 18 older adult subjects (56 to 85 years of age) across dose cohorts 10 to 30 µg.

For the majority of analyzed subjects, the strong S-specific, Th1-biased cytokine response of $CD4^+$ T cells started contracting by Day 43 and reached a lower stable plateau by Day 85 (Figure 5.16 and Figure 5.17). This observation held true for all dose cohorts and both age groups analyzed with varying response magnitudes between individuals. For the adult cohort, Th1 $CD4^+$ T-cell cytokine responses were still clearly detectable at Day 184, representing the 6 month time stamp after the first vaccination (Figure 5.16). PBMC material from the older adults at Day 184 was not yet available at the time of this interim report.

The same dynamics of contraction by Day 43 and stabilization on a lower plateau by Day 85 was also observed for $CD8^+$ T cell cytokine responses (Figure 5.18 and Figure 5.19). For $CD4^+$ T cells, S-specific $CD8^+$ T-cell responses were still clearly detectable up to half a year after the first vaccination in the adult cohort (Figure 5.18). Day 184 analysis for the older adult age group is pending as mentioned above. Interestingly, some of the particularly strong vaccine-induced and pre-existing S pool 2 $CD8^+$ T-cell responses did not contract as strongly and remained at a consistently high level throughout the entire observation period. Moreover, for some of the older adult subjects, the peak of the $CD8^+$ T-cell IFNγ response seemed to be reached later on Day 43 compared to the adult cohorts. This could suggest an age-related delay in mounting a fulminant cytotoxic T-cell response after vaccination.

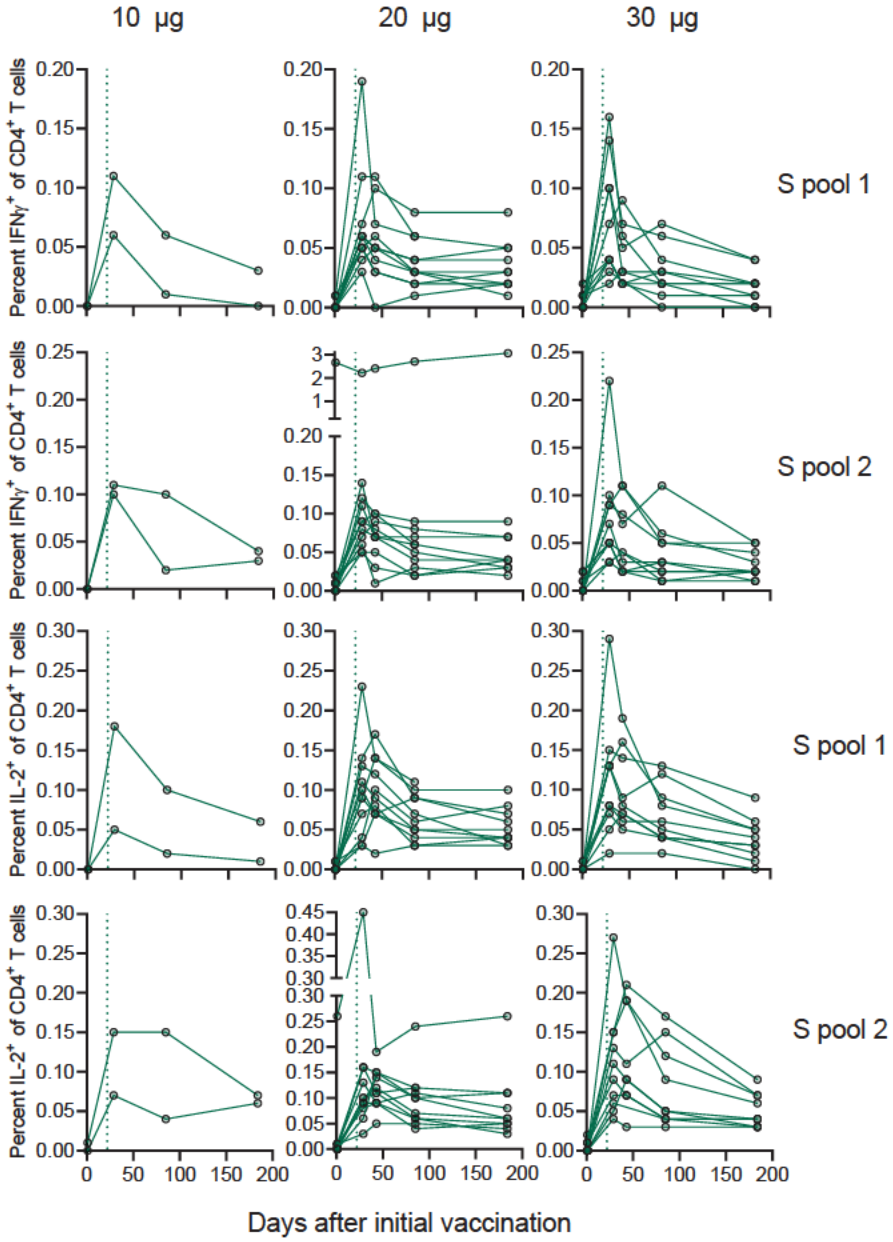

Figure 5.16: Persistence of S-specific CD4+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD4+ T cells (10 to 30 µg cohorts, 18-55 years of age)

Cytokine data are plotted for vaccinated subjects (cohorts: 10 (n=2), 20 (n=11), and 30 µg (n=10)) from Day 1 (pre-prime/initial vaccination), Day 29 (7 days after the boost), Day 43 (3 weeks after the boost), Day 85 (9 weeks after the boost), and/or Day 184 (23 weeks after the boost) after the first vaccination. For the 10 µg adult subjects and 1 subject from the 30 µg adult cohort, Day 43 samples were not available. For 1 subject from the 20 µg adult cohort, Day 184 sample was not available. Green dotted lines indicate the time point of the second vaccination (Day 22).

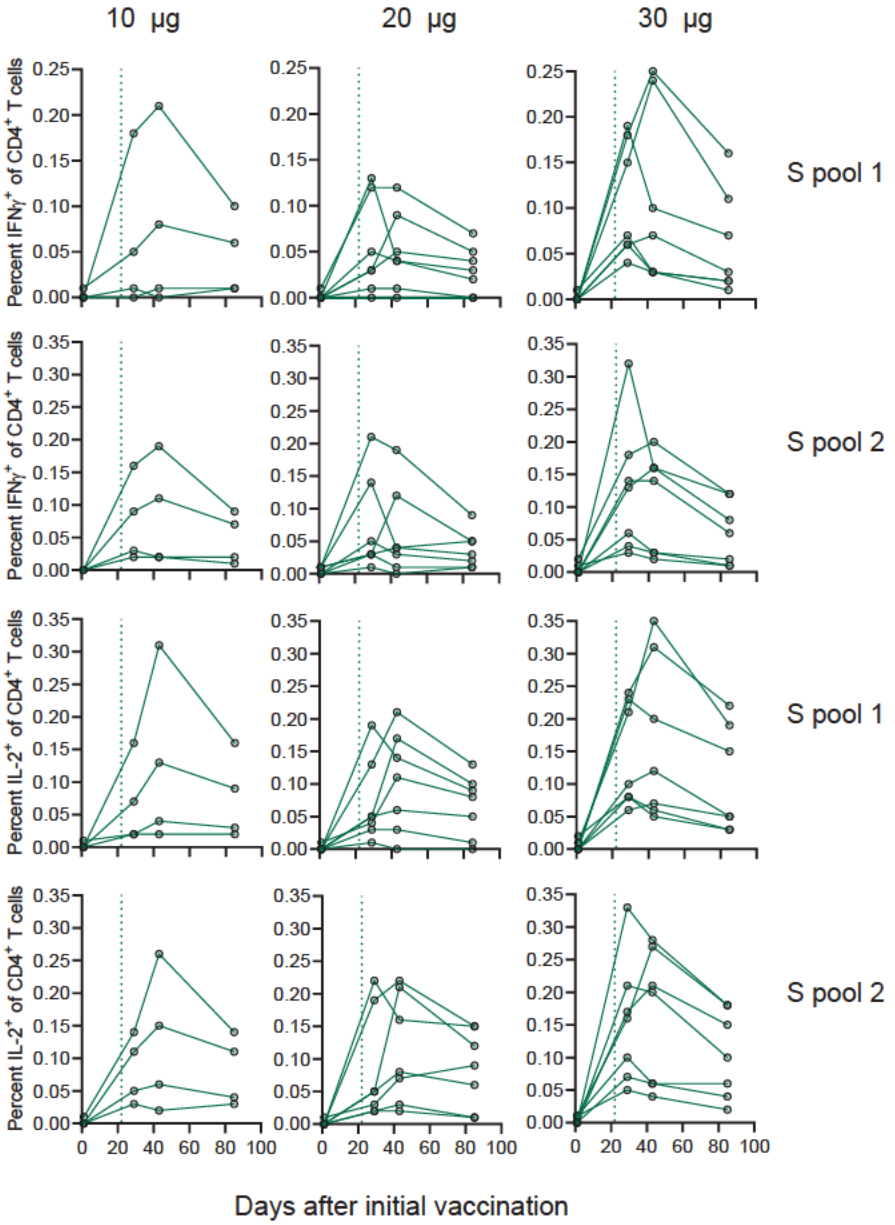

Figure 5.17: Persistence of S-specific CD4+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD4+ T cells (10 to 30 µg cohorts, 56-85 years of age)

Cytokine data are plotted for vaccinated subjects (cohorts: 10 (n=4), 20 (n=7), and 30 µg (n=7), 56 to 85 years of age) from Day 1 (pre-prime/initial vaccination), Day 29 (7 days after the boost), Day 43 (3 weeks after the boost), and Day 85 (9 weeks after the boost) after the first vaccination. Data for Day 184 was not yet available at the time of this report. Green dotted lines indicate the time point of the second vaccination (Day 22).

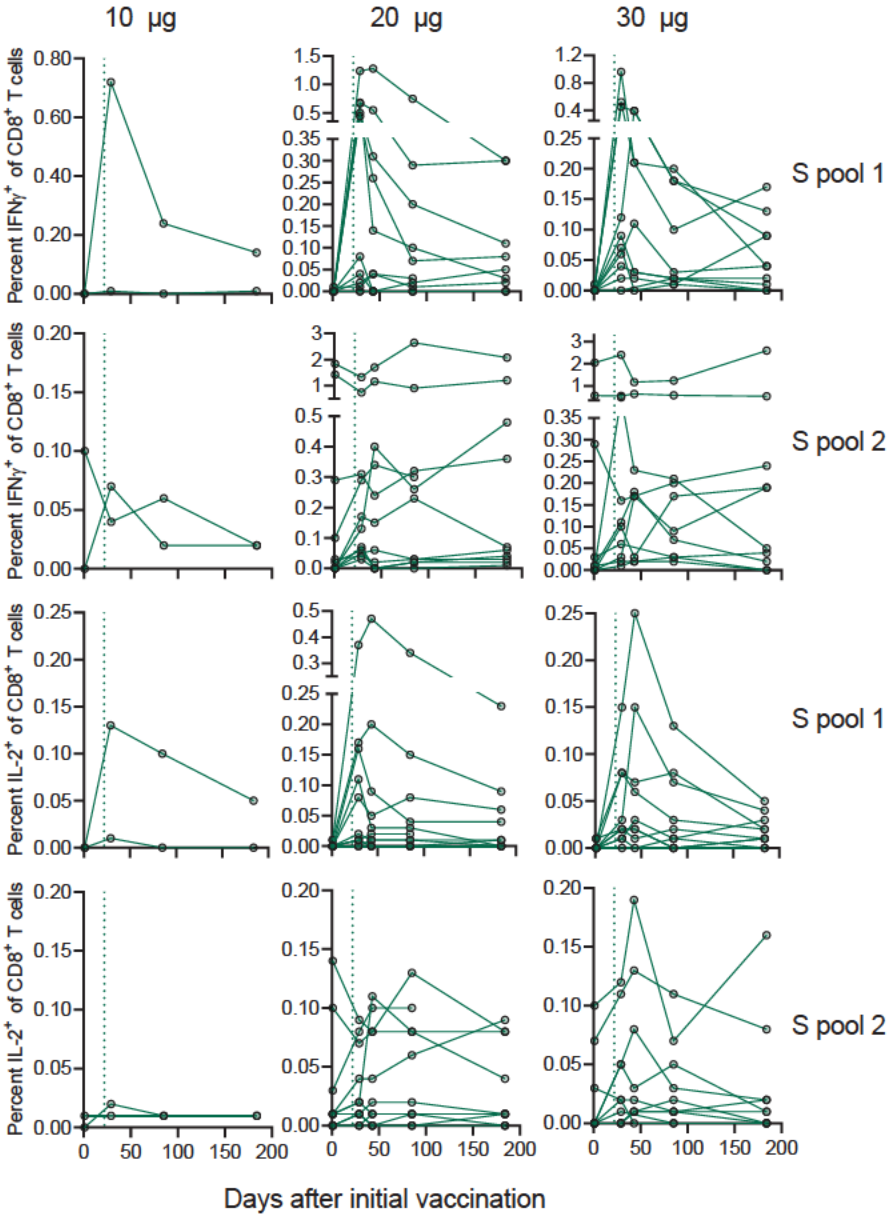

Figure 5.18: Persistence of S-specific CD8+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells (10 to 30 µg cohorts, 18-55 years of age)

Cytokine data are plotted for vaccinated subjects (cohorts: 10 (n=2), 20 (n=11), and 30 µg (n=10)) from Day 1 (pre-prime/initial vaccination), Day 29 (7 days after the boost), Day 43 (3 weeks after the boost), Day 85 (9 weeks after the boost), and/or Day 184 (23 weeks after the boost) after the first vaccination. For the 10 µg adult subjects and 1 subject from the 30 µg adult cohort, Day 43 samples were not available. For 1 subject from the 20 µg adult cohort, Day 184 samples were not available. Green dotted lines indicate the time point of the second vaccination (Day 22).

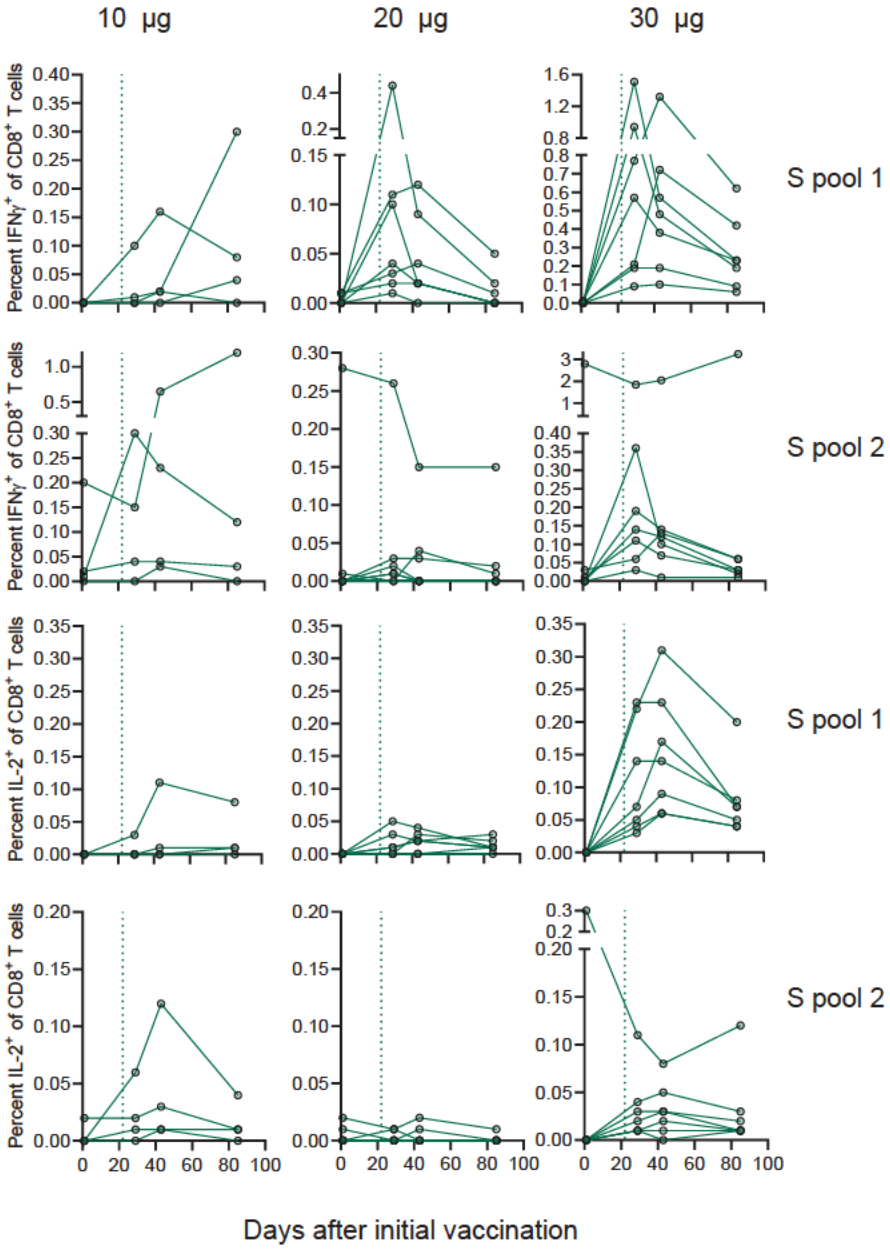

Figure 5.19: Persistence of S-specific CD8+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells (10 to 30 µg cohorts, 56-85 years of age)

Cytokine data are plotted for vaccinated subjects (cohorts: 10 (n=4), 20 (n=7), and 30 µg (n=7), 56 to 85 years of age) from Day 1 (pre-prime/initial vaccination), Day 29 (7 days after the boost), Day 43 (3 weeks after the boost), and Day 85 (9 weeks after the boost) after the first vaccination. Green dotted line indicates the time point of the second vaccination (Day 22).

6 CONCLUSION

Vaccination with different dose levels of BNT162b2 elicited *de novo* SARS-CoV-2 S protein-specific T-cell responses in 77 of the 79 tested study subjects, including but not exclusive to the RBD. Vaccine-induced, S-specific $CD4^+$ T cells secreted IFNγ, or IL-2, or both, and only minor amounts of the Th2 cytokine IL-4 in response to wild-type SARS-CoV-2 S protein peptide pools. The lack of strong IL-4 responses and the detection of fulminant IFNγ and IL-2 production indicates a favorable Th1 profile. Fractions of S-specific $IFN\gamma^+$ $CD8^+$ T cells targeting the N-terminal domain of the S protein reached up to 0.96% of total peripheral blood $CD8^+$ T cells in the 20 and 30 µg adult cohorts and up to 1.57% in the 30 µg older adult cohort at Day 29. For $CD4^+$ as well as for $CD8^+$ T cells, cytokine production in response to peptide pools comprising the entire wild-type SARS-CoV-2 spike protein (pool 1 and 2 combined) vastly exceeded the responses to the RBD peptide pool. This indicates that the T-cell responses elicited by BNT162b2 are directed against multiple epitopes spanning the full length of the S protein including but not limited to the RBD. Moreover, the mean fractions of S-specific $CD4^+$ and $CD8^+$ T cells within total circulating T cells obtained by BNT162b2 vaccination were substantially higher (e.g., the S protein pool 1 IFNγ CD8 response of 30 µg vaccinated subjects was 12.5 fold higher) than that observed in 18 patients who recovered from COVID-19. Moreover, for the clinically targeted 30 µg dose cohort the cytokine responses elicited after vaccination with BNT162b2 in older adults was mostly identical in response pattern and intensity with that of the 18 to 55 years of age cohort.

The analysis of CD4 and CD8 T cell cytokine responses at later time points for up the 6 months after the first immunization reflected the classical dynamics of cellular immune response following an infection or an effective vaccine. After reaching a peak post-boost, the cytokine responses contracted and plateaued at lower, but still clearly detectable frequencies. For the adult age group these responses persisted up to 6 months. A possible impact of a SARS-CoV-2 infection on the persistence of vaccine-induced immune responses cannot be excluded, since the study subjects were not monitored for an infection on a regular basis throughout the course of this the study.

BNT162b2 induced poly-functional and pro-inflammatory $CD4^+$/$CD8^+$ T-cell responses in almost all subjects covering epitopes of the entire SARS-CoV-2 spike protein, with a Th1 polarization of the helper response characterized by the production of IFNγ and IL-2 and only minor amounts of IL-4.

7 DOCUMENT HISTORY

Third version – minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section	Version 02	Version 03	Reason for change
Title page, 2.1, 2.4, and 4.4	BioNTech RNA Pharmaceuticals GmbH	BioNTech SE	BioNTech RNA Pharmaceuticals GmbH was integrated into BioNTech SE on 01 JAN 2021
4.3	BioNTech RNA Pharmaceuticals GmbH	BioNTech Manufacturing GmbH	Parts of BioNTech RNA Pharmaceuticals GmbH were transferred to BioNTech Manufacturing GmbH
4.3, 5, 6, and Appendix	n=74 subjects in total adults: n=46 older adults: n=28	n=79 subjects in total adults: n=50 older adults: n=29	Update of this report with available ICS data for adult and older adult cohorts (Day 1 and Day 29 after first vaccination)
4.3, 5, 6, and Appendix	n/a	For 1 subject, data set was removed (276-01-0300, 10 µg older adult cohort). Data sets were replaced tor 2 subjects (276-01-0299, 10 µg older adult cohort; 276-01-0303, 30 µg older adult cohort)	Monensin was used as Golgi Inhibitor instead of Brefeldin A leading to a reduced viability of the PBMCs after overnight stimulation and a reduced frequency of cytokine-producing T cells. Experiments were repeated for 2 subjects. For subject 276-01-0300 PBMC material was not sufficient to repeat the experiments.
4.3, 5, and 6	n/a	Follow-up data for n=41 subjects in total adults: n=23 older adults: n=18	Update of this report with available ICS data for later time points; Day 43±4 days (3 weeks after the boost), Day 85±7 days (9 weeks after the boost) and Day 184±9 (23 weeks after the boost, adult cohort only) after the first vaccination
4.4	n/a	The FBS supplier was corrected from Biochrom to Sigma	Incorrect documentation of FBS supplier. The change has no impact on the provided data and conclusion.
Appendix	HV-T097 n=7 batches	HV-T097 n=18 batches	Update with additional viability, thawing recovery, and ICS data for the internal assay control sample due to the additional ICS batches measured

Second version – minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section	Version 01	Version 02	Reason for change
4.1	SARS-CoV-2 spike protein pool 1: SARS COV 2_FL-S-PROTEIN_1 to SARS COV 2_FL-S-PROTEIN_106 SARS-CoV-2 spike protein pool 2: SARS COV 2_FL-S-PROTEIN_107 to SARS COV 2_FL-S-PROTEIN_315	SARS-CoV-2 spike protein pool 1: SARS COV 2_FL-S-PROTEIN_1 to SARS COV 2_FL-S-PROTEIN_158 SARS-CoV-2 spike protein pool 2: SARS COV 2_FL-S-PROTEIN_159 to SARS COV 2_FL-S-PROTEIN_315	The wrong pooling information was provided by the peptide supplier JPT. The wrong pooling information had no impact on the conclusions drawn in version 01 of this R&D report.
4.3, 5, 6, and Appendix	n=36 subjects (adults)	n=74 subjects in total adults: n=46 older adults: n=28	Update of this report with available ICS data for adult and older adult cohorts
4.5.3	n/a	BSB and BSB Plus was included in ICS staining procedure	In order to assure optimal staining conditions, reduce staining artifacts, and reduce unspecific background signals BSB and BSB Plus was included into the flow cytometric staining mixes for ICS. This was especially relevant when investigating older study subjects as a more frequent general immune activation was observed presenting itself in higher cytokine background signals.
4.3 and Appendix	n/a	Addition of in-house reference sample data	Request from MHRA
Appendix	n/a	Graphical representation of $CD4^+$ and $CD8^+$ T cell cytokine frequencies as Box-Whisker-Plots	Request from MHRA

8 REFERENCES

BioNTech R&D study report, uID R-20-0235, version 02. Analysis of the Th1/2 cytokine profile of BNT162b1-specific $CD4^+$ and $CD8^+$ T cells from participants in the BNT162-01 trial (interim report for 95 subjects).

9 APPENDIX

Appendix 1: Gating strategy

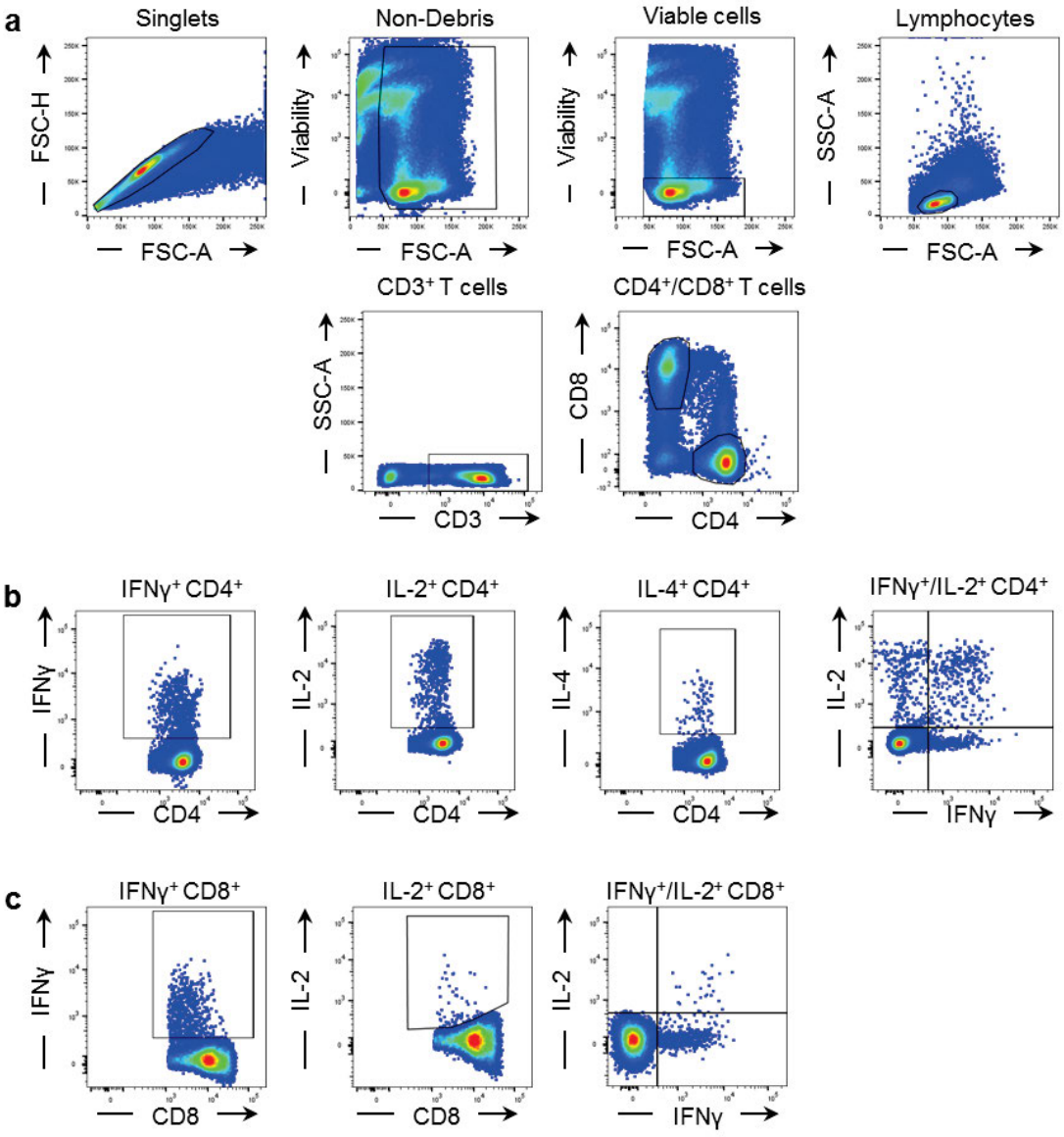

Figure 9.1: Gating strategy for flow cytometry analysis

Flow cytometry gating strategy for identification of IFNγ, IL-2, and IL-4 secreting T cells in study subject PBMC samples. a, $CD4^+$ and $CD8^+$ T cells were gated within single, viable lymphocytes. b, c, Gating of IFNγ, IL-2, and IL-4 in $CD4^+$ T cells (b), and IFNγ and IL-2 in $CD8^+$ T cells (c).

Appendix 2: S-specific CD4 cytokine data plotted as Box-Whisker plots

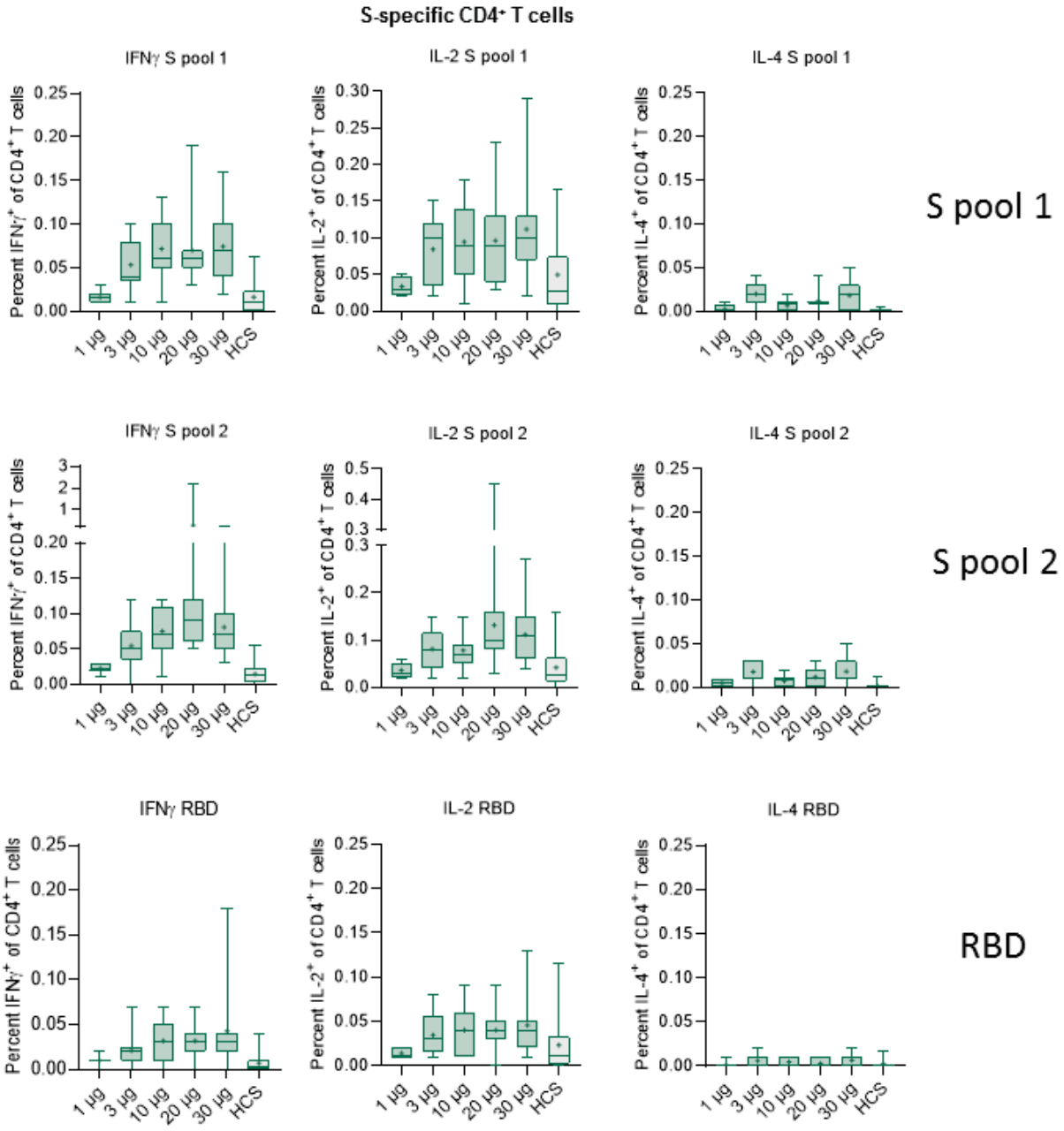

Figure 9.2: S-specific CD4⁺ T cells producing the indicated cytokines (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4⁺ T cells (1 to 30 µg adult cohorts)

Cytokine data are plotted for all vaccinated subjects from Day 29 in response to S pool 1 (upper row), S pool 2 (middle row), and RBD peptide pool (lower row) stimulations. HCS: human convalescent sample (n=18); Box-Whisker plots indicating the minimum and maximum values, lines in the boxes indicate the median values, + indicates the mean values

Appendix 3: S-specific CD8 cytokine data plotted as Box-Whisker plots

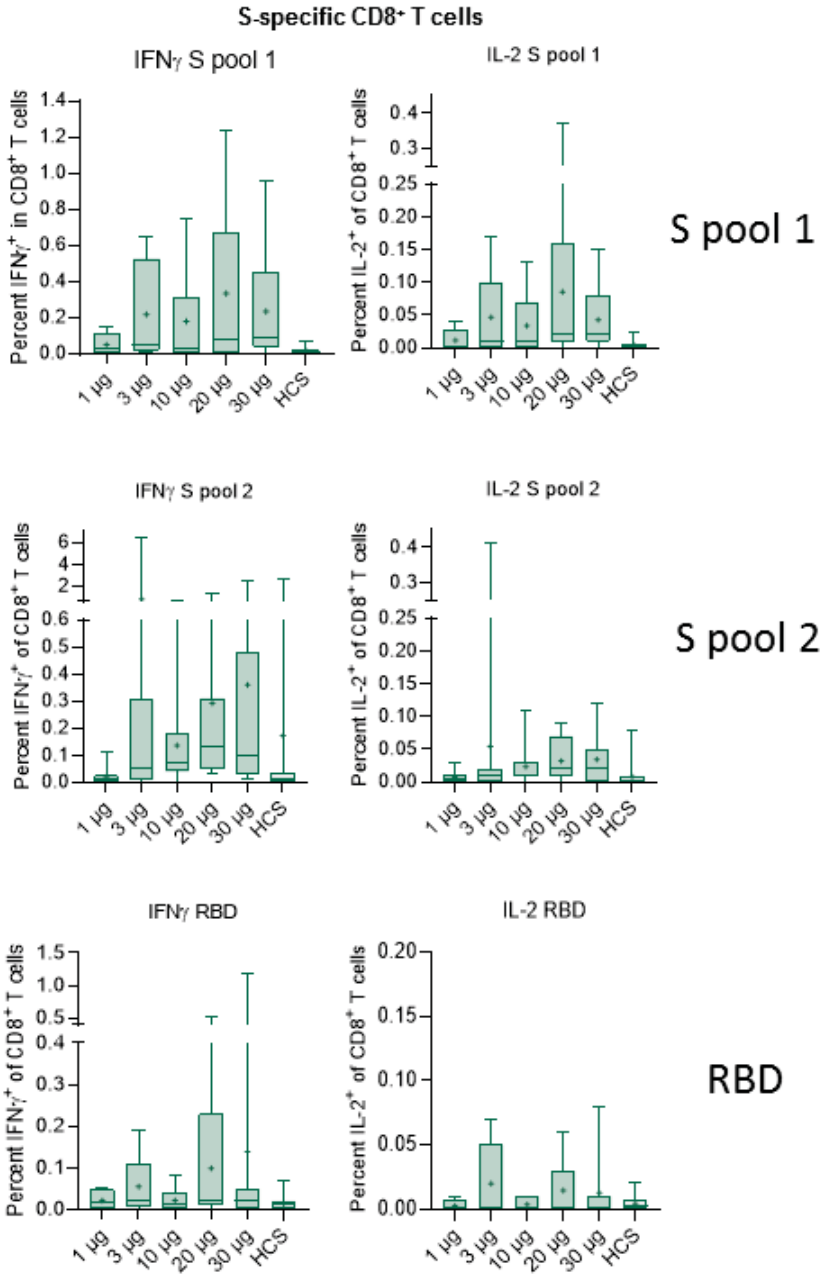

Figure 9.3: S-specific CD8+ T cells producing the indicated cytokines (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells (1 to 30 µg adult cohorts)

Cytokine data are plotted for all vaccinated subjects from Day 29 in response to S pool 1 (upper row), S pool 2 (middle row), and RBD peptide pool (lower row) stimulations. HCS: human convalescent sample (n=18); Box-Whisker plots indicating the minimum and maximum values, lines in the boxes indicate the median values, + indicates the mean values

Appendix 4: Frequency of cytokine-producing CD4+ T cells in response to RBD

Table 9-1: Frequency of cytokine-producing CD4+ T cells in response to RBD

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-02-0153	0.01	0.01	0	0	0	0.01	0	0
	276-02-0154	0.01	0.01	0	0	0.01	0.02	0	0.01
	276-02-0157	0	0.01	0	0.01	0	0.02	0	0
	276-02-0158	0	0	0	0	0	0.01	0	0
	276-02-0164	0	0.01	0	0.01	0	0.02	0	0
	276-02-0166	0	0.01	0	0	0	0.01	0	0
	276-02-0171	0	0.01	0	0	0	0.01	0	0
	276-02-0189	0	0.02	0	0.01	0	0.01	0	0
3 µg	276-02-0185	0	0	0	0	0	0.01	0.01	0
	276-02-0191	0.01	0.01	0	0	0	0.01	0	0
	276-02-0192	0	0.01	0	0	0	0.03	0	0
	276-02-0193	0.01	0.02	0	0.01	0	0.02	0	0
	276-02-0194	0	0.02	0	0.01	0	0.02	0	0
	276-02-0195	0	0.03	0	0.02	0	0.06	0	0.01
	276-02-0197	0	0.01	0	0.01	0	0.03	0	0.01
	276-02-0200	0	0.02	0	0.01	0	0.05	0	0.01
	276-02-0201	0.01	0.07	0	0.04	0	0.08	0.01	0.02
10 µg	276-02-0101	0	0.03	0	0.02	0	0.04	0	0.01
	276-02-0102	0.02	0	0	0.01	0.01	0.02	0	0
	276-02-0103	0	0.07	0	0.03	0	0.08	0	0.01
	276-02-0104	0	0.02	0	0.01	0	0.03	0	0.01
	276-02-0105	0	0.05	0	0.04	0	0.09	0	0.01
	276-02-0110	0.03	0.03	0	0.02	0.01	0.06	0	0.01
	276-02-0111	0	0.01	0	0	0	0.01	0	0
	276-02-0114	0	0.03	0	0.02	0	0.04	0	0
	276-02-0117	0	0.01	0	0	0	0.01	0	0
	276-02-0118	0.01	0.07	0	0.02	0	0.05	0	0
	276-02-0121	0.01	0.03	0	0.01	0	0.01	0	0
20 µg	276-02-0156	0	0.02	0	0.01	0	0.04	0	0
	276-02-0168	0.01	0.01	0	0.01	0.01	0	0	0
	276-02-0172	0	0	0	0.01	0	0.01	0	0
	276-02-0173	0	0.04	0	0.02	0	0.03	0	0.01
	276-02-0174	0	0.04	0	0.03	0.01	0.05	0	0
	276-02-0175	0.01	0.02	0	0.01	0	0.03	0	0
	276-02-0177	0.01	0.03	0	0.02	0.01	0.04	0	0
	276-02-0178	0	0.03	0	0.02	0	0.03	0	0
	276-02-0179	0.01	0.02	0	0.01	0.01	0.04	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0180	0	0.07	0	0.04	0	0.08	0	0.01
	276-02-0183	0	0.07	0	0.04	0	0.09	0	0.01
30 µg	276-02-0127	0	0.04	0	0.01	0	0.05	0	0.01
	276-02-0128	0	0.04	0	0.02	0	0.04	0	0.02
	276-02-0134	0.01	0.02	0	0.01	0.01	0.04	0	0
	276-02-0137	0.02	0.03	0	0.01	0	0.02	0	0
	276-02-0142	0.02	0.06	0	0.05	0	0.13	0	0.01
	276-02-0143	0	0	0	0.01	0	0.01	0	0
	276-02-0144	0	0.04	0	0.03	0	0.05	0	0.01
	276-02-0145	0	0.01	0	0.01	0.01	0.03	0	0
	276-02-0149	0.02	0.18	0	0.03	0	0.08	0	0.01
	276-02-0150	0	0.02	0	0	0	0.01	0	0
	276-02-0155	0	0.03	0	0.03	0	0.04	0	0.01
10 µg older adult	276-01-0261	0	0	0	0	0	0.02	0	0
	276-01-0263	0	0.05	0	0.04	0	0.09	0	0.01
	276-01-0265	0	0.01	0	0.01	0	0.02	0	0
	276-01-0267	0	0.01	0	0	0	0.01	0	0
	276-01-0268	0	0.03	0	0.02	0	0.03	0	0.01
	276-01-0269	0	0.09	0	0.05	0	0.08	0	0.02
	276-01-0275	0	0.04	0	0.02	0	0.03	0	0.01
	276-01-0276	0	0.09	0	0.04	0	0.09	0	0.04
	276-01-0277	0	0	0	0	0	0	0	0
	276-01-0279	0	0.01	0	0	0	0.01	0	0
	276-01-0299	0.01	0.01	0	0.01	0	0.02	0	0
20 µg older adult	276-02-0215	0	0.03	0	0.02	0	0.07	0	0.01
	276-02-0216	0	0.01	0	0.01	0	0.02	0.01	0
	276-02-0221	0	0.02	0	0.01	0	0.02	0	0.01
	276-02-0222	0.01	0	0	0	0	0.01	0	0
	276-02-0223	0.02	0.06	0	0.05	0	0.08	0	0.05
	276-02-0224	0	0.02	0	0.01	0	0.02	0	0.01
	276-02-0226	0	0.01	0	0.01	0	0.01	0	0.01
	276-02-0229	0	0	0	0	0	0	0	0.01
	276-02-0233	0.01	0.01	0	0.01	0.01	0.02	0	0
30 µg older adult	276-01-0272	0	0.05	0	0.03	0	0.1	0	0.01
	276-01-0303	0	0.05	0	0.01	0	0.02	0	0.01
	276-01-0306	0	0.03	0	0.02	0	0.04	0	0
	276-01-0308	0	0.05	0	0.04	0.01	0.07	0	0.01
	276-01-0314	0.01	0.01	0	0	0	0.02	0.01	0
	276-01-0316	0	0.08	0	0.05	0	0.08	0	0
	276-01-0319	0	0.03	0	0.02	0.01	0.03	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0323	0	0.01	0	0.01	0	0.02	0	0
	276-01-0324	0	0.05	0	0.03	0	0.06	0.01	0

Appendix 5: Frequency of cytokine-producing CD8+ T cells in response to RBD

Table 9-2: Frequency of cytokine-producing CD8+ T cells in response to RBD

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	0.01	0.05	0	0.01	0	0.01
	276-02-0154	0	0	0	0	0	0
	276-02-0157	0.02	0	0	0	0	0
	276-02-0158	0	0	0	0	0	0
	276-02-0164	0.01	0.02	0	0	0	0
	276-02-0166	0.01	0.05	0	0.01	0	0.01
	276-02-0171	0.03	0.01	0	0	0	0
	276-02-0189	0	0.04	0	0	0	0
3 µg	276-02-0185	0.02	0.03	0	0	0.01	0
	276-02-0191	0	0.02	0	0	0	0
	276-02-0192	0	0.11	0	0.01	0	0.03
	276-02-0193	0	0.02	0	0	0	0
	276-02-0194	0	0	0	0	0	0
	276-02-0195	0	0.19	0	0.05	0	0.07
	276-02-0197	0	0.11	0	0.03	0	0.07
	276-02-0200	0	0	0	0	0	0.01
	276-02-0201	0	0.01	0	0	0	0
10 µg	276-02-0101	0	0	0	0	0	0
	276-02-0102	0	0	0	0	0	0.01
	276-02-0103	0	0.06	0	0	0	0.01
	276-02-0104	0	0.04	0	0.01	0	0.01
	276-02-0105	0.01	0.04	0	0.01	0	0
	276-02-0110	0.02	0.01	0	0	0	0
	276-02-0111	0	0.01	0	0	0	0
	276-02-0114	0	0	0	0	0	0
	276-02-0117	0	0	0	0	0	0
	276-02-0118	0	0.08	0	0	0	0.01
	276-02-0121	0	0	0	0	0	0
20 µg	276-02-0156	0	0.03	0	0	0	0
	276-02-0168	0	0	0	0	0	0
	276-02-0172	0.01	0.01	0	0	0	0.01
	276-02-0173	0	0.02	0	0	0	0
	276-02-0174	0	0	0	0	0	0
	276-02-0175	0	0.01	0	0	0	0
	276-02-0177	0	0.23	0	0.02	0	0.03
	276-02-0178	0	0.01	0	0	0	0

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	0	0.52	0	0.02	0	0.06
	276-02-0180	0	0.24	0	0.03	0	0.05
	276-02-0183	0	0.02	0	0	0	0.01
30 µg	276-02-0127	0	0.03	0	0	0	0
	276-02-0128	0	0	0	0	0	0.01
	276-02-0134	0.01	0.05	0	0	0	0
	276-02-0137	0.02	0.01	0	0	0	0
	276-02-0142	0	1.19	0	0.03	0	0.08
	276-02-0143	0	0.02	0	0	0.01	0
	276-02-0144	0	0	0	0	0.01	0.01
	276-02-0145	0	0	0	0	0	0
	276-02-0149	0	0.04	0	0.01	0.01	0.01
	276-02-0150	0	0	0	0	0	0.01
	276-02-0155	0	0.18	0	0.01	0	0.02
10 µg older adult	276-01-0261	0	0	0	0	0	0
	276-01-0263	0.01	0.01	0	0	0	0
	276-01-0265	0	0	0	0	0	0
	276-01-0267	0.01	0	0	0	0	0
	276-01-0268	0	0.17	0	0.01	0.01	0.01
	276-01-0269	0	0.01	0	0	0	0
	276-01-0275	0	0	0	0	0	0
	276-01-0276	0	0	0	0	0	0.01
	276-01-0277	0	0	0	0	0	0
	276-01-0279	0	0	0	0	0	0
	276-01-0299	0	0	0	0	0	0
20 µg older adult	276-02-0215	0.01	0	0	0	0	0
	276-02-0216	0	0	0	0	0	0
	276-02-0221	0	0	0	0	0	0
	276-02-0222	0	0	0	0	0.01	0
	276-02-0223	0	0.01	0	0	0	0
	276-02-0224	0	0.17	0	0.01	0	0
	276-02-0226	0.03	0.38	0	0.02	0	0.05
	276-02-0229	0	0.01	0	0	0	0
	276-02-0233	0	0.06	0	0.01	0	0
30 µg older adult	276-01-0272	0.02	0	0	0	0	0
	276-01-0303	0.02	1.02	0	0.02	0	0.02
	276-01-0306	0	0.01	0	0	0	0
	276-01-0308	0	0.24	0	0.01	0.01	0.03
	276-01-0314	0.01	0	0	0	0	0.01
	276-01-0316	0.04	0.28	0	0.06	0	0.08

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	0	0.04	0	0	0	0.01
	276-01-0323	0	0.32	0	0.02	0	0.06
	276-01-0324	0	0.01	0	0	0	0

Appendix 6: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1

Table 9-3: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-02-0153	0.01	0.02	0	0.02	0.01	0.04	0	0
	276-02-0154	0	0.01	0	0.01	0	0.02	0	0
	276-02-0157	0.01	0.02	0	0.01	0	0.05	0	0
	276-02-0158	0.01	0.01	0	0.01	0	0.03	0	0
	276-02-0164	0	0.02	0	0.01	0.01	0.05	0	0.01
	276-02-0166	0	0.03	0	0.01	0	0.03	0	0
	276-02-0171	0	0.01	0	0.01	0	0.02	0	0
	276-02-0189	0.01	0.01	0	0.01	0.01	0.03	0	0.01
3 µg	276-02-0185	0	0.01	0	0.01	0	0.02	0	0
	276-02-0191	0	0.03	0	0.02	0	0.03	0	0.01
	276-02-0192	0	0.06	0	0.03	0	0.11	0	0.02
	276-02-0193	0.01	0.04	0	0.03	0	0.1	0	0.02
	276-02-0194	0.01	0.04	0	0.02	0	0.04	0	0.01
	276-02-0195	0	0.09	0	0.07	0	0.13	0	0.03
	276-02-0197	0	0.04	0	0.03	0	0.07	0	0.02
	276-02-0200	0	0.07	0	0.05	0	0.11	0	0.03
	276-02-0201	0	0.1	0	0.07	0.01	0.15	0	0.04
10 µg	276-02-0101	0	0.06	0	0.04	0	0.08	0	0.01
	276-02-0102	0	0.06	0	0.02	0	0.06	0	0
	276-02-0103	0	0.1	0	0.08	0.01	0.18	0	0.01
	276-02-0104	0	0.05	0	0.03	0	0.09	0	0.01
	276-02-0105	0	0.11	0	0.09	0	0.18	0	0.02
	276-02-0110	0.01	0.09	0	0.05	0.01	0.14	0	0.01
	276-02-0111	0	0.04	0	0.02	0	0.05	0	0
	276-02-0114	0	0.08	0	0.04	0	0.1	0	0
	276-02-0117	0	0.01	0	0	0	0.01	0	0
	276-02-0118	0	0.13	0	0.05	0.01	0.1	0	0.01
	276-02-0121	0	0.06	0	0.03	0	0.05	0	0
20 µg	276-02-0156	0	0.05	0	0.04	0	0.11	0	0.01
	276-02-0168	0	0.04	0	0.02	0	0.04	0	0
	276-02-0172	0	0.03	0	0.02	0	0.03	0	0.01
	276-02-0173	0	0.05	0	0.01	0.01	0.03	0	0.01
	276-02-0174	0	0.06	0	0.05	0.01	0.1	0	0.02
	276-02-0175	0.01	0.05	0	0.03	0.01	0.07	0	0.01
	276-02-0177	0	0.06	0	0.04	0	0.09	0	0.01
	276-02-0178	0	0.07	0	0.06	0	0.09	0	0.01
	276-02-0179	0	0.06	0	0.04	0	0.13	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0180	0	0.11	0	0.08	0	0.14	0	0.01
	276-02-0183	0.01	0.19	0	0.13	0	0.23	0	0.04
30 µg	276-02-0127	0	0.14	0	0.07	0	0.15	0	0.04
	276-02-0128	0	0.1	0.01	0.06	0.01	0.13	0	0.05
	276-02-0134	0.01	0.04	0	0.02	0.01	0.08	0	0.01
	276-02-0137	0.02	0.04	0	0.02	0.01	0.07	0	0
	276-02-0142	0	0.16	0	0.1	0	0.29	0	0.02
	276-02-0143	0.01	0.02	0	0.02	0	0.05	0	0
	276-02-0144	0	0.07	0	0.05	0	0.13	0	0.02
	276-02-0145	0	0.04	0	0.03	0	0.08	0	0.01
	276-02-0149	0	0.1	0	0.06	0	0.13	0	0.02
	276-02-0150	0.01	0.03	0	0.01	0	0.02	0	0
	276-02-0155	0.01	0.08	0	0.04	0	0.1	0	0.03
10 µg older adult	276-01-0261	0	0	0	0.01	0	0.02	0	0
	276-01-0263	0	0.07	0	0.05	0	0.15	0	0.02
	276-01-0265	0.01	0.05	0	0.03	0	0.07	0	0.01
	276-01-0267	0.01	0.01	0	0.01	0.01	0.02	0	0
	276-01-0268	0.03	0.08	0.01	0.05	0.01	0.13	0.01	0.02
	276-01-0269	0	0.18	0	0.1	0	0.16	0	0.03
	276-01-0275	0	0.05	0	0.03	0	0.06	0	0.01
	276-01-0276	0	0.25	0	0.14	0	0.26	0	0.08
	276-01-0277	0	0	0	0.01	0	0.02	0	0.01
	276-01-0279	0	0.01	0	0.01	0.01	0.02	0	0
	276-01-0299	0	0.03	0	0.02	0	0.06	0	0
20 µg older adult	276-02-0215	0	0.13	0	0.09	0	0.19	0	0.07
	276-02-0216	0	0.07	0	0.04	0	0.08	0.01	0.02
	276-02-0221	0	0.03	0	0.02	0	0.05	0	0.01
	276-02-0222	0	0.01	0	0.01	0	0.03	0	0
	276-02-0223	0.01	0.12	0	0.07	0	0.13	0	0.05
	276-02-0224	0	0.05	0	0.03	0	0.05	0	0.01
	276-02-0226	0	0.04	0	0.03	0	0.07	0	0.01
	276-02-0229	0	0	0	0	0	0.01	0	0
	276-02-0233	0	0.03	0	0.02	0.01	0.04	0	0
30 µg older adult	276-01-0272	0	0.18	0	0.1	0	0.24	0	0.03
	276-01-0303	0	0.05	0	0.02	0	0.07	0	0.01
	276-01-0306	0	0.06	0	0.03	0	0.1	0	0.02
	276-01-0308	0	0.15	0	0.1	0.01	0.21	0	0.05
	276-01-0314	0	0.04	0	0.02	0	0.06	0	0
	276-01-0316	0	0.19	0	0.14	0	0.23	0.01	0
	276-01-0319	0.01	0.07	0	0.04	0.02	0.08	0	0.01

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0323	0	0.06	0	0.04	0	0.08	0	0.01
	276-01-0324	0	0.08	0	0.04	0	0.09	0	0.01

Appendix 7: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1

Table 9-4: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	0.02	0.03	0	0	0	0
	276-02-0154	0	0.01	0	0	0	0
	276-02-0157	0.01	0.06	0	0.01	0.01	0.02
	276-02-0158	0	0	0	0	0	0
	276-02-0164	0.01	0.13	0	0.03	0	0.04
	276-02-0166	0	0.15	0	0.02	0	0.03
	276-02-0171	0.02	0	0	0	0	0
	276-02-0189	0	0.02	0	0	0	0
3 µg	276-02-0185	0.01	0.05	0	0	0.01	0.01
	276-02-0191	0	0.02	0	0	0	0
	276-02-0192	0	0.65	0	0.04	0	0.07
	276-02-0193	0	0.12	0	0.01	0	0.03
	276-02-0194	0	0.02	0	0	0	0
	276-02-0195	0	0.54	0	0.1	0	0.13
	276-02-0197	0.02	0.51	0	0.13	0	0.17
	276-02-0200	0.02	0.01	0	0	0	0
	276-02-0201	0	0.05	0	0.01	0	0.01
10 µg	276-02-0101	0	0	0	0	0	0
	276-02-0102	0	0.02	0	0.01	0	0.02
	276-02-0103	0	0.31	0	0.03	0.01	0.07
	276-02-0104	0.01	0.75	0	0.06	0	0.12
	276-02-0105	0	0.72	0	0.08	0	0.13
	276-02-0110	0	0.03	0	0	0	0
	276-02-0111	0	0.04	0	0	0	0.01
	276-02-0114	0	0.02	0	0.01	0	0.01
	276-02-0117	0	0	0	0	0	0
	276-02-0118	0	0.08	0	0	0	0
	276-02-0121	0	0.01	0	0	0	0.01
20 µg	276-02-0156	0	0.08	0	0	0	0.01
	276-02-0168	0	0	0	0	0	0
	276-02-0172	0	0	0	0	0	0.01
	276-02-0173	0.01	0.01	0	0	0	0
	276-02-0174	0	0.04	0	0.01	0	0.02
	276-02-0175	0	0.44	0	0.13	0	0.16
	276-02-0177	0	0.5	0	0.05	0	0.08
	276-02-0178	0	1.24	0	0.28	0.01	0.37

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	0	0.67	0	0.05	0	0.11
	276-02-0180	0	0.68	0	0.11	0.01	0.17
	276-02-0183	0	0.02	0	0.01	0	0.01
30 µg	276-02-0127	0	0.02	0	0	0	0.01
	276-02-0128	0	0.04	0	0.01	0.01	0.02
	276-02-0134	0	0.06	0	0	0	0.01
	276-02-0137	0	0.07	0	0.01	0	0.02
	276-02-0142	0	0.96	0	0.03	0	0.08
	276-02-0143	0	0.12	0	0.02	0	0.03
	276-02-0144	0.01	0.45	0	0.09	0	0.15
	276-02-0145	0	0.09	0	0	0	0.02
	276-02-0149	0.01	0.52	0	0.03	0.01	0.08
	276-02-0150	0	0	0	0	0	0
	276-02-0155	0	0.26	0	0.03	0	0.05
10 µg older adult	276-01-0261	0	0.01	0	0	0	0
	276-01-0263	0.01	0.53	0	0.08	0	0.11
	276-01-0265	0	0.1	0	0.02	0	0.03
	276-01-0267	0	0.01	0	0	0	0
	276-01-0268	0.01	0.26	0	0.01	0	0.02
	276-01-0269	0	0	0	0	0	0
	276-01-0275	0.02	0.09	0	0.02	0	0.03
	276-01-0276	0.01	0.01	0	0	0	0
	276-01-0277	0	0	0	0	0	0
	276-01-0279	0	0	0	0	0	0
	276-01-0299	0	0	0	0	0	0
20 µg older adult	276-02-0215	0	0.1	0	0.03	0	0.05
	276-02-0216	0	0	0	0	0	0
	276-02-0221	0	0.04	0	0	0	0.01
	276-02-0222	0.01	0.02	0	0	0	0
	276-02-0223	0.01	0.03	0	0	0	0.01
	276-02-0224	0	0.44	0	0.02	0	0.03
	276-02-0226	0.01	0.62	0	0.04	0	0.1
	276-02-0229	0	0.01	0	0	0	0
	276-02-0233	0.01	0.11	0	0	0	0
30 µg older adult	276-01-0272	0.01	0.77	0	0.02	0	0.07
	276-01-0303	0.01	1.57	0	0.01	0	0.03
	276-01-0306	0	1.51	0	0.1	0	0.23
	276-01-0308	0	0.21	0	0.02	0	0.03
	276-01-0314	0	0.09	0	0.02	0	0.05
	276-01-0316	0.01	0.57	0	0.14	0	0.22

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	0	0.19	0	0.03	0	0.04
	276-01-0323	0	0.94	0	0.09	0	0.14
	276-01-0324	0	0.2	0	0.03	0	0.04

Appendix 8: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 2

Table 9-5: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 2

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-02-0153	0.01	0.02	0	0.01	0	0.03	0	0.01
	276-02-0154	0.01	0.03	0.01	0.02	0.01	0.03	0	0.01
	276-02-0157	0.02	0.02	0.01	0.01	0.01	0.05	0	0
	276-02-0158	0	0.02	0	0	0.01	0.02	0	0
	276-02-0164	0.01	0.03	0	0.02	0	0.06	0	0.01
	276-02-0166	0	0.03	0	0.02	0.01	0.05	0	0
	276-02-0171	0	0.01	0	0.01	0.01	0.02	0	0
	276-02-0189	0	0.02	0	0.01	0	0.03	0	0.01
3 µg	276-02-0185	0.01	0	0	0	0	0.02	0	0
	276-02-0191	0	0.02	0	0.02	0	0.04	0	0.01
	276-02-0192	0	0.05	0	0.03	0	0.09	0	0.01
	276-02-0193	0.03	0.05	0.01	0.03	0.01	0.08	0	0.01
	276-02-0194	0.01	0.05	0	0.03	0	0.04	0	0.01
	276-02-0195	0.01	0.09	0	0.06	0	0.15	0	0.03
	276-02-0197	0	0.05	0	0.03	0.01	0.08	0	0.03
	276-02-0200	0	0.06	0	0.04	0	0.1	0	0.03
	276-02-0201	0.01	0.12	0.01	0.07	0.01	0.13	0	0.03
10 µg	276-02-0101	0	0.06	0	0.04	0	0.09	0	0.02
	276-02-0102	0.03	0.12	0	0.01	0	0.04	0	0
	276-02-0103	0.02	0.11	0.01	0.08	0.01	0.15	0	0.01
	276-02-0104	0	0.06	0	0.04	0	0.09	0	0.01
	276-02-0105	0	0.11	0.01	0.09	0.01	0.15	0	0.02
	276-02-0110	0.01	0.07	0	0.04	0.01	0.08	0	0.01
	276-02-0111	0	0.03	0	0.02	0	0.05	0	0
	276-02-0114	0	0.05	0.01	0.02	0.01	0.05	0	0
	276-02-0117	0	0.01	0	0.01	0.01	0.02	0	0
	276-02-0118	0.01	0.11	0	0.04	0.01	0.07	0	0.01
	276-02-0121	0	0.1	0	0.05	0	0.07	0	0
20 µg	276-02-0156	0	0.05	0	0.03	0	0.09	0	0.01
	276-02-0168	0.01	0.07	0	0.04	0	0.06	0	0.01
	276-02-0172	0.01	0.06	0	0.02	0.01	0.03	0	0
	276-02-0173	0	0.12	0	0.06	0	0.1	0	0.02
	276-02-0174	2.67	2.22	0.24	0.38	0.26	0.45	0.05	0.03
	276-02-0175	0.02	0.05	0.01	0.03	0.01	0.08	0	0.01
	276-02-0177	0	0.11	0	0.07	0.01	0.13	0	0.01
	276-02-0178	0.01	0.09	0	0.06	0	0.09	0.01	0.01
	276-02-0179	0.02	0.09	0.01	0.07	0.01	0.16	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0180	0	0.08	0	0.05	0	0.1	0	0
	276-02-0183	0.01	0.14	0	0.08	0	0.16	0	0.03
30 µg	276-02-0127	0	0.09	0	0.07	0.01	0.15	0	0.04
	276-02-0128	0	0.07	0	0.04	0	0.11	0	0.03
	276-02-0134	0	0.03	0	0.02	0	0.04	0	0.01
	276-02-0137	0.02	0.05	0	0.03	0.01	0.07	0	0.01
	276-02-0142	0	0.22	0	0.16	0	0.27	0	0.01
	276-02-0143	0.01	0.03	0	0.02	0	0.05	0	0
	276-02-0144	0	0.09	0	0.07	0	0.15	0	0.02
	276-02-0145	0.01	0.05	0	0.03	0.02	0.09	0	0.01
	276-02-0149	0	0.1	0	0.07	0	0.13	0	0.01
	276-02-0150	0.02	0.05	0	0.02	0	0.06	0	0.01
	276-02-0155	0.01	0.11	0.01	0.07	0.01	0.11	0.01	0.05
10 µg older adult	276-01-0261	0	0.02	0	0.02	0	0.05	0	0.01
	276-01-0263	0	0.06	0	0.05	0	0.11	0	0.02
	276-01-0265	0	0.09	0	0.05	0	0.11	0	0.01
	276-01-0267	0	0.02	0	0.01	0	0.03	0	0
	276-01-0268	0.01	0.06	0.01	0.03	0.01	0.08	0	0.02
	276-01-0269	0	0.16	0	0.09	0.01	0.14	0	0.03
	276-01-0275	0.01	0.04	0	0.02	0	0.05	0	0.01
	276-01-0276	0.01	0.16	0	0.09	0	0.2	0	0.06
	276-01-0277	0	0.03	0	0.01	0	0.04	0	0.01
	276-01-0279	0	0.03	0	0.01	0	0.03	0	0.01
	276-01-0299	0	0.05	0	0.03	0.01	0.09	0	0.01
20 µg older adult	276-02-0215	0.01	0.14	0	0.1	0	0.22	0	0.07
	276-02-0216	0	0.08	0	0.04	0	0.09	0	0.02
	276-02-0221	0	0.03	0	0.02	0	0.05	0	0.02
	276-02-0222	0	0.01	0	0.01	0	0.02	0	0
	276-02-0223	0.01	0.21	0	0.13	0	0.19	0	0.05
	276-02-0224	0	0.05	0	0.03	0	0.05	0	0.01
	276-02-0226	0	0.06	0	0.02	0.01	0.05	0	0.01
	276-02-0229	0.01	0.03	0	0.01	0	0.02	0	0
	276-02-0233	0.01	0.03	0	0.02	0.01	0.03	0	0
30 µg older adult	276-01-0272	0	0.13	0	0.08	0	0.17	0	0.01
	276-01-0303	0	0.06	0	0.01	0.01	0.06	0	0.01
	276-01-0306	0	0.14	0	0.1	0	0.21	0	0.03
	276-01-0308	0.02	0.18	0.01	0.09	0.01	0.16	0	0.06
	276-01-0314	0	0.04	0	0.02	0	0.07	0	0
	276-01-0316	0	0.32	0	0.22	0	0.33	0	0.01
	276-01-0319	0.01	0.03	0	0.02	0.01	0.05	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0323	0	0.06	0	0.04	0.01	0.1	0	0.01
	276-01-0324	0	0.08	0	0.05	0	0.11	0	0.01

Appendix 9: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 2

Table 9-6: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 2

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	0	0.03	0	0.01	0	0.01
	276-02-0154	0	0	0	0	0	0
	276-02-0157	0.01	0.01	0	0	0	0
	276-02-0158	0	0	0	0	0	0
	276-02-0164	0.01	0.11	0	0.02	0	0.03
	276-02-0166	0.01	0.01	0	0	0.01	0.01
	276-02-0171	0.04	0	0	0	0.01	0
	276-02-0189	0	0.01	0	0.01	0	0.01
3 µg	276-02-0185	0.01	0	0	0	0	0
	276-02-0191	0	0	0	0	0	0
	276-02-0192	0.01	0.06	0	0.01	0	0.02
	276-02-0193	0	0.03	0	0	0	0
	276-02-0194	0.34	0.31	0.02	0.01	0.02	0.02
	276-02-0195	5.59	6.53	0.27	0.36	0.33	0.41
	276-02-0197	0	0.02	0	0	0	0.01
	276-02-0200	0.01	0.05	0	0	0	0.01
	276-02-0201	0.33	0.3	0.01	0.01	0.02	0.02
10 µg	276-02-0101	0.01	0.05	0	0.01	0	0.01
	276-02-0102	0.04	0.15	0	0	0	0.01
	276-02-0103	0	0	0	0	0	0.01
	276-02-0104	0	0.18	0	0.03	0	0.04
	276-02-0105	0.1	0.04	0.01	0.01	0.01	0.01
	276-02-0110	0.07	0.68	0.01	0.08	0.01	0.11
	276-02-0111	0.04	0.06	0	0	0	0
	276-02-0114	0.11	0.19	0.01	0.02	0.02	0.02
	276-02-0117	0	0	0	0	0	0
	276-02-0118	0	0.08	0	0.01	0	0.03
	276-02-0121	0	0.07	0	0.01	0	0.02
20 µg	276-02-0156	0	0.07	0	0	0	0
	276-02-0168	0.29	0.31	0.01	0.03	0.01	0.04
	276-02-0172	0.02	0.06	0	0	0.01	0.01
	276-02-0173	0.03	0.04	0	0	0	0
	276-02-0174	1.83	1.32	0.08	0.03	0.1	0.07
	276-02-0175	0	0.05	0	0.01	0	0.01
	276-02-0177	1.42	0.74	0.11	0.07	0.14	0.09
	276-02-0178	0	0.13	0	0.01	0.01	0.02

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	0	0.03	0	0.01	0	0.01
	276-02-0180	0	0.17	0	0.01	0.01	0.02
	276-02-0183	0.1	0.29	0.02	0.05	0.03	0.08
30 µg	276-02-0127	0	0.1	0.01	0.01	0	0.02
	276-02-0128	0.56	0.55	0.06	0.08	0.07	0.11
	276-02-0134	0.01	0.02	0	0	0	0
	276-02-0137	0.29	0.16	0.01	0.01	0.03	0.02
	276-02-0142	2.05	2.4	0.08	0.08	0.1	0.12
	276-02-0143	0	0.03	0	0	0	0
	276-02-0144	0.01	0.11	0	0.03	0	0.05
	276-02-0145	0	0.01	0	0	0	0
	276-02-0149	0.01	0.48	0	0.02	0	0.05
	276-02-0150	0.03	0.06	0	0	0	0.01
	276-02-0155	0.02	0.04	0	0	0	0
10 µg older adult	276-01-0261	0.02	0.04	0	0	0	0
	276-01-0263	0.01	0.06	0	0	0	0
	276-01-0265	0	0	0	0	0	0.01
	276-01-0267	0.01	0.01	0	0	0	0
	276-01-0268	0.33	0.33	0.02	0.02	0.03	0.03
	276-01-0269	0.01	0.3	0	0.03	0	0.06
	276-01-0275	0	0.01	0	0	0	0.01
	276-01-0276	0.02	0.12	0	0.03	0	0.04
	276-01-0277	0	0.02	0	0	0	0
	276-01-0279	0.2	0.15	0.02	0.01	0.02	0.02
	276-01-0299	0.01	0.06	0	0	0	0
20 µg older adult	276-02-0215	0	0.01	0	0	0	0
	276-02-0216	0	0.03	0	0.01	0	0.01
	276-02-0221	0	0	0	0	0	0
	276-02-0222	0	0.03	0	0.01	0	0.01
	276-02-0223	0	0.01	0	0	0	0
	276-02-0224	0.28	0.26	0.02	0.01	0.02	0.01
	276-02-0226	0	0.03	0	0	0	0
	276-02-0229	0	0.02	0	0	0	0
	276-02-0233	0.01	0	0	0	0.01	0
30 µg older adult	276-01-0272	0.03	0.06	0	0	0	0.01
	276-01-0303	0.02	0.01	0	0	0.01	0
	276-01-0306	0	0.14	0	0.01	0	0.01
	276-01-0308	2.79	1.84	0.19	0.1	0.3	0.11
	276-01-0314	0	0.03	0	0	0	0.01
	276-01-0316	0.01	0.11	0	0.02	0	0.03

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	0	0.19	0	0.03	0	0.04
	276-01-0323	0	0.36	0	0.02	0	0.02
	276-01-0324	0	0.01	0	0	0	0

Appendix 10: Frequency of cytokine-producing CD4+ T cells in response to S protein pool 1+2

Table 9-7: Frequency of cytokine-producing $CD4^+$ T cells in response to S protein pool 1+2

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	0.02	0.03	0	0.02	0.01	0.05	0	0.01
	276-02-0154	0.01	0.03	0	0.02	0.01	0.03	0	0.01
	276-02-0157	0.02	0.04	0	0.02	0	0.07	0	0
	276-02-0158	0.01	0.02	0	0	0	0.03	0	0
	276-02-0164	0	0.04	0	0.02	0	0.07	0	0.01
	276-02-0166	0	0.04	0	0.02	0	0.05	0	0.01
	276-02-0171	0.01	0.01	0	0.01	0	0.03	0	0
	276-02-0189	0.01	0.04	0	0.01	0.01	0.04	0	0.01
3 µg	276-02-0185	0	0.01	0	0.01	0	0.04	0	0
	276-02-0191	0	0.05	0	0.03	0	0.05	0	0.01
	276-02-0192	0.01	0.1	0.01	0.05	0.01	0.15	0	0.02
	276-02-0193	0.02	0.07	0.01	0.05	0.01	0.14	0	0.02
	276-02-0194	0	0.06	0	0.03	0	0.06	0	0.02
	276-02-0195	0.01	0.12	0	0.09	0	0.19	0	0.03
	276-02-0197	0	0.08	0	0.05	0	0.13	0	0.05
	276-02-0200	0	0.12	0	0.08	0	0.18	0	0.05
	276-02-0201	0.02	0.18	0	0.13	0	0.21	0	0.05
10 µg	276-02-0101	0	0.09	0	0.07	0	0.13	0	0.03
	276-02-0102	0.02	0.07	0	0.03	0	0.09	0	0
	276-02-0103	0.01	0.17	0.01	0.13	0.01	0.26	0.01	0.02
	276-02-0104	0	0.07	0	0.04	0	0.11	0	0.01
	276-02-0105	0	0.23	0.01	0.18	0.01	0.32	0	0.03
	276-02-0110	0	0.13	0	0.05	0	0.15	0	0.03
	276-02-0111	0.01	0.03	0	0.02	0	0.06	0	0.01
	276-02-0114	0	0.09	0	0.05	0.01	0.12	0	0.01
	276-02-0117	0.01	0.02	0	0.02	0	0.05	0	0.01
	276-02-0118	0.02	0.16	0	0.06	0	0.12	0	0.02
	276-02-0121	0.03	0.13	0	0.05	0	0.09	0	0.01
20 µg	276-02-0156	0.01	0.09	0.01	0.06	0.01	0.15	0	0.02
	276-02-0168	0.01	0.07	0	0.05	0.01	0.08	0	0.01
	276-02-0172	0	0.05	0	0.03	0	0.05	0	0.01
	276-02-0173	0	0.17	0	0.1	0.01	0.14	0	0.03
	276-02-0174	3.28	2.51	0.25	0.35	0.28	0.43	0.05	0.03
	276-02-0175	0.02	0.06	0.01	0.04	0.01	0.09	0	0.01
	276-02-0177	0	0.11	0	0.06	0.01	0.13	0	0
	276-02-0178	0	0.13	0	0.08	0	0.13	0	0.01
	276-02-0179	0.02	0.11	0.01	0.07	0.01	0.19	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0180	0.01	0.13	0	0.09	0	0.18	0	0.01
	276-02-0183	0.01	0.21	0	0.13	0	0.3	0	0.04
30 µg	276-02-0127	0	0.21	0	0.1	0.02	0.19	0	0.05
	276-02-0128	0.01	0.12	0.01	0.07	0.01	0.14	0	0.06
	276-02-0134	0.01	0.05	0.01	0.03	0.02	0.09	0	0.01
	276-02-0137	0.03	0.06	0	0.03	0.02	0.08	0	0.01
	276-02-0142	0	0.34	0	0.2	0	0.42	0	0.03
	276-02-0143	0	0.04	0	0.03	0	0.07	0	0.01
	276-02-0144	0	0.14	0	0.1	0	0.21	0	0.04
	276-02-0145	0.01	0.07	0	0.03	0.01	0.12	0	0.02
	276-02-0149	0.12	0.27	0	0.12	0	0.23	0	0.03
	276-02-0150	0	0.04	0	0.02	0	0.06	0	0
	276-02-0155	0.02	0.14	0	0.1	0	0.17	0	0.06
10 µg older adult	276-01-0261	0	0	0	0	0	0.02	0	0
	276-01-0263	0	0.12	0	0.09	0	0.22	0	0.03
	276-01-0265	0	0.1	0	0.06	0.01	0.14	0	0.01
	276-01-0267	0	0.03	0	0.02	0.01	0.05	0	0.01
	276-01-0268	0.01	0.11	0.01	0.07	0	0.14	0	0.03
	276-01-0269	0	0.27	0	0.15	0	0.22	0	0.05
	276-01-0275	0	0.07	0	0.03	0	0.07	0	0.01
	276-01-0276	0	0.34	0	0.19	0	0.37	0	0.14
	276-01-0277	0	0.04	0	0.02	0	0.06	0	0.01
	276-01-0279	0	0.04	0	0.01	0	0.04	0.01	0.01
	276-01-0299	0.01	0.08	0	0.05	0.01	0.11	0	0.02
20 µg older adult	276-02-0215	0	0.22	0	0.14	0.01	0.32	0	0.11
	276-02-0216	0	0.12	0	0.06	0	0.13	0	0.03
	276-02-0221	0	0.06	0	0.04	0	0.08	0	0.02
	276-02-0222	0	0.02	0	0.01	0	0.02	0	0
	276-02-0223	0	0.26	0	0.15	0	0.23	0	0.06
	276-02-0224	0	0.07	0	0.04	0.01	0.08	0	0.02
	276-02-0226	0	0.09	0	0.04	0	0.09	0	0.01
	276-02-0229	0	0.03	0	0.01	0	0.02	0	0.01
	276-02-0233	0	0.06	0	0.04	0	0.05	0	0
30 µg older adult	276-01-0272	0	0.29	0	0.15	0	0.33	0.01	0.05
	276-01-0303	0	0.1	0	0.02	0.01	0.08	0	0.02
	276-01-0306	0	0.17	0	0.1	0	0.23	0	0.03
	276-01-0308	0	0.24	0	0.12	0.02	0.22	0	0.06
	276-01-0314	0	0.05	0	0.03	0	0.09	0	0
	276-01-0316	0	0.43	0	0.29	0.01	0.44	0	0.03
	276-01-0319	0.01	0.09	0.01	0.04	0.01	0.1	0.01	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0323	0	0.09	0	0.05	0.01	0.11	0	0.01
	276-01-0324	0	0.11	0	0.06	0	0.13	0.01	0.01

Appendix 11: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1+2

Table 9-8: Frequency of cytokine-producing CD8+ T cells in response to S protein pool 1+2

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	0.02	0.04	0	0	0	0
	276-02-0154	0.02	0.04	0	0	0.01	0
	276-02-0157	0.01	0	0	0	0.01	0.01
	276-02-0158	0.01	0	0	0	0	0
	276-02-0164	0	0.12	0	0.03	0	0.05
	276-02-0166	0	0.09	0	0.01	0	0.01
	276-02-0171	0.04	0.03	0	0	0	0
	276-02-0189	0.01	0.04	0	0	0	0.01
3 µg	276-02-0185	0.01	0.04	0	0.01	0	0.01
	276-02-0191	0	0.05	0	0	0	0
	276-02-0192	0.01	0.71	0	0.02	0	0.07
	276-02-0193	0	0.09	0	0.01	0	0.01
	276-02-0194	0.43	0.33	0.02	0.01	0.02	0.01
	276-02-0195	6.77	7.77	0.37	0.54	0.44	0.66
	276-02-0197	0.02	0.47	0	0.07	0	0.12
	276-02-0200	0.03	0.09	0	0.01	0	0.01
	276-02-0201	0.45	0.41	0.01	0.02	0.02	0.03
10 µg	276-02-0101	0	0.03	0	0.01	0	0.01
	276-02-0102	0.02	0.16	0	0.01	0	0.01
	276-02-0103	0	0.37	0	0.02	0	0.04
	276-02-0104	0	0.78	0	0.09	0	0.12
	276-02-0105	0.13	0.57	0.01	0.07	0.02	0.11
	276-02-0110	0.05	0.54	0.01	0.04	0.01	0.07
	276-02-0111	0.02	0.05	0	0	0	0
	276-02-0114	0.11	0.17	0.01	0.03	0.01	0.03
	276-02-0117	0	0	0	0	0	0
	276-02-0118	0	0.14	0	0.01	0	0.01
	276-02-0121	0.01	0.08	0	0.01	0	0.02
20 µg	276-02-0156	0.11	0.31	0	0.01	0	0.01
	276-02-0168	0.32	0.3	0.03	0.04	0.03	0.05
	276-02-0172	0	0.04	0	0	0	0.01
	276-02-0173	0.03	0.07	0	0.01	0	0.01
	276-02-0174	0.8	0.66	0.04	0.01	0.04	0.03
	276-02-0175	0	0.42	0	0.1	0.01	0.14
	276-02-0177	1.57	1.24	0.15	0.12	0.21	0.16
	276-02-0178	0	1.31	0	0.27	0	0.31

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	0	0.52	0	0.02	0	0.04
	276-02-0180	0	0.67	0	0.08	0	0.16
	276-02-0183	0.06	0.22	0.01	0.04	0.03	0.05
30 µg	276-02-0127	0.02	0.15	0.01	0.01	0	0.01
	276-02-0128	0.59	0.65	0.08	0.09	0.1	0.12
	276-02-0134	0.01	0.05	0	0	0.01	0
	276-02-0137	0.23	0.24	0.01	0.02	0.02	0.03
	276-02-0142	2.21	3.38	0.07	0.13	0.1	0.21
	276-02-0143	0	0.07	0	0	0	0.01
	276-02-0144	0	0.4	0	0.05	0	0.1
	276-02-0145	0	0.09	0	0	0	0
	276-02-0149	0	0.76	0	0.04	0	0.07
	276-02-0150	0	0	0	0	0	0
	276-02-0155	0	0.27	0	0.02	0	0.02
10 µg older adult	276-01-0261	0.01	0.04	0	0	0	0.01
	276-01-0263	0.02	0.54	0	0.05	0	0.09
	276-01-0265	0.01	0.09	0	0.02	0	0.03
	276-01-0267	0.01	0.01	0	0	0	0
	276-01-0268	0.41	0.52	0.04	0.04	0.05	0.04
	276-01-0269	0.01	0.22	0	0.02	0	0.04
	276-01-0275	0.02	0.11	0	0.01	0	0.01
	276-01-0276	0.03	0.13	0	0.01	0	0.03
	276-01-0277	0	0	0	0	0	0
	276-01-0279	0.3	0.4	0.01	0.01	0.02	0.03
	276-01-0299	0	0	0	0	0	0
20 µg older adult	276-02-0215	0	0.12	0	0.04	0	0.04
	276-02-0216	0	0.04	0	0.01	0	0.01
	276-02-0221	0	0.03	0	0.01	0	0.01
	276-02-0222	0.01	0.02	0	0	0	0
	276-02-0223	0.03	0.08	0	0.01	0	0.01
	276-02-0224	0.33	0.47	0.02	0.01	0.02	0.02
	276-02-0226	0.02	0.38	0	0.01	0	0.01
	276-02-0229	0	0.02	0	0	0	0
	276-02-0233	0.02	0.11	0	0	0	0
30 µg older adult	276-01-0272	0.02	0.74	0	0.03	0	0.05
	276-01-0303	0.02	1.82	0	0.01	0	0.03
	276-01-0306	0.02	1.33	0	0.08	0	0.15
	276-01-0308	3.53	2.53	0.2	0.11	0.29	0.13
	276-01-0314	0	0.07	0	0.01	0	0.02
	276-01-0316	0.05	0.56	0	0.13	0	0.19

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	0	0.31	0	0.02	0	0.04
	276-01-0323	0	1.09	0	0.13	0	0.17
	276-01-0324	0.02	0.19	0	0.01	0	0.02

Appendix 12: Frequency of cytokine-producing CD4+ T cells in response to CEFX

Table 9-9: Frequency of cytokine-producing CD4+ T cells in response to CEFX

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-02-0153	0.04	0.03	0.02	0.02	0.04	0.02	0	0
	276-02-0154	0.05	0.04	0.04	0.03	0.16	0.12	0.04	0.03
	276-02-0157	0.06	0.06	0.04	0.04	0.09	0.09	0.01	0.01
	276-02-0158	0.12	0.13	0.08	0.08	0.15	0.16	0.02	0.02
	276-02-0164	1.58	1.75	0.78	0.93	0.84	1	0.5	0.54
	276-02-0166	0.18	0.13	0.16	0.1	0.21	0.15	0	0
	276-02-0171	0.03	0.04	0.02	0.02	0.04	0.03	0	0
	276-02-0189	0.01	0.02	0.01	0.02	0.05	0.07	0.02	0.03
3 µg	276-02-0185	0.02	0.01	0.01	0.01	0.03	0.02	0	0
	276-02-0191	0.04	0.06	0.03	0.04	0.04	0.06	0	0.01
	276-02-0192	0.07	0.05	0.05	0.04	0.07	0.05	0.01	0
	276-02-0193	0.36	0.25	0.12	0.07	0.14	0.08	0.04	0.03
	276-02-0194	0.02	0.02	0.01	0.01	0.02	0.01	0	0
	276-02-0195	1.01	1.3	0.45	0.6	0.52	0.65	0.28	0.38
	276-02-0197	0.02	0.02	0.02	0.02	0.02	0.03	0	0
	276-02-0200	0.03	0.03	0.02	0.02	0.03	0.04	0	0
	276-02-0201	1.95	1.93	0.52	0.59	0.55	0.64	0.32	0.32
	276-02-0185	0.02	0.01	0.01	0.01	0.03	0.02	0	0
10 µg	276-02-0101	0.05	0.06	0.05	0.05	0.06	0.07	0	0
	276-02-0102	0.07	0.12	0.02	0.02	0.03	0.02	0	0
	276-02-0103	0.03	0.01	0.03	0.01	0.03	0.01	0	0
	276-02-0104	0.03	0.02	0.02	0.02	0.03	0.03	0	0
	276-02-0105	0.04	0.02	0.03	0.01	0.04	0.02	0.01	0
	276-02-0110	0.08	0.08	0.06	0.03	0.08	0.04	0.01	0
	276-02-0111	0.15	0.13	0.07	0.06	0.15	0.14	0.01	0.01
	276-02-0114	0.11	0.1	0.06	0.06	0.09	0.08	0.02	0.01
	276-02-0117	0.04	0.03	0.03	0.03	0.04	0.04	0	0
	276-02-0118	0.25	0.24	0.14	0.12	0.16	0.14	0.01	0.01
	276-02-0121	0.01	0.03	0.02	0.02	0.02	0.03	0	0
20 µg	276-02-0156	0.26	0.22	0.17	0.15	0.18	0.17	0.07	0.05
	276-02-0168	0.04	0.05	0.02	0.03	0.03	0.03	0	0.01
	276-02-0172	0.02	0.01	0.02	0.03	0.03	0.03	0.03	0
	276-02-0173	0.07	0.05	0.05	0.04	0.07	0.05	0	0
	276-02-0174	0.13	0.08	0.06	0.03	0.09	0.05	0.02	0
	276-02-0175	0.05	0.04	0.04	0.03	0.05	0.04	0	0
	276-02-0177	0.16	0.09	0.12	0.06	0.13	0.08	0.01	0
	276-02-0178	0.03	0.01	0.02	0.01	0.02	0.01	0.01	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	0.1	0.09	0.07	0.06	0.09	0.08	0	0
	276-02-0180	0.01	0.01	0.01	0	0.01	0.01	0	0
	276-02-0183	1.47	1.46	0.92	0.82	0.96	0.86	0.89	0.73
30 µg	276-02-0127	0.11	0.11	0.07	0.09	0.09	0.1	0.01	0
	276-02-0128	0.05	0.05	0.05	0.03	0.06	0.04	0	0
	276-02-0134	0.16	0.12	0.12	0.09	0.16	0.13	0.01	0.01
	276-02-0137	0.08	0.1	0.06	0.06	0.11	0.12	0.01	0.01
	276-02-0142	1.68	1.93	0.58	0.63	0.66	0.71	0.26	0.23
	276-02-0143	0.01	0.01	0.01	0.01	0.02	0.02	0	0
	276-02-0144	0.01	0.01	0.01	0.01	0.03	0.02	0	0
	276-02-0145	0.02	0.02	0.02	0.01	0.06	0.04	0	0
	276-02-0149	0.07	0.07	0.04	0.05	0.05	0.06	0.01	0.01
	276-02-0150	0.09	0.08	0.02	0.01	0.03	0.02	0	0
	276-02-0155	0.03	0.01	0.02	0.01	0.03	0.03	0	0
10 µg older adult	276-01-0261	0.05	0.03	0.02	0.02	0.04	0.04	0.01	0
	276-01-0263	0	0.09	0	0.09	0.01	0.43	0	0.06
	276-01-0265	0.03	0.03	0.02	0.02	0.03	0.03	0	0
	276-01-0267	0.03	0.02	0.01	0.02	0.02	0.02	0	0
	276-01-0268	0.06	0.03	0.05	0.03	0.05	0.03	0.01	0.01
	276-01-0269	0.02	0.03	0.01	0.02	0.05	0.03	0	0
	276-01-0275	0.03	0.03	0.02	0.02	0.05	0.06	0	0
	276-01-0276	0.02	0.02	0.01	0.01	0.03	0.02	0	0
	276-01-0277	0	0	0	0.01	0	0.01	0	0
	276-01-0279	0.04	0.03	0.03	0.02	0.04	0.03	0	0
	276-01-0299	0.1	0.1	0.06	0.03	0.08	0.06	0.01	0.01
20 µg older adult	276-02-0215	0.02	0.01	0.01	0.02	0.02	0.02	0	0
	276-02-0216	0.03	0.02	0.02	0.01	0.02	0.02	0.01	0.01
	276-02-0221	0.02	0.02	0.02	0.01	0.03	0.02	0	0
	276-02-0222	0.01	0.01	0.01	0.01	0.03	0.02	0	0
	276-02-0223	0.05	0.05	0.03	0.02	0.04	0.03	0	0.01
	276-02-0224	0.13	0.11	0.11	0.1	0.14	0.11	0.01	0.01
	276-02-0226	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.01
	276-02-0229	0.1	0.1	0.02	0.04	0.03	0.04	0.01	0.01
	276-02-0233	0.09	0.07	0.07	0.07	0.15	0.14	0.03	0.03
30 µg older adult	276-01-0272	0.03	0.04	0.02	0.02	0.04	0.03	0	0
	276-01-0303	0.03	0.01	0.02	0.01	0.04	0.04	0.01	0.01
	276-01-0306	0.02	0.02	0.01	0.01	0.01	0.02	0	0
	276-01-0308	0.1	0.08	0.07	0.05	0.1	0.06	0.01	0
	276-01-0314	0.02	0.02	0.01	0.01	0.03	0.03	0.02	0.01
	276-01-0316	0.01	0.01	0	0	0.02	0.01	0	0

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	0.01	0.01	0.01	0.01	0.05	0.04	0.01	0.01
	276-01-0323	0.01	0.01	0.01	0.01	0.02	0.01	0	0
	276-01-0324	0.34	0.36	0.22	0.23	0.24	0.24	0.09	0.08

Appendix 13: Frequency of cytokine-producing CD8+ T cells in response to CEFX

Table 9-10: Frequency of cytokine-producing CD8+ T cells in response to CEFX

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	0.72	1.3	0.18	0.26	0.23	0.34
	276-02-0154	0.62	0.67	0.29	0.33	0.35	0.39
	276-02-0157	0.76	1.5	0.34	0.51	0.41	0.66
	276-02-0158	1.31	1.34	0.27	0.31	0.36	0.41
	276-02-0164	0.53	0.5	0.14	0.15	0.2	0.2
	276-02-0166	0.04	0.03	0.02	0.02	0.02	0.03
	276-02-0171	0.66	0.61	0.26	0.24	0.3	0.28
	276-02-0189	0.12	0.16	0.04	0.07	0.05	0.07
3 µg	276-02-0185	0.21	0.18	0.1	0.09	0.13	0.11
	276-02-0191	0	0.03	0	0.01	0	0.01
	276-02-0192	0.84	0.79	0.29	0.29	0.41	0.41
	276-02-0193	0.13	0.13	0.09	0.08	0.11	0.1
	276-02-0194	17.31	15.56	2.65	2.2	3.58	2.94
	276-02-0195	9.72	10.31	1.47	1.64	2.02	2.15
	276-02-0197	3.15	3.11	1.46	1.47	1.85	1.87
	276-02-0200	2.07	3.22	0.22	0.32	0.36	0.51
	276-02-0201	2.85	3.26	0.54	0.61	0.87	1.01
10 µg	276-02-0101	0.22	0.24	0.15	0.17	0.18	0.19
	276-02-0102	0.55	0.57	0.16	0.17	0.19	0.19
	276-02-0103	0.67	0.52	0.34	0.2	0.43	0.27
	276-02-0104	0.67	0.51	0.17	0.14	0.27	0.19
	276-02-0105	1.75	1.34	0.44	0.37	0.53	0.45
	276-02-0110	9.54	9.85	0.79	0.51	1.24	0.96
	276-02-0111	2.27	1.85	0.57	0.48	0.71	0.56
	276-02-0114	1.19	3.8	0.13	0.24	0.19	0.33
	276-02-0117	0.14	0.18	0.04	0.07	0.06	0.1
	276-02-0118	2.21	1.5	0.13	0.09	0.21	0.16
	276-02-0121	0.12	0.12	0.05	0.04	0.06	0.07
20 µg	276-02-0156	0.72	0.82	0.18	0.18	0.21	0.23
	276-02-0168	1.5	1.55	0.36	0.44	0.49	0.65
	276-02-0172	0.12	0.16	0.04	0.06	0.05	0.07
	276-02-0173	7.38	6.34	0.51	0.43	0.8	0.7
	276-02-0174	2.36	1.73	0.67	0.49	0.81	0.65
	276-02-0175	0.03	0	0	0.01	0.01	0.01
	276-02-0177	5.12	2.49	0.86	0.48	1.11	0.63
	276-02-0178	5.7	4.16	1.65	1.2	2.15	1.62

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	0.09	0.07	0.06	0.07	0.07	0.07
	276-02-0180	0.37	0.3	0.13	0.11	0.17	0.13
	276-02-0183	13.51	11.14	1.76	1.34	2.8	1.69
30 µg	276-02-0127	0.05	0.12	0.03	0.03	0.05	0.05
	276-02-0128	2.32	1.75	0.81	0.79	1	0.98
	276-02-0134	1.84	1.21	0.53	0.27	0.67	0.42
	276-02-0137	1.27	1.23	0.23	0.31	0.32	0.4
	276-02-0142	8.82	9.35	1.34	1.29	2.15	2.36
	276-02-0143	0.43	0.49	0.1	0.06	0.14	0.11
	276-02-0144	0.41	0.39	0.09	0.07	0.13	0.11
	276-02-0145	2.57	1.65	1.14	0.56	1.38	0.8
	276-02-0149	1.57	1.02	0.28	0.26	0.41	0.38
	276-02-0150	1.14	0.91	0.16	0.22	0.24	0.3
	276-02-0155	0.77	0.88	0.39	0.4	0.47	0.46
10 µg older adult	276-01-0261	7.26	15.24	2.29	5.19	2.95	6.6
	276-01-0263	0.01	5.36	0	1.98	0	2.47
	276-01-0265	0.26	0.34	0.17	0.22	0.2	0.25
	276-01-0267	7.77	7.99	0.47	0.44	0.61	0.6
	276-01-0268	1.44	1.38	0.25	0.27	0.31	0.35
	276-01-0269	1.27	1.21	0.26	0.22	0.46	0.37
	276-01-0275	0.62	0.8	0.14	0.19	0.17	0.25
	276-01-0276	0.92	0.65	0.21	0.18	0.28	0.26
	276-01-0277	1.96	2.07	0.6	0.75	0.79	0.9
	276-01-0279	0	0	0.06	0.03	0.09	0.04
	276-01-0299	1.84	1.48	0.65	0.42	0.78	0.52
20 µg older adult	276-02-0215	4.85	5.64	0.27	0.29	0.4	0.46
	276-02-0216	0.82	0.86	0.29	0.23	0.39	0.3
	276-02-0221	2.24	2.19	0.76	0.83	0.96	0.97
	276-02-0222	1.58	1.45	0.48	0.5	0.71	0.66
	276-02-0223	5.49	5.48	2.67	2.54	3.33	3.09
	276-02-0224	4.63	3.72	0.78	0.74	1.03	0.99
	276-02-0226	0.3	0.34	0.11	0.15	0.14	0.22
	276-02-0229	2.24	2.18	0.61	0.66	0.72	0.8
	276-02-0233	0.65	0.34	0.34	0.16	0.37	0.19
30 µg older adult	276-01-0272	3.27	2.97	0.56	0.45	0.81	0.59
	276-01-0303	0.64	0.68	0.1	0.11	0.15	0.16
	276-01-0306	3.01	2.97	0.41	0.66	0.61	0.9
	276-01-0308	5	4.77	1.52	1.22	2.14	1.63
	276-01-0314	2.59	2.34	1.14	0.84	1.42	1.06
	276-01-0316	0.58	0.62	0.24	0.24	0.33	0.32

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	0.63	0.49	0.22	0.21	0.28	0.26
	276-01-0323	1.67	1.14	0.81	0.63	0.99	0.73
	276-01-0324	2.29	2.27	0.6	0.55	0.74	0.73

Appendix 14: Frequency of cytokine-producing CD4+ T cells in response to anti-CD3

Table 9-11: Frequency of cytokine-producing CD4+ T cells in response to anti-CD3

	Cytokine	CD4+ IFNγ+	CD4+ IFNγ+	CD4+ IFNγ+ IL-2+	CD4+ IFNγ+ IL-2+	CD4+ IL-2+	CD4+ IL-2+	CD4+ IL-4+	CD4+ IL-4+
Dose	Subject ID	V1	V5	V1	V5	V1	V5	V1	V5
1 µg	276-02-0153	2.16	1.88	0.79	0.48	3.57	2.33	0.25	0.19
	276-02-0154	0.89	0.62	0.4	0.24	2.6	2.22	0.13	0.1
	276-02-0157	2.14	2.38	1.12	1.03	7.08	6.98	0.19	0.19
	276-02-0158	1.34	1.27	0.19	0.2	1.91	2.68	0.04	0.02
	276-02-0164	3.49	3.35	0.67	0.74	2.31	2.71	0.15	0.16
	276-02-0166	0.4	0.42	0.11	0.12	1.22	1.57	0.07	0.12
	276-02-0171	3.86	1.89	0.97	0.45	1.66	1.01	0.16	0.07
	276-02-0189	0.57	0.8	0.15	0.16	2.53	1.98	0.37	0.59
3 µg	276-02-0185	0.31	0.18	0.14	0.06	2.53	1.2	0.07	0.02
	276-02-0191	1.81	1.43	0.36	0.32	0.88	1.24	0.11	0.1
	276-02-0192	0.5	0.4	0.13	0.1	1.23	0.88	0.12	0.09
	276-02-0193	21.72	20.88	4.66	4.31	5.74	5.46	0.64	0.85
	276-02-0194	6.42	5.3	1.37	1.08	3.68	2.77	0.15	0.18
	276-02-0195	6.22	7.46	1.28	1.61	2.43	3.18	0.71	0.98
	276-02-0197	0.17	0.17	0.05	0.04	0.8	0.67	0.07	0.09
	276-02-0200	1.74	2.05	0.42	0.54	2.54	3.75	0.15	0.16
	276-02-0201	13.98	11.7	2.31	2.04	5.19	5.85	1.38	1.3
10 µg	276-02-0101	1.49	1.21	0.47	0.38	2.88	2.36	0.05	0.04
	276-02-0102	0.39	0.32	0.11	0.05	0.69	0.37	0.02	0
	276-02-0103	1.15	0.51	0.51	0.19	3.56	1.47	0.25	0.11
	276-02-0104	0.21	0.09	0.08	0.04	0.72	0.4	0.09	0.04
	276-02-0105	0.97	0.33	0.33	0.1	1.69	0.52	0.06	0.02
	276-02-0110	3.02	1.87	0.93	0.46	4.84	2.17	0.36	0.14
	276-02-0111	3.09	1.6	0.96	0.48	2.5	1.53	0.05	6.93
	276-02-0114	0.5	0.64	0.18	0.18	1.71	1.52	0.23	0.22
	276-02-0117	0.58	0.57	0.29	0.29	3.69	3.52	0.11	0.07
	276-02-0118	5.18	4.65	0.69	0.64	3.17	3.33	0.18	0.11
	276-02-0121	0.37	0.43	0.11	0.14	1.19	1.68	0.06	0.05
20 µg	276-02-0156	6.2	8.19	1.64	2.51	4.4	6	0.58	0.46
	276-02-0168	3.33	3.79	0.65	1.15	1.66	2.73	0.17	0.27
	276-02-0172	2.27	1.48	0.36	0.38	1.13	1.8	0.09	0.06
	276-02-0173	1.28	0.81	0.51	0.28	3.88	2.25	0.15	0.1
	276-02-0174	13.18	8.22	4.18	2.73	8.14	4.61	0.48	0.16
	276-02-0175	0.23	0.14	0.07	0.05	0.87	0.67	0.01	0
	276-02-0177	1.64	1.43	0.4	0.42	1.56	1.82	0.03	0.01
	276-02-0178	2.35	1.59	0.73	0.52	1.84	1.39	0.22	0.1
	276-02-0179	10.19	11.93	4.9	5.32	6.74	6.77	0.1	0.02

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0180	0.69	0.45	0.25	0.16	1.83	1.73	0.13	0.07
	276-02-0183	1.56	2.18	0.57	0.73	4.34	4.49	0.24	0.17
30 µg	276-02-0127	3.11	3.34	1.11	1.49	4.37	6.49	0.07	0.14
	276-02-0128	4.25	3.49	1.46	1.31	7.58	7.97	0.4	0.48
	276-02-0134	0.79	0.56	0.3	0.22	4.6	3.93	0.16	0.07
	276-02-0137	6.2	5.7	1.05	0.99	4.21	4.44	0.18	0.14
	276-02-0142	8.72	8.81	1.8	1.71	5.6	5.29	0.39	0.17
	276-02-0143	1.19	0.63	0.25	0.07	1.92	0.67	0.1	0.01
	276-02-0144	0.37	0.31	0.18	0.16	1.37	1.4	0.02	0.02
	276-02-0145	0.48	0.44	0.18	0.15	2.27	1.64	0.08	0.07
	276-02-0149	5.92	6.6	1.06	1.74	2.57	4.2	0.17	0.17
	276-02-0150	16.65	18.67	1.65	2.85	3.04	4.47	0.16	0.17
	276-02-0155	1.6	1.17	0.82	0.52	4.86	4.39	0.34	0.31
10 µg older adult	276-01-0261	4.47	4.49	0.42	0.49	1.13	1.71	0.24	0.25
	276-01-0263	0	0.58	0	0.21	0.07	2.38	0.05	0.06
	276-01-0265	1.06	0.72	0.55	0.27	3.3	1.69	0.21	0.1
	276-01-0267	4.71	6.61	0.81	0.97	2.21	1.66	0.27	0.43
	276-01-0268	1.37	1.3	0.51	0.46	2.36	1.79	0.3	0.32
	276-01-0269	0.21	0.24	0.09	0.07	1.36	1.06	0.12	0.11
	276-01-0275	0.12	0.23	0.03	0.05	0.57	0.99	0.08	0.11
	276-01-0276	0.27	0.24	0.04	0.07	0.97	1.2	0.15	0.3
	276-01-0277	11.46	13.95	1.45	2.65	1.86	3.43	0.37	0.33
	276-01-0279	12.63	8.5	2.5	1.97	3.38	2.57	0.66	0.48
	276-01-0299	3.61	4.27	0.77	0.57	1.86	1.04	0.11	0.11
20 µg older adult	276-02-0215	4.7	3.65	0.82	0.79	2.76	3.43	0.39	0.4
	276-02-0216	3	2.49	0.85	0.54	1.73	0.97	0.34	0.17
	276-02-0221	6.62	4.38	1.11	0.75	3.89	2.18	0.5	0.27
	276-02-0222	0.27	0.19	0.11	0.07	1.65	1.22	0.06	0.05
	276-02-0223	10.35	11.63	1.61	1.44	4.06	3.33	0.57	0.5
	276-02-0224	2.64	1.94	0.26	0.33	2.08	2.45	0.1	0.09
	276-02-0226	1.65	1.14	1.13	0.5	6.34	3.55	0.25	0.11
	276-02-0229	28.81	27.64	1.33	1.33	1.62	1.82	0.37	0.49
	276-02-0233	1.35	1.83	0.78	0.98	5.07	4.95	0.11	0.1
30 µg older adult	276-01-0272	2.72	3.67	0.38	0.49	1.4	1.53	0.25	0.33
	276-01-0303	18.58	18.43	3.95	2.75	5.01	3.22	0.29	0.15
	276-01-0306	0.27	0.42	0.08	0.11	0.81	1.32	0.05	0.1
	276-01-0308	9.8	12.62	3.47	2.32	10.97	6.11	0.27	0.45
	276-01-0314	0.32	0.19	0.13	0.09	0.94	0.96	0.08	0.04
	276-01-0316	0.48	0.59	0.1	0.12	0.85	0.69	0.13	0.07
	276-01-0319	0.22	0.14	0.09	0.06	3.09	1.71	0.07	0.04

	Cytokine	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}2^+$	$CD4^+$ $IL\text{-}4^+$	$CD4^+$ $IL\text{-}4^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0323	0.73	0.52	0.34	0.24	1.44	1.16	0.1	0.07
	276-01-0324	3.61	3.06	0.6	0.62	1.98	1.85	0.21	0.13

Appendix 15: Frequency of cytokine-producing CD8+ T cells in response to anti-CD3

Table 9-12: Frequency of cytokine-producing CD8+ T cells in response to anti-CD3

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
1 µg	276-02-0153	12.64	14.5	1.54	1.8	3.7	3.32
	276-02-0154	11.86	10.95	1.48	1.58	6.85	7.26
	276-02-0157	9.4	8.55	1.68	1.24	3.18	2.34
	276-02-0158	13.36	14.9	0.63	0.79	1.37	1.72
	276-02-0164	12.2	11.7	1.63	1.62	2.57	2.49
	276-02-0166	0.98	1.44	0.12	0.21	0.42	0.68
	276-02-0171	8.62	5	0.61	0.42	1.17	0.75
	276-02-0189	11.61	13.97	1.12	1.51	2.21	2.48
3 µg	276-02-0185	2.47	2.23	0.47	0.33	1.75	1.36
	276-02-0191	4.11	3.73	0.48	0.31	0.75	0.61
	276-02-0192	7.54	5.5	1.17	1.03	2.33	2.7
	276-02-0193	10.05	14.75	1.42	1.91	2.61	3.39
	276-02-0194	30.17	31.47	4.49	4.83	6.12	6.29
	276-02-0195	30.25	37.69	1.78	2.79	2.66	3.97
	276-02-0197	11.03	10.82	1.65	1.65	3.36	3.22
	276-02-0200	3.25	5.17	0.45	0.88	1.23	1.93
	276-02-0201	24.35	20.34	1.95	2.1	4.29	4.59
10 µg	276-02-0101	7.06	7.89	2.02	2.03	3.68	3.02
	276-02-0102	8.53	6.72	0.65	0.44	1.1	0.79
	276-02-0103	9.44	5.55	1.25	0.66	2.1	1.14
	276-02-0104	2.59	2.1	0.38	0.29	1.68	1.04
	276-02-0105	11.63	7.99	0.88	0.63	1.4	0.92
	276-02-0110	43.21	39.23	5.35	3.15	6.84	4.7
	276-02-0111	9.53	6.1	2.45	1.62	3.46	2.1
	276-02-0114	15.71	13.37	0.31	0.43	0.69	0.72
	276-02-0117	45.1	26.12	1.51	1.25	2.81	3.03
	276-02-0118	9.95	8.48	0.77	0.76	1.71	1.71
	276-02-0121	1.36	1.7	0.11	0.16	1.55	1.77
20 µg	276-02-0156	7.56	10.64	1.4	1.82	2.24	2.96
	276-02-0168	19.47	18.75	1.79	2.66	3.16	4.75
	276-02-0172	2.76	3.77	0.35	0.73	0.87	1.71
	276-02-0173	12.49	10.93	1.14	0.79	2.34	1.71
	276-02-0174	37.48	38.75	3.7	4.04	5.42	6.31
	276-02-0175	2.02	1.66	0.41	0.36	1.05	0.84
	276-02-0177	11.43	7.27	1.33	1.14	2.23	2.11
	276-02-0178	14.19	10.8	2.83	2.44	4.3	3.51

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-02-0179	6.73	6.6	1.53	1.64	3.43	3.35
	276-02-0180	8.06	7.22	0.4	0.36	0.96	0.91
	276-02-0183	13.45	13.25	2.62	2.39	6.95	5.17
30 µg	276-02-0127	11.03	12.31	2.28	2.82	4.65	5.99
	276-02-0128	11.12	10.35	1.46	1.46	4.89	4.96
	276-02-0134	5.07	3.88	1.44	1.04	5.33	4.09
	276-02-0137	21.61	18.44	1.8	1.7	3.5	3.15
	276-02-0142	26.51	24.86	2.85	2.33	4.34	4.18
	276-02-0143	10.01	6.7	0.56	0.24	5.06	2.27
	276-02-0144	2.85	2.86	0.22	0.2	0.61	0.71
	276-02-0145	3.84	3.36	0.95	0.71	3.48	2.71
	276-02-0149	10.6	9.38	1.26	1.57	1.94	2.49
	276-02-0150	41.99	45.12	2.04	3.34	3.6	5.52
	276-02-0155	14.8	15.25	2.44	2.65	6.64	6.13
10 µg older adult	276-01-0261	22.42	25.43	2.13	3	5.53	7.84
	276-01-0263	0.08	8.6	0	0.72	0.05	3.91
	276-01-0265	6.7	5.2	1.93	1.31	3.64	2.21
	276-01-0267	50.44	54.05	3.06	3.56	4.73	5.41
	276-01-0268	7.38	8.47	1.06	1.03	3.01	2.49
	276-01-0269	4.4	4.59	0.8	0.75	2.94	2.53
	276-01-0275	5.84	6.83	0.32	0.55	0.74	1.11
	276-01-0276	8.41	8.47	1.28	1.19	2.45	2.74
	276-01-0277	26.92	29.14	1.04	1.82	1.97	3.17
	276-01-0279	20.28	13.38	0.65	0.4	1.16	0.96
	276-01-0299	44.88	42.86	10.76	6.89	12.18	7.57
20 µg older adult	276-02-0215	25.3	31.04	2.57	3.28	3.9	4.8
	276-02-0216	30.68	31.33	4.21	3.61	6.16	5.02
	276-02-0221	17.46	14.27	3.2	2.9	6.67	5.56
	276-02-0222	4.48	3.14	0.88	0.66	3.22	2.11
	276-02-0223	12.98	12.16	2.14	1.66	3.53	2.48
	276-02-0224	34.05	30.89	3	3.34	4.43	5.15
	276-02-0226	15.62	11.98	2.58	1.54	5.35	3.98
	276-02-0229	37	41.77	1.46	1.93	1.89	2.59
	276-02-0233	7.7	11.01	1.98	3.01	4.13	4.66
30 µg older adult	276-01-0272	19.42	19.84	1.81	1.6	3.62	3.17
	276-01-0303	11.07	9.93	1.24	0.85	3.51	1.87
	276-01-0306	13.54	13.85	1.21	1.84	2.72	3.83
	276-01-0308	18.85	24.1	1.29	1.21	4.67	2.86
	276-01-0314	5.53	5.46	1.15	0.99	3.54	2.83
	276-01-0316	8.38	11.05	0.64	0.87	1.98	2.04

	Cytokine	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IFN\gamma^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$	$CD8^+$ $IL\text{-}2^+$
Dose	**Subject ID**	**V1**	**V5**	**V1**	**V5**	**V1**	**V5**
	276-01-0319	7.1	6.29	0.88	0.8	4.72	3.66
	276-01-0323	4.89	3.92	0.93	0.8	1.98	1.93
	276-01-0324	9.11	8.76	1.18	1.07	2.36	2.07

Appendix 16: Frequency of cytokine-producing CD4+ T cells in reference samples in response to CEFX and anti-CD3 stimulation

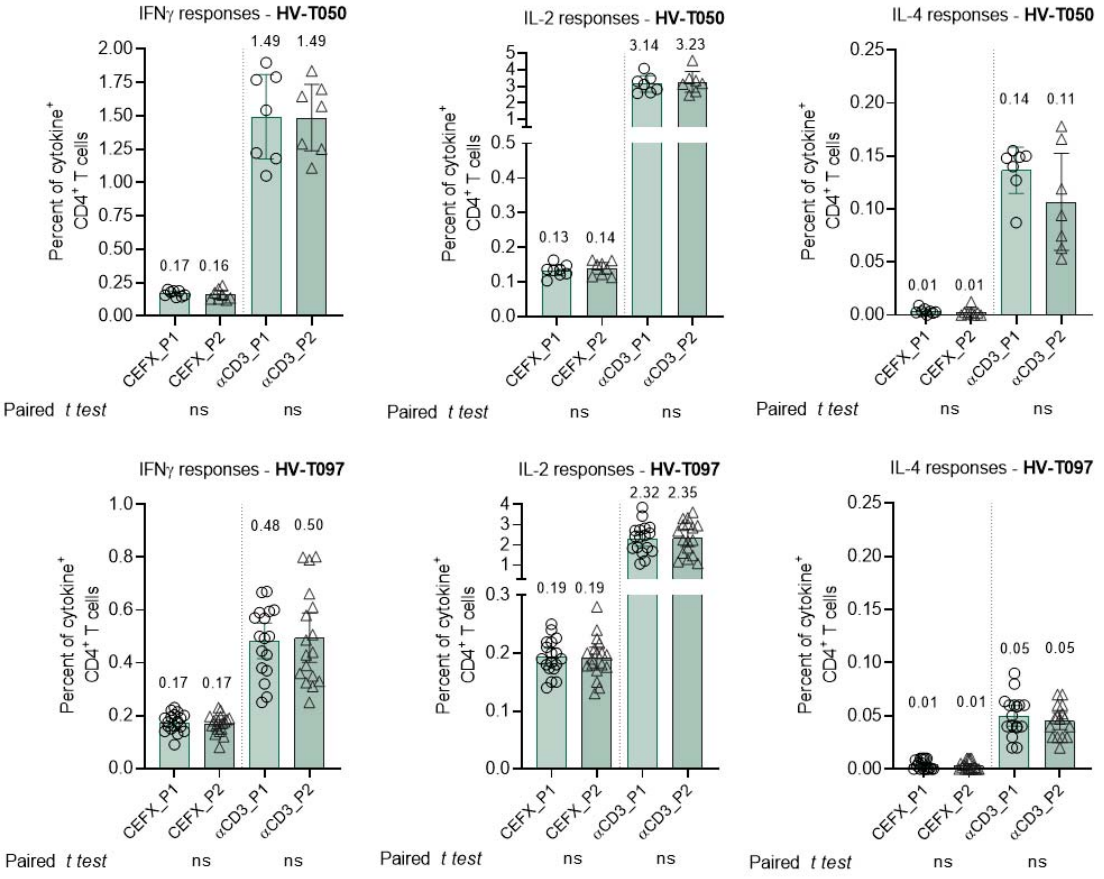

Figure 9.4: Frequency of cytokine-producing CD4+ T cells (IFNγ, IL-2, and IL-4) as a fraction of total circulating CD4+ T cells in response to CEFX and anti-CD3 stimulation

PBMCs from healthy volunteers (HV-T050 (n=8 batches) and HV-T097 (n=18 batches)) served as in-house reference assay controls and were stimulated in parallel to study subjects' PBMC samples. One reference sample row was included on each assay plate to control for intra- and inter-assay variability. The PBMC material available from 1 donor was not sufficient to cover all subject screenings in this report. Hence, a bridging experiment to a second PBMC (HV-T097) donor was performed during the reported study dates. Bar charts show arithmetic means with 95% CI in response to CEFX and anti-CD3. Circles and triangles depict individual data points from one assay plate, respectively. Numbers located above the bars are the arithmetic mean fractions. No significant differences in the frequency of cytokine-producing CD4+ T cells were obtained among paired samples (P1 = plate 1, P2 = plate 2, paired t-test (two-tailed), ns= not significant). Due to technical errors, the following data points had to be excluded from the analysis: for HV-T050, one anti-CD3 staining batch for P1 and P2; for HV-T097, one anti-CD3 staining batch for P1 and P2. For IL-4 responses, 1 batch for P1 and 2 batches for P2 were excluded for HV-T097.

Appendix 17: Frequency of cytokine-producing CD8+ T cells in reference samples in response to CEFX and anti-CD3 stimulation

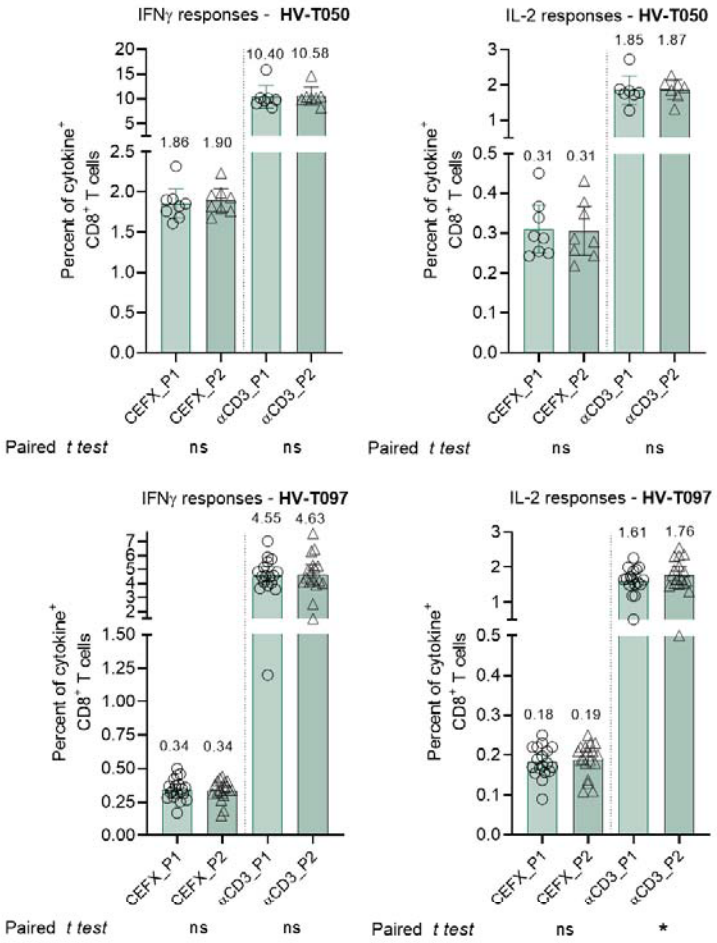

Figure 9.5: Frequency of cytokine-producing CD8+ T cells (IFNγ and IL-2) as a fraction of total circulating CD8+ T cells in response to CEFX and anti-CD3 stimulation

PBMCs from healthy volunteers (HV-T050 (n=8 batches) and HV-T097 (n=18 batches)) served as in-house reference assay controls and were stimulated in parallel to study subjects' PBMC samples. One reference sample row was included on each assay plate to control for intra- and inter-assay variability. The PBMC material available from 1 donor was not sufficient to cover all subject screenings in this report. Hence, a bridging experiment to a second PBMC (HV-T097) donor was performed during the reported study dates. Bar charts show arithmetic means with 95% CI in response to CEFX and anti-CD3. Circles and triangles depict individual data points from one assay plate, respectively. Numbers located above the bars are the arithmetic mean fractions. No significant differences in the frequency of cytokine-producing CD4+ T cells were obtained among paired samples (P1 = plate 1, P2 = plate 2, paired t-test (two-tailed), ns= not significant). Due to technical errors, the following data points were excluded from the analysis: for HV-T050, one anti-CD3 staining batch for P1 and P2; for HV-T097, one anti-CD3 staining batch for P1 and P2.

Appendix 18: Thawing recovery and viability of reference samples

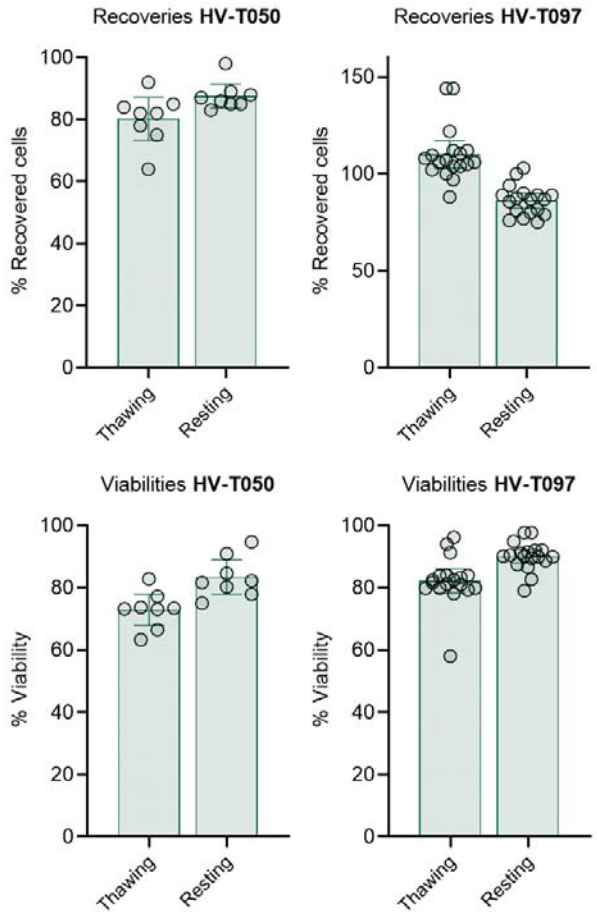

Figure 9.6: Thawing recovery and viability of PBMCs from reference samples

PBMCs from healthy volunteers (HV-T050 (n=8 batches) and HV-T097 (n=18 batches)) served as in-house reference assay controls and were processed in parallel to study subjects' PBMC samples for each performed assay run. The PBMC material available from 1 donor was not sufficient to cover all subject screenings in this report. Bar charts show arithmetic means with 95% CI for PBMC recovery (upper panel) and viability (lower panel) after thawing and resting. Circles depict individual measurements. The recovery rates after thawing and resting as well as PBMC viability were comparable between the different batches for both healthy volunteer donors.

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R&D STUDY REPORT No. R-20-0244

EX VIVO ELISPOT DATA PROCESSING AND ANALYSIS WITHIN BNT162-01 CLINICAL TRIAL

Version 03
Date: 19 MAR 2021

Reported by Dr. Evelyna Derhovanessian, Dr. Rolf Hilker & Julian Sikorski

Test data: ELISpot data, Fast Track SURE
Key words: SARS-CoV-2, BNT162-01 study, T-cell response, ELISpot data analysis, subject response evaluation

This R&D report consists of 39 pages.

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LIST OF ABBREVIATIONS

aa	Amino acid
BFX	Bioinformatics
BNT162b	BNT162 RNA vaccine utilizing nucleoside modified messenger RNA
CD	Cluster of differentiation
CMV	Cytomegalovirus
CoA	Certificate of analysis
CSV	Computer Software Validation
DEV	DEVelopment environment
Dose group	Group of study participants who receive the same vaccine at the same dose level and who belong to the same age group, i.e., younger participants or older participants
DS&BA	Data Science and Biomarker Analysis
EDA	ELISpot data analysis tool
EBV	Epstein-Barr virus
ELISpot	Enzyme-linked immunosorbent spot assay
FL-S-protein	Full-length spike protein
GCP	Good Clinical Practice
HTML	Hypertext Markup Language
HLA	Human leukocyte antigen
IFN	Interferon
mAb	Monoclonal antibody
MI	Mutual Information
RBD	Receptor-binding domain
RNA	Ribonucleic acid
R&D	Research & Development
Older participants	Participants aged 56 to 85 years
PBMC	Peripheral blood mononuclear cell
S protein	SARS-CoV-2 spike protein
SAS	Analytics Software name of SAS Institute GmbH
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SOP	Standard operating procedure
SURE	SUbject Response Evaluation tool
TNTC	Too Numerous To Count
XML	Extensible Markup Language
Younger participants	Participants aged 18 to 55 years

RESPONSIBILITIES

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Reviewer:		22MAR2021
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QA representative:	(b) (6)	22MAR2021
	BioNTech SE	Date

Meaning of the signatures:

Person responsible for the study: I am responsible for the content of the R&D report and confirm that it represents an accurate record of the results. This study was performed according to the SOPs and methods as well as the rules and regulations described in the report.

Author: I am the author of this document.

Reviewer: I reviewed the R&D report and confirm that this document complies with the scientific and technical standards and requirements.

QA representative: I confirm that this document complies with the relevant quality assurance requirements.

1 SUMMARY

BioNTech has developed an RNA-based vaccine against SARS-CoV-2 within the clinical trial BNT162-01. In order to assess immunogenicity of the vaccine candidates, peripheral blood T cells of the study participants were analyzed for $CD4^+$ and $CD8^+$ T cells specific for the SARS-CoV-2 spike protein (S protein). This analysis was performed using *ex vivo* interferon γ (IFNγ) ELISpot on blood samples collected on pre-Dose 1 and on Day 29, (i.e., 7 d post-Dose 2). In a subset of study participants who received 10, 20, and 30 µg BNT162b2, blood samples were also collected on Day 85 (i.e., 63 d post-Dose 2) and Day 184 (i.e., 162 d post-Dose 2) and analyzed. The ELISpot assay was performed under GCP conditions within the analytical study GA-RB-022-01A by the Biolytics-GCP test facility, providing an expert call on the presence or absence of T-cell responses, as well as spot count data for each vaccine target in each sample. The spot count data were further processed and normalized based on T-cell fitness/content of each sample, in order to enable accurate interpretation of the immunogenicity of BNT162b1 and BNT162b2.

As of 02 March 2021, evaluable $CD4^+$ and $CD8^+$ T-cell response data were available from 97 participants that received BNT162b1, 70 younger participants aged 18 to 55 years at dose levels of 1, 3, 10, 20, 30, 50, or 60 µg (note: Dose 2 was not given in the 60 µg dose group), and 27 older participants aged 56 to 85 years at dose levels of 10, 20, or 30 µg, as well as 76 participants that received BNT162b2 in Cohorts 1 to 10 at dose levels of 1, 3, 10, 20, or 30 µg in 47 younger participants, or 10, 20, or 30 µg in 29 older participants.

BNT162b1 induced strong RBD-specific $CD4^+$ T-cell responses in the majority of study participants given both Dose 1 and Dose 2 (86 of 88 [97.7%]), including all older participants (27 of 27 [100%]); $CD8^+$ responses were induced in 47 of 61 (77.0%) younger participants and in 21 of 27 (77.7%) older participants. In contrast, T-cell responses were detected less often and were lower in magnitude in 9 younger participants who received only Dose 1 in the 60 µg dose group, indicating the importance of a booster dose.

BNT162b2 induced strong SARS-CoV-2 S protein-specific $CD4^+$ T-cell responses measured at Day 29 in all of the dosed younger or older participants (76 of 76 [100%]); $CD8^+$ T-cell responses were induced in 45 of 47 (95.7%) younger participants and 24 of 29 (82.8%) older participants. Despite the slightly lower $CD8^+$ immunogenicity rate in older participants, the magnitude of BNT162b2-induced responses was comparable to those induced in younger participants who received 30 µg BNT162b2. These T-cell responses were directed against different parts of the antigen including non-RBD sequences, indicating the induction of multi-epitopic responses by BNT162b2 in both age groups.

Dosing twice with BNT162b1 or BNT162b2 led to a substantial increase in incidence and magnitude of T-cell responses in both age groups, and across all dose levels for BNT162b1. While the magnitude of $CD4^+$ T-cell responses induced by BNT162b2 was also similar across different dose levels, the magnitude of $CD8^+$ T-cell responses was

highest at the 30 µg dose level. The participants with the strongest $CD4^+$ T-cell responses had more than 10-fold of the memory responses observed in the same participants against immunodominant peptides from cytomegalovirus, Epstein-Barr virus, influenza virus, and tetanus toxoid. The same participants also had strong $CD8^+$ T-cell responses that were comparable to memory responses against the above mentioned viral antigens. BNT162b2-induced $CD4^+$ and $CD8^+$ T-cell responses showed a decrease on Day 85, but remained detectable on Day 184 in almost all participants vaccinated with >10 µg at levels higher than or in range of recall antigen memory responses.

RBD- and S protein-specific $CD4^+$ T-cell responses observed after vaccination were induced *de novo* by BNT162b1 in 97.5% of participants and by BNT162b2 in 100% of participants. RBD- and S protein-specific $CD8^+$ T-cell responses observed after vaccination were induced *de novo* by BNT162b1 in 95.5% of participants and by BNT162b2 in 96.6% of participants.

	22MAR2021
Responsible Person: Dr. Evelyna Derhovanessian; Director Immune Monitoring Development & Coordination	Date

2 GENERAL INFORMATION

2.1 Sponsor and Test Facility

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Author 2:	Dr. Evelyna Derhovanessian Director Immune Monitoring Development & Coordination
Author 3:	Julian Sikorski Associate Director Data Engineering
Experimenter: 1. ELISpot data analysis 2. Software & algorithm development, automated analysis 3. Data processing	1. Dr. Evelyna Derhovanessian Director Immune Monitoring Development & Coordination 2. Dr. Rolf Hilker Associate Director Bioinformatics Research & Development 3. Julian Sikorski Associate Director Data Engineering

2.3 Study Dates

Start of data analysis: 01 JUL 2020

Data cut-off for this report (V03): 02 MAR 2021

Completion of data analysis: data analysis ongoing

2.4 Guidelines and Regulations

All experiments have been executed in accordance with the existing standard operating procedures and described processes of BioNTech SE. Applicable documents are listed below.

- SOP-100-024 Planning and Reporting
- SOP-080-009 Validation of Computerized Systems (EDA)

- SOP-081-001 Software Development under GxP
- SOP-100-070 Validation of Computerized Systems (SURE, planned)

2.5 Changes and Deviations

Not applicable. There is no formal R&D plan available.

2.6 Documentation and Archive

Study plans and reports are stored and archived according to SOP-100-003.

Evaluated data are saved at BioNTech's servers:

- ELISpot EDA files and Certificates of Analysis including expert call in .xlsx format (for SAS Import):

\\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_Biomarker_clinical_data\99_data_postbox\Elispot

- Fast Track SURE tool results:

\\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_Biomarker_clinical_data\SURE

- Final results of process:

\\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_Biomarker_clinical_data\99_data_postbox\Elispot

Raw data are saved at:

This work does not deal with raw data, as it is based on processed data from another workflow. The corresponding raw data and resulting process data are described in GA-RB-022-01A analytical study interim report version 01.

3 INTRODUCTION

3.1 Background

BioNTech SE is developing an RNA-based vaccine against SARS-CoV-2 within the clinical trial BNT162-01. In order to assess immunogenicity of the vaccine, the T-cell populations in the blood of the healthy volunteers participating in the clinical trial were analyzed for both $CD4^+$- and $CD8^+$-specific T cells against the SARS-CoV-2 spike protein vaccine targets. This analysis was performed with an ELISpot assay under GCP conditions within the analytical study GA-RB-022-01A by the BioNTech Biolytics-GCP unit. The resulting spot counts of the ELISpot assay were evaluated with the ELISpot Data Analysis tool (EDA-001). This tool performs a statistical test to identify positive immune responses in each tested sample. In the next steps, these results were checked by subject matter experts, and a final immunogenicity call (expert call) was made for each analyzed sample.

Prior to final analysis and interpretation of the ELISpot data and in order to ensure meaningful comparison of spot counts across different participants treated in different dose groups, possible differences in sample quality, T-cell fitness, and T-cell content of different samples, reflected in their response to anti-CD3 stimulation, had to be taken into account. To this end, a new method implemented in a new software tool was developed. The tool is called “Fast Track Subject Response Evaluation” (“Fast Track SURE”). It normalizes the spot counts with respect to the sample positive control (sample stimulated with anti-CD3 mAb), which reflects T-cell fitness. In a second step, SURE compares the response strength of both visits and performs a classification of the response for each sample/visit pair. Finally, the normalized background is subtracted from the normalized experiment spot count to account for varying background when comparing samples. In a final step, the fitness-normalized spot counts (generated from 3.3×10^5 cells) were extrapolated to 1×10^6 cells, for better comparability with published data (usually reported for 1×10^6 cells).

Since “Fast Track SURE” is under development, Computer Software Validation (CSV) of SURE is planned and currently in the starting phase. It will be conducted according to SOP-081-001 and SOP-100-070 (see Section 2.4).

3.2 Objectives

The objective of this study was to further process the *ex vivo* IFNγ ELISpot data generated from the BNT162-01 clinical trial by the BioNTech Biolytics-GCP unit to enable:

a) statistical comparison of ELISpot results from different visits of the same participant, after normalization of the spot counts against the positive control.
b) comparison of ELISpot results between participants from the different dose groups, using normalized spot count data.
c) accurate interpretation of the immunogenicity of BNT162b1 and BNT162b2 vaccine candidates.

3.3 Study Design

This study analyzes the ELISpot result data from participants vaccinated with BNT162b1 (97 participants) or BNT162b2 (76 participants) in the BNT162-01 clinical trial. The data flow after release of the ELISpot data from the Biolytics-GCP unit (see interim report GA-RB-022-01A) until generation of processed spot counts for interpretation of BNT162b1 and BNT162b2 immunogenicity is shown in Figure 1 and described in Section 4.5.1.

After generation of the ELISpot assay results, "Fast Track SURE" performed a fitness normalization and participant response evaluation for all participants (see Figure 1 and Sections 4.5.2 and 4.5.3). Then, the normalized background was subtracted from the normalized experiment spot count to account for varying background when comparing samples. In a final step, the fitness-normalized spot counts (generated from 3.3×10^5 cells) were extrapolated to 1×10^6 T cells, (Figure 1 and Section 4.5.4) for better comparability with published data (usually reported for 1×10^6 cells).

This final result allows direct use of the data in summarizing and continual analyses. The immunogenicity rate and processed (i.e., normalized and extrapolated) spot count data for vaccine candidates BNT162b1 and BNT162b2 were further analyzed for dose-response relationships (Section 5).

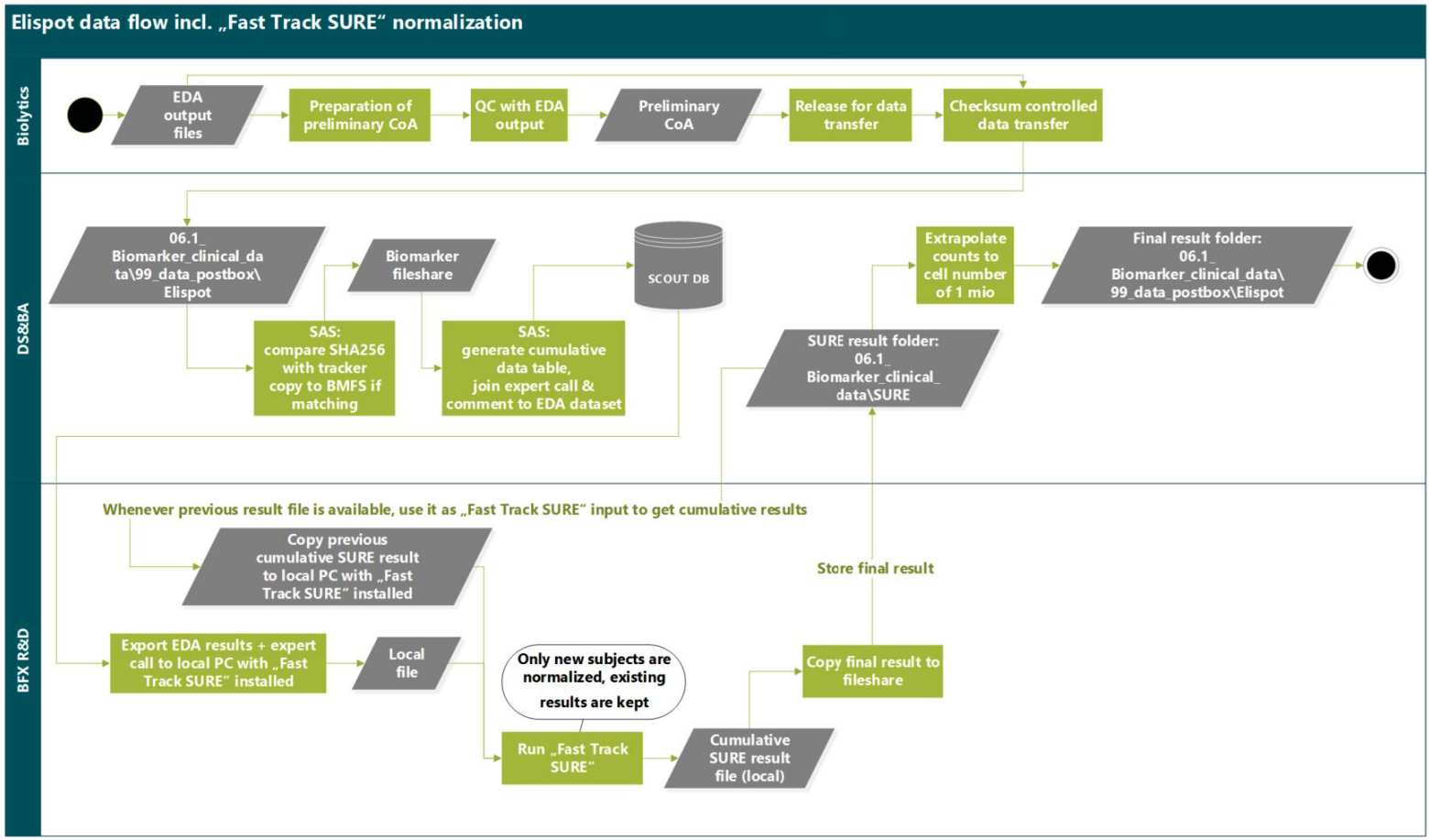


Figure 1: ELISpot data analysis Process UML version 2

The UML encompasses all steps of ELISpot data generation, data processing, and data analysis until the final result table is generated. The direct export of the SCOUT DB has been performed since 11 November 2020 and the replacement of the "Unique Target ID" was not necessary anymore from 9 December 2020 on due to an update to the EDA output. DS&BA = Data Science & Biomarker Analysis, BFX = Bioinformatics, R&D = Research & Development.

4 MATERIALS AND METHODS

4.1 Test Data

The following sources were used as test data:

***Ex vivo* ELISpot analysis data from BNT162-01 clinical trial participant samples**

Identification	**BNT162-01 ELISpot results including expert call**
Description	Results of samples from participants in the clinical trial BNT162-01 examined in the GCP-compliant analytical study GA-RB-022-01A using a standardized procedure that contains a qualified *ex vivo* ELISpot method. These results have been statistically evaluated with EDA-001 and assessed by an expert.
Storage at	\\biontech.int\Projects\BioNTechRNA\RN9391R00_CoV-VAC\06.1_ Biomarker_clinical_data\99_data_postbox\Elispot

Test data preparation
BNT162-01 participants' ELISpot result data including expert call acquired until 11 NOV 2020 were copied from the above mentioned network drive to one local PC with the correct environment setup for running "Fast Track SURE". After this date, the data has been directly exported from the SCOUT DB to the aforementioned PC. Results were copied back to the network folder mentioned in Section 2.6 as "Fast Track SURE tool results" after a manual plausibility check using the Notepad++ "compare" plugin.

4.2 Control Data

Not applicable.

4.3 Test System

The test system for the "Fast Track SURE" fitness normalization and subject response evaluation for this report was a DEV environment on a local PC.

4.4 Materials

Data processing before and after "Fast Track SURE" was done in SAS 9.4.

"Fast Track SURE" software was maintained in the GitLab version control system of BioNTech SE at:

https://gitlab-rnddev.biontech.de/bioinformatics-research-development/eda_helper/-/tree/master/exVivoTool

Also required was the “analysis_bnt.py” module from the BNT_Utils GitLab repository at:

https://gitlab-rnddev.biontech.de/bioinformatics-research-development/bnt_utils.

The computer to run “Fast Track SURE” was required to have Python 3 (https://www.python.org/) and Stan (https://mc-stan.org/, a statistical modeling and high-performance statistical computation platform) via PyStan (https://pystan.readthedocs.io/en/latest/index.html).

Some additional Python packages were required and the below listed versions were used:

- matplotlib version 3.2.2
- numpy version 1.18.5
- pandas version 1.0.5
- scikit-learn version 0.23.1
- pystan version 2.19.1.1

4.5 Methods

4.5.1 Data Processing

The original BioNTech Biolytics-GCP data were obtained for each sample (one visit, one participant). In order to generate a cumulative dataset, original copies of the EDA files and electronic Certificates of Analysis (CoAs) were transferred from the postbox folder to the DS&BA file share. Data integrity was maintained by generating a checksum for the original files for each analytical run and setting the files to read-only. The checksum match was verified after each data transfer. For both EDA files and electronic CoAs, the data was pooled separately, generating a cumulative dataset for each data type. Subsequently, expert calls and comments from the CoAs were added to the EDA data. Finally, an export file for fitness normalization and subject response evaluation (SURE) process was generated directly from the BioNTech Data Science & Biomarker Analysis (DS&BA) team's SCOUT DB by the BioNTech Bioinformatics R&D team as shown in Figure 1.

The export was directly stored on a local computer with the environment set up for running "Fast Track SURE". "Fast Track SURE" processed the cumulative EDA results including the expert call. Additionally, "Fast Track SURE" received the previous cumulative "Fast Track SURE" output as second input containing the "Fast Track SURE" results for the already analyzed participants (except for the first run). "Fast Track SURE" then performed a fitness normalization and subject response evaluation for all new participants in the cumulative input tables. The normalized background was subtracted from the normalized experiment spot count to account for varying background when comparing samples. "Fast Track SURE" produced the normalized and evaluated results in a zip archive file accompanied by an md5 cheksum. These were copied back to the network storage (see transfer back from bioinformatics (BFX) R&D team to DS&BA team in Figure 1).

In a final step, the results were merged with cohort and dose information and the spot counts were extrapolated to a T-cell number of 1×10^6 (Figure 1 and Section 4.5.4).

4.5.2 Fitness Normalization of ELISpot Spot Counts

A normalization method was developed to account for varying sample quality in the *ex vivo* ELISpot assay reflected in the number of spots in response to stimulation with anti-CD3 mAb.

The dependency of the experiment spot counts to the positive control spot counts was modeled in a log-linear fashion with a Bayesian model including a noise component. The likelihood of the model was defined as:

$$\log \lambda_E = \alpha \log \lambda_P + \log \beta_j + \sigma\varepsilon,$$

where λ_E is the normalized spot count of the sample, α is a stable factor (normally distributed) common among all positive controls λ_P, β_j is a sample j specific

component (normally distributed), and $\sigma\varepsilon$ is the noise component, of which σ is Cauchy distributed and ε is Student's-t distributed.

This model was the result of the following considerations:

1. The functional dependency of $\lambda_E = f(\lambda_P)$ has to be modeled, which is the probability of $P(\lambda_E|\lambda_P)$.
2. The spot count formation was expected to be a Poisson process.
3. The observed spot counts for a sample were used to infer its Poisson rate λ.
4. α was introduced to model a general difference between the anti-CD3 positive control and the samples.
5. β_j was introduced to model that each sample was a different batch and had a spot count rate independent of the other samples.
6. To model the noise of the system in a robust fashion, σ was chosen to be Cauchy distributed, because it is heavy-tailed

For a robust normalization, each sample was drawn 10,000 times from the model, and the median of these instances was assigned as fitness-normalized spot count value. As a reference value to normalize to, a spot count of 1,200 was chosen for the sample positive control, because it corresponds to the TNTC (Too Numerous To Count) value, which is the readout limit of the ELISpot measuring device. In other words, the mean spot count of each sample was normalized as if 1,200 spots had been counted for its respective positive control.

As an example, when the drawing from the posterior distribution $P(\lambda_E|\lambda_P = 1200)$ was performed for a sample with a mean spot count of 68 and a weak positive control spot count of 696 (indicating poor sample fitness), the distribution of the draws shown in Figure 2 resulted from the model. The median spot count of this example after normalization was 110. This example shows that the model works in the expected fashion: The TNTC value (1,200) was ~1.7 times the mean spot count value of the weak positive control. The normalized spot count value of the sample was ~1.6 times its mean spot count value prior to normalization. Thus, both normalization factors were close to each other and reflected the expected nearly linear relationship. As a result, the normalized spot count of 110 reflects the unbiased result to be expected from a sample with high T-cell fitness.

This method was applied to the *ex vivo* ELISpot results of all samples from BNT162-01 study participants who received BNT162b1 or BNT162b2 (only Cohorts 1 to 10) that were analyzed in the analytical study GA-RB-022-01A until 02 MAR 2021 as part of the "Fast Track SURE" software.

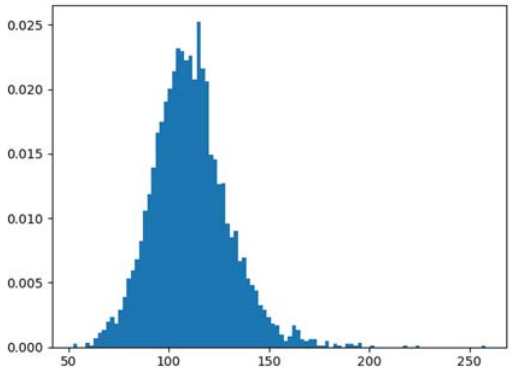


Figure 2: Example of the distribution of sampled spot counts

A fictive example with a mean spot count of 68 and a positive control spot count of 696 was normalized to $\boldsymbol{P(\lambda_E|\lambda_P = 1,200)}$. The x-axis shows the spot count and the y-axis shows the fraction of draws within each bin. The median spot count after normalization is 110.

4.5.3 Subject Response Evaluation

This section describes the SURE algorithm, which was performed based on the fitness-normalized *ex vivo* ELISpot data. After all random draws were performed according to Section 4.5.2, the 10,000 data points for each sample from the pre-Dose 1 visit were taken together with the 10,000 random draws for the corresponding post-vaccination sample. Then their adjusted mutual information (MI) was computed. The adjusted MI is a measure of the statistical dependence of two random variables and in this case has a range from 0 to 1, where a value toward 1 means both random variable sets are very different (see Figure 3, left plot), while a value toward 0 means that both random variable sets are very close or identical (see Figure 3, right plot). The adjusted MI was used because it accounts for the fact that the MI is generally higher for two clusterings with a larger number of clusters, regardless of whether there is actually more information shared.

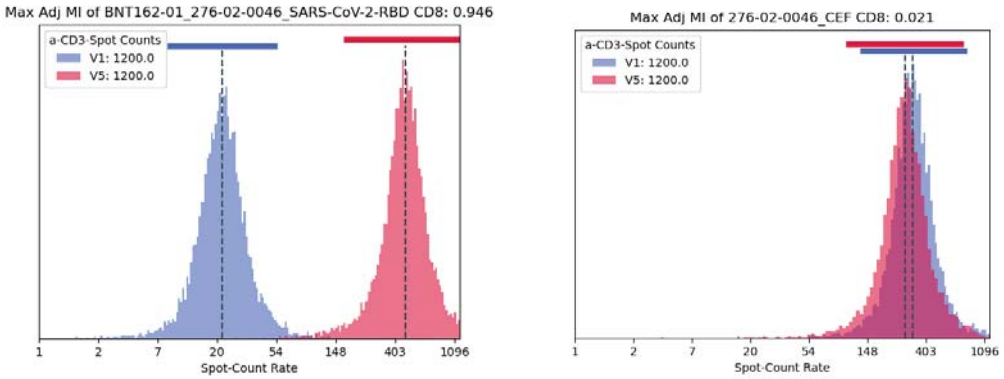


Figure 3: Each example image is a visual comparison of the density of the fitness-normalized spot counts of two visits for the same antigen (based on 10,000 random draws each)

Left: Spot counts showing a *de-novo* response. Visit 1 (pre-Dose 1) data show no immune response, while Visit 5 (Day 29 = 7 days post-Dose 2) data shows a positive immune response. The adjusted mutual information (MI) is very high at 0.946. Right: Data from both visits show a stable positive immune response with an adjusted MI of 0.021. The horizontal bar on top of each distribution visualizes the range from the 0.025 up to the 0.975 quantile.

In the final step of the SURE algorithm, the data from both visits (pre- and post-vaccination) were classified according to Table 1. The adjusted MI is the decisive metric to reliably classify any alteration of the T-cell response of an individual after immunization with the vaccine candidate based on the sample analysis with the *ex vivo* ELISpot method.

Table 1: List of all possible Subject Response Evaluation (SURE) calls depending on the combination of pre- and post-vaccination responses

Pre-dose ELISpot result	Post-dose ELISpot result	SURE
Not evaluable/not done	No response	No response
Not evaluable/not done	Positive response	No data
Not evaluable/not done	Not evaluable/not done	No data
No response	No response	No response
No response	Positive response	*De-novo* response
No response	Not evaluable/not done	No data
Positive response	No response	No response
Positive response	Positive response	Pre-existing response: - MI > 0.8: amplified - 0.4 < MI ≤ 0.8: ambiguous - MI ≤ 0.4: stable
Positive response	Not evaluable/not done	No data

MI = mutual information

Finally, the fitness-normalized background (negative control spot count) was subtracted from the normalized experiment spot count (see Section 4.5.2) to account for varying background when comparing samples.

The Subject Response Evaluation was performed for all samples from BNT162-01 study participants who received BNT162b1 or BNT162b2 (only Cohorts 1 to 10) that have been analyzed in the analytical study GA-RB-022-01A until 02 MAR 2021 as part of the "Fast Track SURE" software.

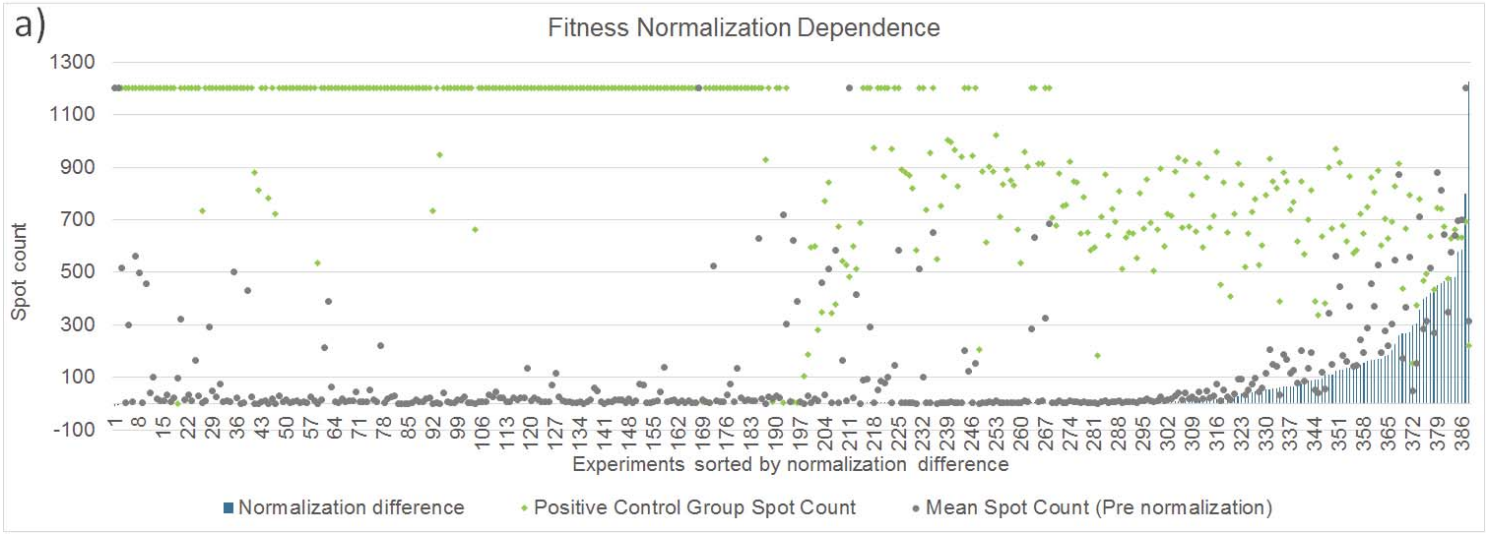
4.5.4 Extrapolation of Cell Numbers

In a final step, the "Fast Track SURE" results were merged with cohort and dose information and the fitness-normalized spot counts (generated from 3.3×10^5 cells) were extrapolated to 1×10^6 cells. This enabled comparability with published data that are usually reported for 1×10^6 cells.

5 RESULTS

5.1 Summary Fitness Normalization of T-cell Responses

As demonstrated in Figure 4, the model is robust for negative *ex vivo* ELISpot analysis results (low to no spot counts, indicating no T-cell response) and samples with high T-cell fitness/T-cell content. Only the spot counts of samples with lower T-cell fitness/T-cell content (spots of the positive control decreasing from 1,000) and spot counts ≥25 spots were notably adjusted by the normalization. For the majority (75.5%) of the 388 data points from 97 participants who received BNT162b1 and 79% of the 912 data points from 76 participants who received BNT162b2 reported here (Day 1 and Day 29), the absolute number of spot counts was only marginally altered by the fitness normalization (i.e., spot count change was <5 spots, see Figure 5). For only 15.7% of BNT162b1 and 11% of BNT162b2 data points the original spot count was changed by >50 spots. Note that for 2 participants, anti-CD3 was not pipetted to the plates; thus, ELISpot data could not be normalized because the sample positive control was missing. The four outliers from Figure 5a are found on the far right in Figure 4a: These have low T-cell fitness and a notable response that should be much stronger, if the samples had better fitness. Hence, the normalization algorithm is suitable for its intended purpose.



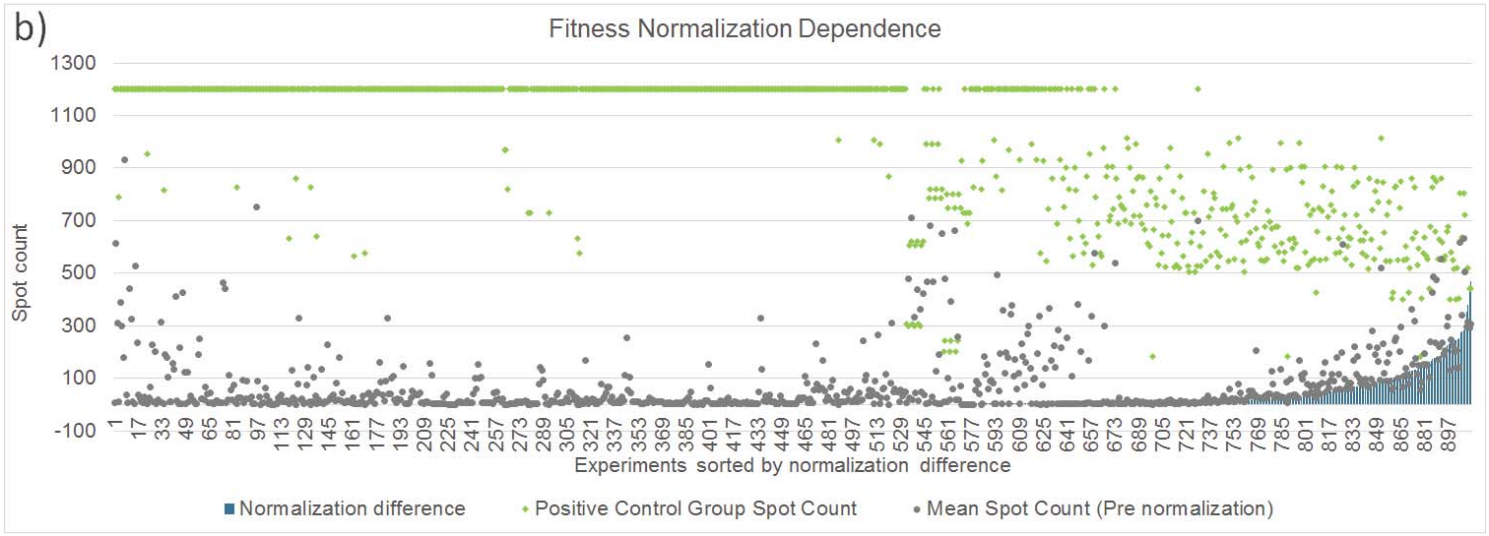


Figure 4: T-cell fitness normalization dependence – BNT162b1 and BNT162b2

$CD4^+$ and $CD8^+$ T-cell data from two time points (Day 1 and Day 29) in response to stimulation with the RBD PepMix in participants who received BNT162b1 (a) or in response to two pools of the S protein and the RBD pool in participants who received BNT162b2 (b) are shown. Dependence of non-normalized mean spot count (gray) and positive control spot count (light green) to the difference of the non-normalized mean spot count to the fitness-normalized spot count (blue bars) sorted by this difference. As expected, the normalization did not significantly change spot count values of samples of good quality (1,200 spots in positive control, left to middle) or samples with varying fitness and very low to no spots (no T-cell responses, middle to middle right). In contrast, samples with higher spot counts and lower fitness were normalized as intended (toward the right end of plot).

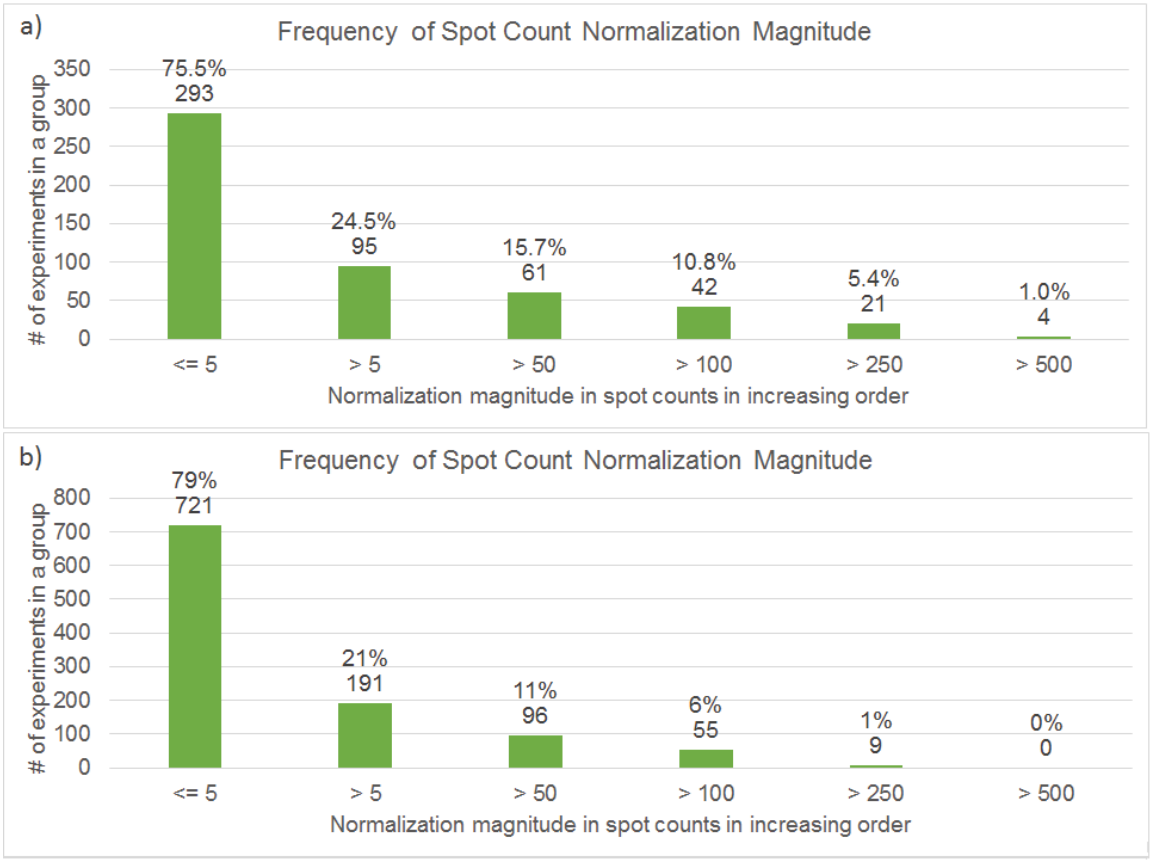


Figure 5: Frequency of spot count normalization magnitude – BNT162b1 and BNT162b2

$CD4^+$ and $CD8^+$ T-cell data from two time points (Day 1 and Day 29) in response to stimulation with the RBD PepMix in participants who received BNT162b1 (a) or in response to two pools of the S protein and the RBD pool in participants who received BNT162b2 (b) are shown. The bins define the magnitude of increase of the original mean spot count to the fitness-normalized spot count. In 75.5% (a) and 79% (b) of the experiments, the normalization did not alter the spot count values significantly (first bar on the left). 15.7% (a) and 11% (b) of the experiments required a larger correction, which is >50 spot counts (third bar from the left). Finally, 4 (a) and 0 (b) outliers required a strong correction of the spot counts >500 spots (sixth bar from the left).

5.2 Immunogenicity of BNT162b1

5.2.1 Immunogenicity Population

Ex vivo ELISpot data were generated from 102 participants in the BNT162-01 trial by BioNTech Biolytics-GCP (see GA-RB-022-01A). Data from 5 participants were excluded from this report due to following reasons:

- No valid ELISpot data was available: 276-01-0089, 276-01-0298, 276-01-0320
- Only bulk peripheral blood mononuclear cell (PBMC) ELISpot data were available: 276-01-0083
- Non-evaluable CD8 data and non-evaluable CD4 data at Visit 1 (pre-Dose 1) for participant 276-01-0036. This participant showed a very weak $CD4^+$ response at Visit 5 (Day 29 or 7 days post-Dose 2).

The remaining 97 participants were distributed in the 1 µg to 60 µg dose groups in two age groups, as summarized in Table 2).

Table 2: Participant disposition and ELISpot analysis set for BNT162b1

Dose group	ELISpot data available (# of participants)	
	Day 1	Day 29±3
1 µg	10	11
3 µg	11	11
10 µg	10/11*	11
20 µg	6/8*	8
30 µg	10	10
50 µg	10	10
60 µg (only Dose 1)	9	9
10 µg (56 – 85 years)	8	8
20 µg (56 – 85 years)	8	8
30 µg (56 – 85 years)	10/11*	11

*number of CD4 datasets/number of CD8 datasets

Ex vivo ELISpot analysis was completed for participants from the above mentioned dose groups with sufficient PBMCs available.

5.2.2 Vaccine-induced T-cell Responses

$CD4^+$ and $CD8^+$ T-cell responses in BNT162b1-vaccinated participants were characterized prior to Dose 1 (Day 1 = Visit 1) and on Day 29 (7 days after Dose 2 for the 1 µg to 50 µg dose groups = Visit 5). The fitness-normalized, background-subtracted, extrapolated ELISpot data were further compared between dose groups. Data from 6 participants (1 participant from the 10 µg dose group, 4 participants from

the 20 µg dose group, and 1 participant from the 30 µg dose group) could not be normalized. The immunogenicity data from these participants have been included in the statistics reported here; however, the spot count data are excluded from Figures or analyses concentrating on spot count data.

5.2.2.1 CD4⁺ T-cell Responses

Of 88 participants who received Dose 1 and Dose 2 (1 to 50 µg dose groups), 86 (97.7%) including all older participants and participants who received ≥3 µg BNT162b1) mounted RBD-specific CD4⁺ T-cell responses (Figure 6a). In addition to equal immunogenicity rate in both age groups, older participants mounted T-cell responses at equal magnitude as younger participants (Figure 7). While the magnitude of responses varied between individuals, participants with the strongest CD4⁺ T-cell responses to RBD had more than 10-fold of the memory responses observed in the same participants when stimulated with cytomegalovirus (CMV), Epstein-Barr virus (EBV), influenza virus, and tetanus toxoid-derived immunodominant peptide panels (Figure 6b). No CD4⁺ T-cell responses were detectable at baseline, except for 2 participants with a low number of pre-existing RBD-reactive CD4⁺ T cells, which increased after vaccination (normalized mean spot count from 64 to 1,519 in the 50 µg dose group and 31 to 181 in the 20 g dose group). For 5 participants the baseline data were not evaluable (see Table 2). Thus in 97.5% of participants with CD4⁺ T-cell responses and evaluable baseline data (79 out of 81) RBD-specific CD4⁺ T-cell responses were induced *de novo* by vaccination and were not present at baseline.

In 5 of 9 participants in the 60 µg dose group (55.6%), who received Dose 1 only, both immunogenicity rate and response strength were lower compared to the other dose groups, indicating the importance of booster dose.

Of note, while at 1 µg BNT162b1, the CD4⁺ immunogenicity rate was lower (9 of 11 participants [81.8%]), the magnitude of vaccine-induced T-cell responses in some participants was almost as high as with 50 µg BNT162b1 (Figure 6a).

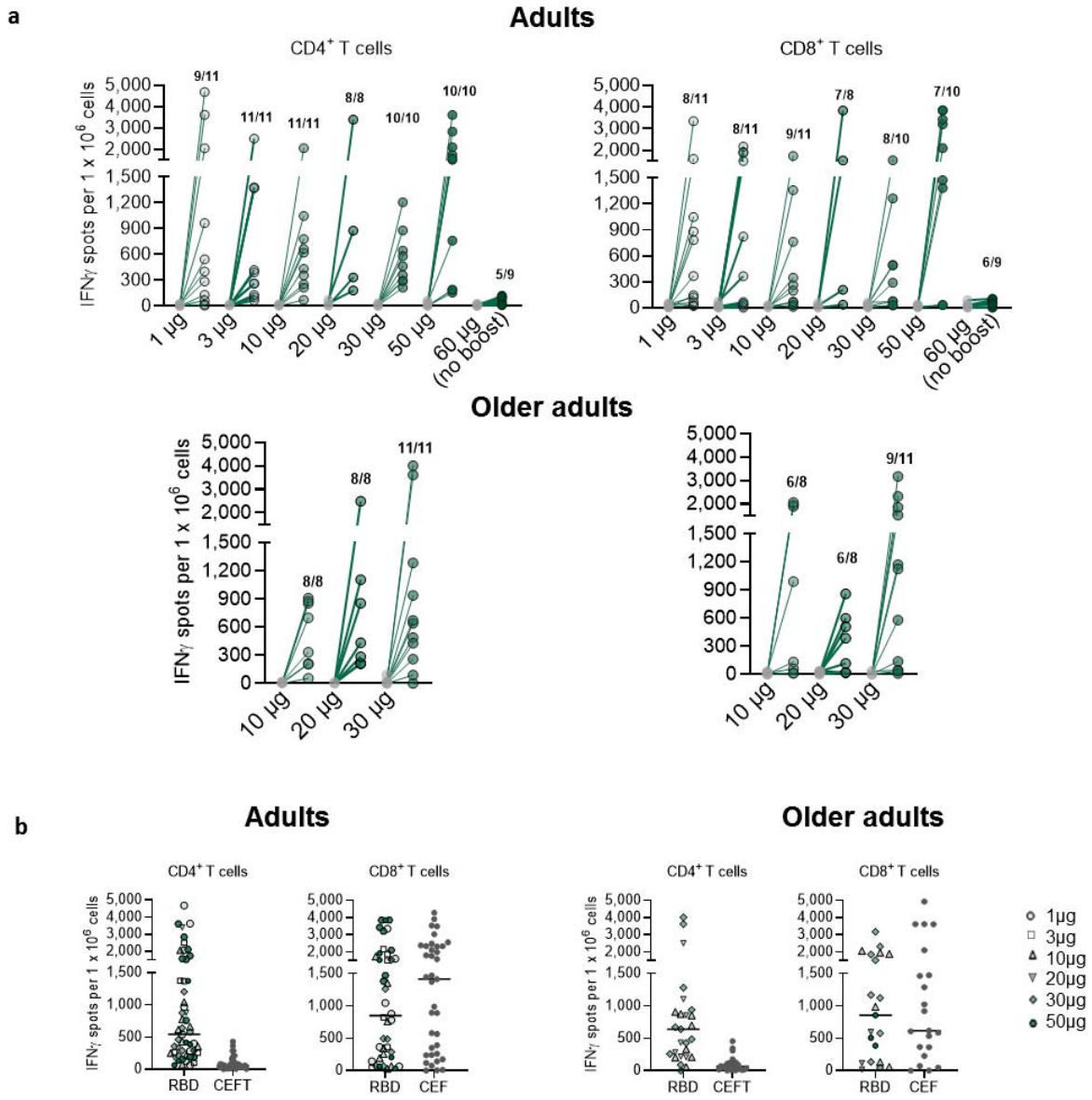


Figure 6: Frequency and magnitude of BNT162b1-induced CD4⁺ and CD8⁺ T-cell responses

PBMCs obtained on Day 1 (pre-Dose 1) and on Day 29 (7 days post-Dose 2 for the 1 µg to 50 µg dose groups, or 28 days after Dose 1 for the 60 µg dose group) were analyzed in *ex vivo* IFNγ ELISpot (see GA-RB-022-01A). Common pathogen T-cell epitope pools CEF (CMV, EBV, and influenza virus human leukocyte antigen (HLA) class I epitopes) and CEFT (CMV, EBV, influenza virus, and tetanus toxoid HLA class II epitopes) served to assess general T-cell reactivity, cell culture medium served as negative control. Each dot represents the normalized mean spot count from duplicate wells for 1 study participant, after subtraction of the medium-only control. a, Ratios above post-vaccination data points are the number of participants with detectable CD4⁺ or CD8⁺ T-cell response within the total number of tested participants per dose group. b, RBD-specific CD4⁺ and CD8⁺ T-cell responses in all participants dosed twice (n=61 younger participants (adults), n=27 older participants) with a positive response to RBD and their baseline CEFT- and CEF-specific T-cell responses. Note: CD4 and CD8 data from 1 younger participant from the 10 µg dose group, from 1 younger participant from the 30 µg dose group, and from 4 younger participants from the 20 µg dose group could not be normalized and hence have not been included in the plots. Horizontal lines represent the median of each group.

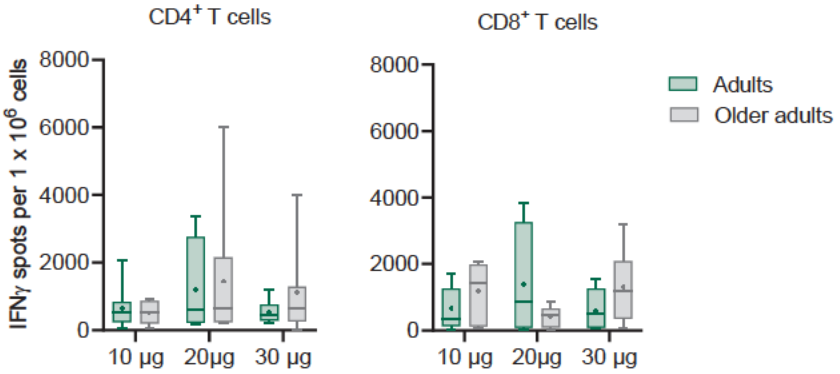


Figure 7: Comparison of T-cell responses between younger and older adult participants

RBD-specific CD4+ (left) and CD8+ (right) T-cell response data from younger participants (adults) (green boxes) and older participants (gray boxes) measured at Day 29 (same data as in Figure 6a) are shown for dose groups of 10, 20, and 30 µg. Only positive responses have been plotted. Box-Whisker plots indicate the min and max values, lines in the boxes indicate the median values, + indicates the mean values.

5.2.2.2 CD8+ T-cell Responses

Vaccine-induced CD8+ T-cell responses were observed in 47 of 61 (77.0%) younger participants and in 21 of 27 (77.7%) of older participants who received BNT162b1 (two-dose regimen). In addition to an equally high immunogenicity rate in older participants, the magnitude of CD8+ T-cell responses was also similar to the younger participants(Figure 7). The majority (40 of 67 [59.7%]) of the observed CD8+ responses were strong (Figure 6a) and comparable with memory responses against CMV, EBV, and influenza virus in the same participants (Figure 6b). Paired data were available from 67 out of 68 participants with CD8+ T-cell responses. In 64 participants (95.5%), CD8+ T-cell responses were induced *de novo* by the vaccine and were not detectable at baseline. For 1 participant from the 1 µg dose group, the baseline data were not evaluable.

Nine participants treated only with Dose 1 of 60 µg BNT162b1 had a lower response rate (6 out of 9 [66%]) and weaker CD8+ T-cell responses to RBD. Pre-existing responses to RBD were present in 2 participants at baseline and did not increase after vaccination. Thus, *de-novo* responses were induced in 4 out of 9 participants who received only Dose 1 of 60 µg BNT162b1.

5.3 Immunogenicity of BNT162b2

5.3.1 Immunogenicity Population

Ex vivo ELISpot analysis data on samples from Day 1 and Day 29 were generated from 84 participants from Cohorts 1 to 10 by BioNTech Biolytics-GCP (see GA-RB-022-01A). Data from 8 participants were excluded from this report due to following reasons:

- No valid ELISpot data were available: 276-02-0158, 276-02-0195, 276-02-0214, 276-02-0216, and 276-01-0272
- Participants did not receive Dose 2: 276-02-0116 and 276-02-0160
- Only bulk PBMC ELISpot data were available: 276-02-0118

The remaining 76 participants were distributed in the 1 µg to 30 µg dose groups in two age groups, as summarized in Table 3).

In addition, *ex vivo* ELISpot data were available from samples collected on Day 85 and/or Day 184 in a subset of 25 participants in dose levels >3 µg. Due to technical issues, no valid ELISpot data could be generated from 1 participant (276-01-0261). The remaining 24 participants were distributed in Cohorts 1 to 10 as summarized in Table 3).

Table 3: Participant disposition and ELISpot analysis set for BNT162b2

Dose group	ELISpot data available (# of participants)			
	Day 1	Day 29±3	Day 85±7	Day 184±9
1 µg (Cohort 3)	9	9	0	0
3 µg (Cohort 6)	10	10	0	0
10 µg (Cohort 1)	7/9*	9	8	8
20 µg (Cohort 5)	9	9	3	6
30 µg (Cohort 2)	10	10	6	6
10 µg (56 – 85 years, Cohort 8)	10	10	3	4
20 µg (56 – 85 years, Cohort 9)	9	9	0	0
30 µg (56 – 85 years, Cohort 10)	10/9*	10	0	0

*number of CD4 datasets/number of CD8 datasets

Ex vivo ELISpot analysis for the indicated time points was completed for participants from Cohorts 1 to 8 with sufficient PBMCs available. For Cohorts 9 and 10, analysis of Day 1 and Day 29 was completed.

5.3.2 Vaccine-induced T-cell Responses

$CD4^+$ and $CD8^+$ T-cell responses in BNT162b2 vaccinated participants were characterized prior to vaccination with Dose 1 (Day 1 = Visit 1) and Day 29 (7 days after Dose 2 = Visit 5). ELISpot analysis was performed using two peptide pools corresponding to the full-length wild-type S protein: S protein Pool 1 (S Pool 1, covering amino acids (aa) 1-643) and S protein Pool 2 (S Pool 2, covering aa 633-1273), as well as a peptide pool covering the whole length of the BNT162b1-encoded RBD sequence (aa 1-16 fused to aa 327-528 of the S protein). For visualization and interpretation of the data, the sum of the normalized, background-subtracted, extrapolated mean spot counts for the two S protein pools was used in Figure 8.

5.3.2.1 $CD4^+$ T-cell Responses

Of 76 participants (47 younger participants and 29 older participants) who received dosing twice, all 76 (100%) mounted $CD4^+$ T-cell responses to the SARS-CoV-2 S protein (Figure 8a). In addition to an equal immunogenicity rate in both age groups, older participants mounted T-cell responses at an equal magnitude as younger participants (Figure 9). While the magnitude varied between individuals, participants with the strongest $CD4^+$ T-cell responses to this antigen had more than 10-fold the memory responses observed in the same participants when stimulated with CMV, EBV, influenza virus, and tetanus toxoid-derived immunodominant peptide panels (Figure 8b). For all participants with evaluable baseline data (n=74), *de novo* $CD4^+$ T-cell responses to the S protein were induced by the vaccine and were absent in the baseline sample. In the majority of the participants (n=67, 90.5%) *de-novo* responses were poly-epitopic and were directed against both S Pool 1 and S Pool 2 of the S protein (Figure 10).

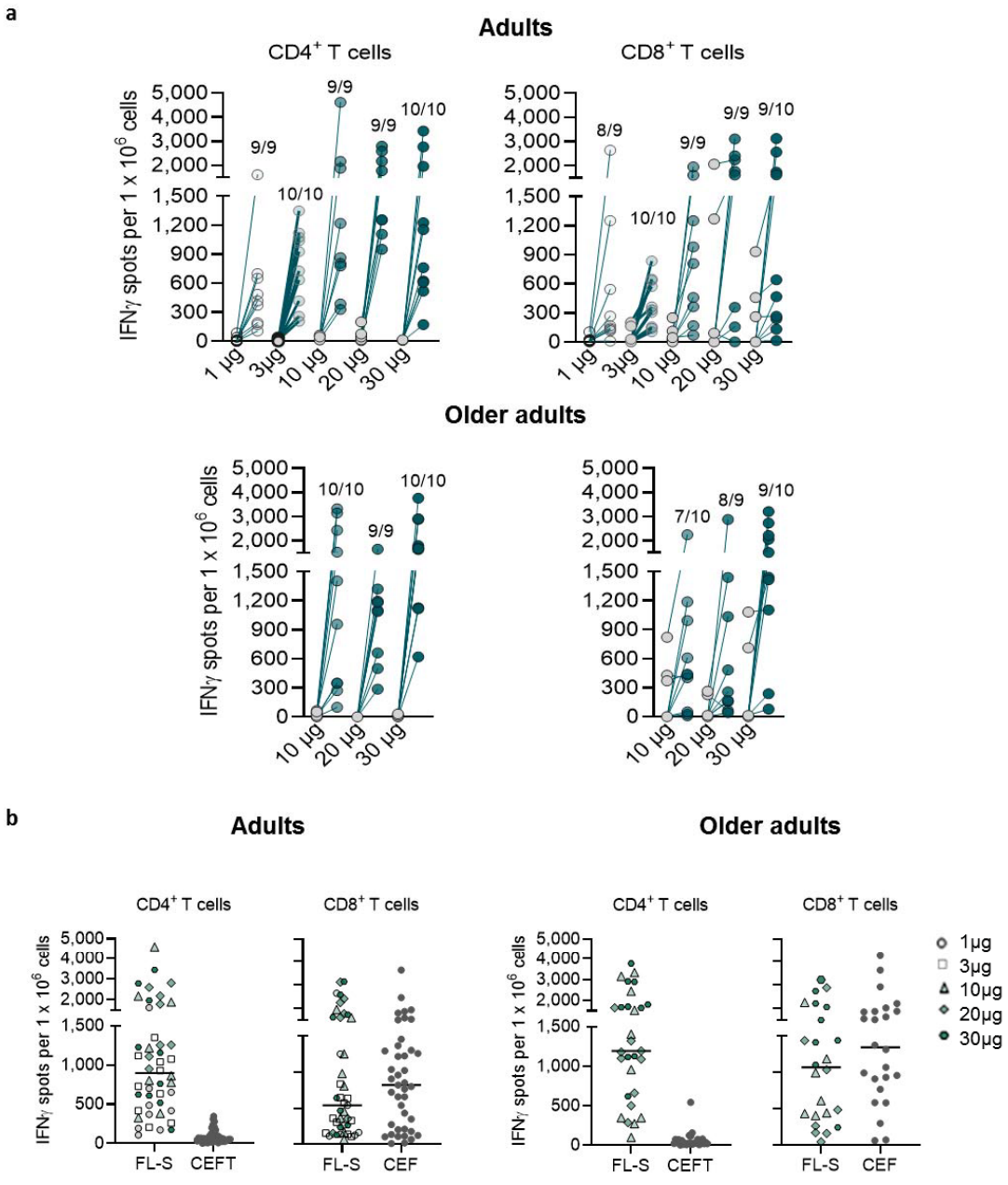


Figure 8: Frequency and magnitude of BNT162b2-induced CD4⁺ and CD8⁺ T-cell responses against full-length S protein

PBMCs obtained on Day 1 (pre-Dose 1) and on Day 29 (7 days post-Dose 2) were analyzed in *ex vivo* IFNγ ELISpot (for details see GA-RB-022-01A). Common pathogen T-cell epitope pools CEF (CMV, EBV, and influenza virus human leukocyte antigen (HLA) class I epitopes) and CEFT (CMV, EBV, influenza virus, and tetanus toxoid HLA class II epitopes) served to assess general T-cell reactivity; cell culture medium served as negative control. Each dot represents the sum of normalized mean spot count from duplicate wells stimulated with two peptide pools corresponding to the full-length wild-type S protein for 1 participant, after subtraction of the medium-only control. a, Ratios above post-vaccination data points are the number of participants with detectable CD4⁺ or CD8⁺ T-cell responses within the total number of tested participants per dose group. b, S protein-specific CD4⁺ and CD8⁺ T-cell responses in all participants with a positive response to S protein (n=46 younger participants (adults), 29 older participants for CD4⁺ and n=43 younger participants, 24 older participants for CD8⁺ T-cell responses) and their baseline CEFT- and CEF-specific T-cell responses. Note: CD4 data from 1 younger participant from the 20 µg dose

group and CD8 data from 2 younger participants from the 20 µg dose group could not be normalized and hence have not been included in the plots. Horizontal lines represent the median of each group.

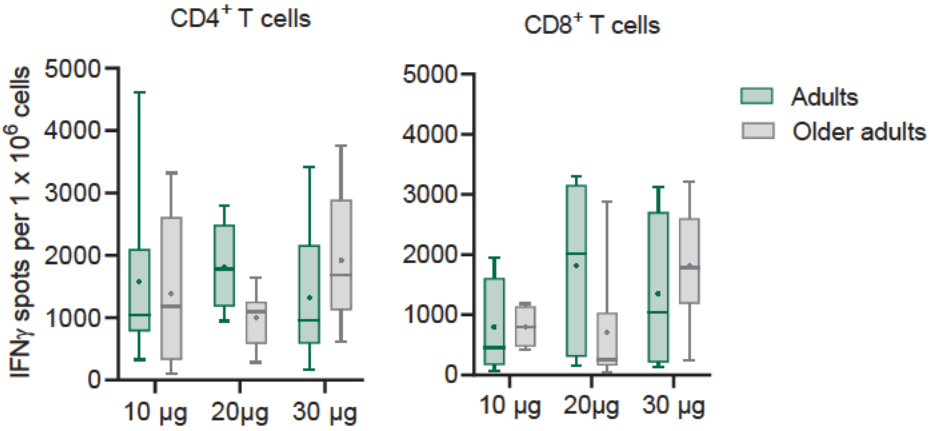


Figure 9: Comparison of T-cell responses between younger and older adult participants

SARS-CoV-2 S protein-specific CD4+ (left) and CD8+ (right) T-cell response data from younger participants (adults, green boxes) and older participants (gray boxes) measured at Day 29 (same data as in Figure 8a) are shown for dose groups of 10, 20, and 30 µg. Only positive responses have been plotted. Box-Whisker plots indicate the minimum and maximum values, lines in the boxes indicate the median values, + indicates the mean values.

5.3.2.2 CD8+ T-cell Responses

BNT162b2 induced strong SARS-CoV-2 S protein-specific CD8+ T-cell responses in 45 of 47 (95.7%) younger participants and 24 of 29 (82.8%) older participants. (Figure 8a), which were directed against both pools of the S protein (Figure 10b). Despite the slightly lower CD8+ immunogenicity rate in older participants, the magnitude of vaccine-induced responses was comparable to those induced in younger participants who received 30 µg BNT162b2 (Figure 9). These were comparable with memory responses against CMV, EBV, and influenza virus in the same participants (Figure 8b). CD8+ responses in 96.6% of participants were induced *de novo* by the vaccine. In the majority of participants with a positive T-cell response (42 of 69 participants [60.9%]), vaccine-induced *de-novo* responses were directed against both pools of the S protein, indicating induction of a poly-epitopic response by BNT162b2 against this antigen including non-RBD sequences.

Of note, the strength of both CD4+ and CD8+ T-cell responses showed a dose-dependent increase up to the dose level of 10 µg. At this dose and higher dose levels, T-cell responses were comparable across all dose levels for the younger participants. In older adults, while the magnitude of CD4+ T-cell responses induced by BNT162b2 was also similar across different dose levels, the magnitude of CD8+ T-cell responses was highest at the 30 µg dose level (Figure 9).

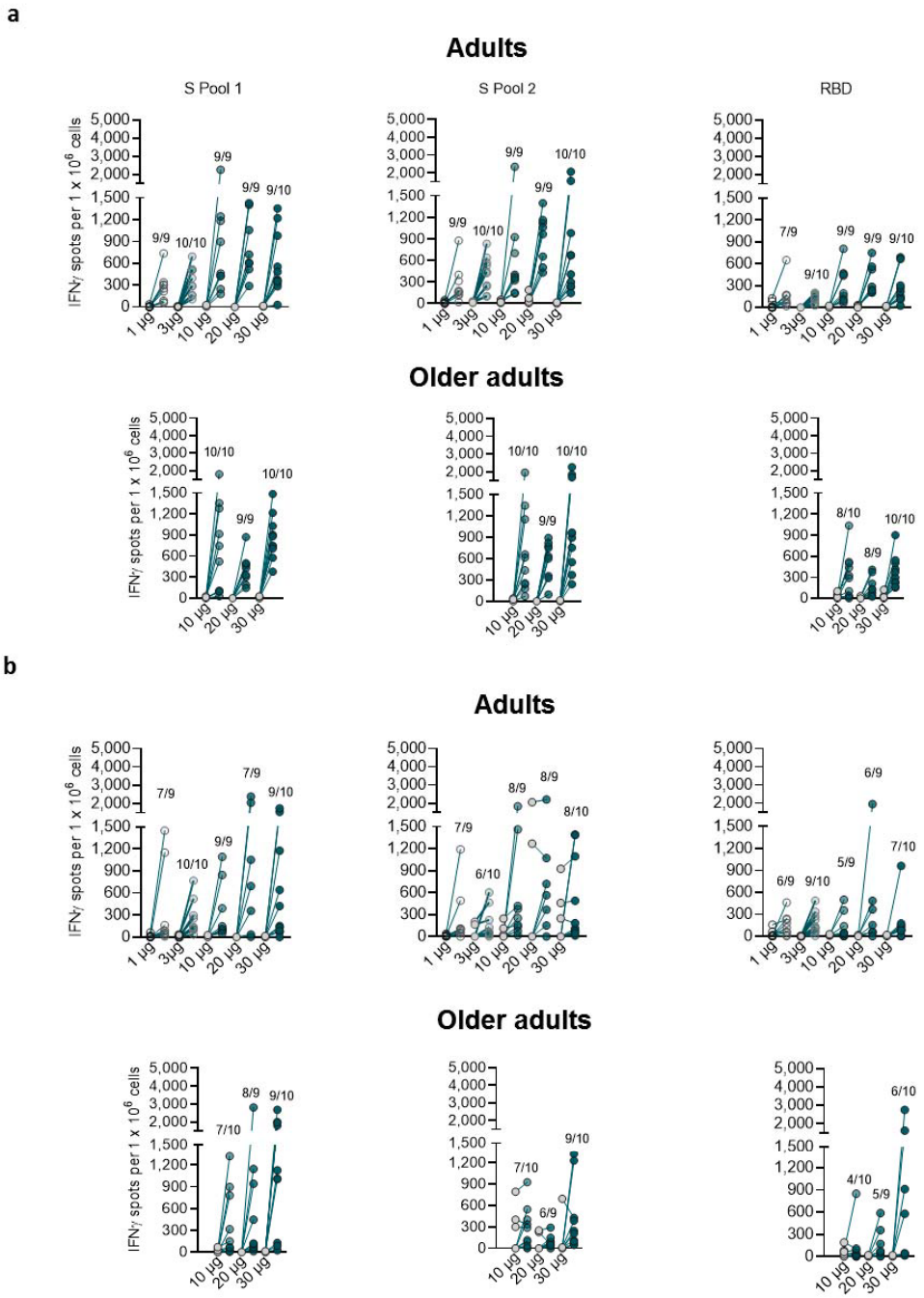


Figure 10: Frequency and magnitude of BNT162b2-induced CD4⁺ and CD8⁺ T-cell responses against different peptide pools

PBMCs obtained on Day 1 (pre-Dose 1) and on Day 29 (7 days post-Dose 2) were analyzed in *ex vivo* IFNγ ELISpot assays (for details see GA-RB-022-01A). Each dot represents the normalized mean spot count from duplicate wells stimulated with S Pool 1 (left panels), S Pool 2 (middle panels), or RBD (right panels), for 1 participant, after subtraction of the medium-only control. (a) CD4⁺ and (b) CD8⁺ T-cell response data are shown. Ratios above post-vaccination data points are the number of participants with detectable CD4⁺ or CD8⁺ T-cell responses within the total number of tested participants per dose group. Note: CD4 data from 1 younger participant from the 20 µg dose group and CD8 data from 2 younger participants from the 20 µg dose group could not be normalized and hence have not been included in the plots. Horizontal lines represent the median of each group.

5.3.3 Durability of BNT162b2-induced CD4+ and CD8+ T-cell Responses

In a subset of 24 participants across the dose groups 10 to 30 µg, samples collected at Day 85 and Day 184 (63 and 162 days post-Dose 2, respectively) were analyzed in order to determine the durability of T-cell responses induced by BNT162b2. On Day 184 and after an initial contraction, both $CD4^+$ and $CD8^+$ T-cell responses were detectable in the majority of participants, across the three dose levels tested. Kinetics of $CD4^+$ and $CD8^+$ responses observed in 4 older participants vaccinated with 10 µg BNT162b2 were comparable to younger participants, with S protein-specific $CD4^+$ T cells still detectable in all 4 participants 162 days after Dose 2. BNT162b2 induced $CD4^+$ and $CD8^+$ responses were either higher than or in the range of recall antigen memory responses (Figure 11).

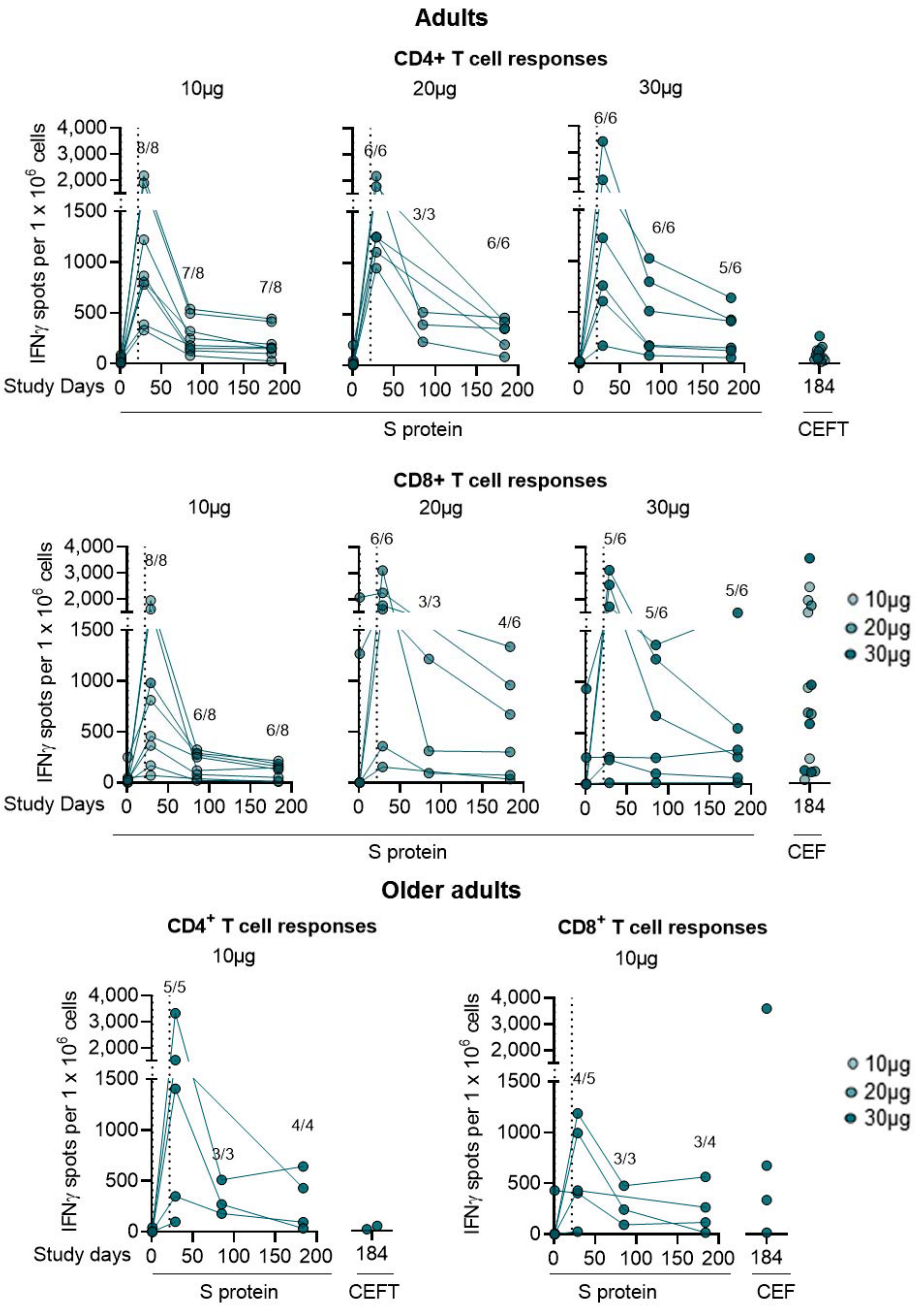


Figure 11: Durability of BNT162b2-induced T-cell responses

PBMCs obtained on Day 1 (before Dose 1), Day 29, Day 85, and Day 184 (7, 63, and 162 days post-Dose 2, respectively), were analyzed in *ex vivo* IFNγ ELISpot (for details see GA-RB-022-01A). Common pathogen T-cell epitope pools CEF (CMV, EBV, and influenza virus human leukocyte antigen (HLA) class I epitopes) and CEFT (CMV, EBV, influenza virus, and tetanus toxoid HLA class II epitopes) served to assess general T-cell reactivity, cell culture medium served as negative control. Each dot represents the sum of normalized mean spot count from duplicate wells stimulated with two peptide pools corresponding to the full-length wild-type S protein for one study participant, after subtraction of the medium-only control. Ratios above post-vaccination data points are the number of participants with detectable $CD4^+$ or $CD8^+$ T-cell responses within the total number of tested participants per dose group and time point.

6 CONCLUSION

A standardized process was implemented to accurately evaluate and interpret the *ex vivo* IFNγ ELISpot data generated in the BNT162-01 trial. Using this semi-automated process, ELISpot results from different visits of the same participant and data from different participants could be compared after normalization of the spot counts against the positive control. This allowed an accurate interpretation of the immunogenicity of the vaccine candidates BNT162b1 and BNT162b2.

BNT162b1 induced strong RBD-specific $CD4^+$ T-cell responses in the majority of participants vaccinated with two doses (86 of 88 [97.7%]), including all older participants (27 of 27 [100%]); $CD8^+$ responses were induced in 47 of 61 (77.0%) younger participants and in 21 of 27 (77.7%) older participants. In contrast, T-cell responses were detected less often and were lower in magnitude in 9 younger participants who received Dose 1 only (60 µg dose group), indicating the importance of a booster dose.

Similarly, high immunogenicity rates were observed for BNT162b2. This vaccine induced strong SARS-CoV-2 S protein-specific $CD4^+$ T-cell responses in all of the vaccinated younger or older adult participants (76 of 76 [100%]); $CD8^+$ T-cell responses were induced in 45 of 47 (95.7%) younger participants and 24 of 29 (82.8%) older participants at Day 29. Despite the slightly lower $CD8^+$ immunogenicity rate in older adults, the magnitude of vaccine-induced responses was comparable to those induced in younger participants who received 30 µg BNT162b2. These T-cell responses were directed against different parts of the antigen including non-RBD sequences, indicating the induction of multi-epitopic responses by BNT162b2 in both age groups. BNT162b2-induced $CD4^+$ and $CD8^+$ T-cell responses remained detectable on Day 184 (162 days post-Dose 2) in almost all participants vaccinated with >10 µg at levels higher than, or in range of recall antigen memory responses.

RBD- and S protein-specific $CD4^+$ T-cell responses observed after vaccination were induced *de novo* by BNT162b1 in 97.5% of participants and by BNT162b2 in 100% of participants. RBD- and S protein-specific $CD8^+$ T-cell responses observed after vaccination were induced *de novo* by BNT162b1 in 95.5% of participants and by BNT162b2 in 96.6% of participants.

7 DOCUMENT HISTORY

Third version – minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section	Version 02	Version 03	Reason for change
3.3, 4.1, 4.4	Manual copy of SURE input and creation of "Unique Target ID"	Direct export from SCOUT DB without adaption	Update of Bioinformatics data analysis process
5.1	65 participants for BNT162b2 included	76 participants for BNT162b2 included	Update of data basis
5.3.1	Table 3 included samples collected on Day 1 and Day 29 only	Data available from samples collected on Day 85 and Day 184 have been added to Table 3	Availability of new ELISpot data from samples collected on Day 85 and Day 184
5.3.3.	n.a.	Section added to describe data generated on samples from Day 85 and Day 184	Availability of new ELISpot data from samples collected on Day 85 and Day 184
All	"Prime/priming" or "boost/booster" were used to describe first and second dose, respectively, given to participants	"Dose 1" and "Dose 2" have been used instead	Consistency with the language used in the BNT162-01 clinical trial report (CTR)
All	"Subject" was used to describe a trial participant	"Participant" has been used instead	Consistency with the language used in the BNT162-01 CTR
All	"Cohort" was used to describe dose groups	"Dose group" has been used instead	Clarity and to be consistent with the language used in the BNT162-01 CTR

Second version – minor editorial changes, such as the correction of typing errors, are not listed.

Reason(s) for change(s) compared to previous version:

Section	Version 01	Version 02	Reason for change
5.2	n=62 adult subjects with evaluable ELISpot data	n=70 adult subjects and n=27 older adult subjects with evaluable ELISpot data	Availability of new ELISpot data from the reported cohorts; addition of new cohorts of older adult subjects
5.3	n=39 adult subjects with evaluable ELISpot data	n=47 adult subjects and n=29 older adult	Availability of new ELISpot data from the reported cohorts; addition of new

Section	Version 01	Version 02	Reason for change
		subjects with evaluable ELISpot data	cohorts of older adult subjects
5.3.1	Data from 276-02-0160 included in the report	Data from 276-02-0160 excluded	No information available on lack of booster vaccination in this subject at the time of preparation of the first version
5.3.2	SARS-CoV-2 spike protein pool 1: SARS COV 2_FL-S-PROTEIN_1 to SARS COV 2_FL-S-PROTEIN_106 SARS-CoV-2 spike protein pool 2: SARS COV 2_FL-S-PROTEIN_107 to SARS COV 2_FL-S-PROTEIN_315	SARS-CoV-2 spike protein pool 1: SARS COV 2_FL-S-PROTEIN_1 to SARS COV 2_FL-S-PROTEIN_158 SARS-CoV-2 spike protein pool 2: SARS COV 2_FL-S-PROTEIN_159 to SARS COV 2_FL-S-PROTEIN_315	The wrong pooling information was provided by the peptide supplier JPT. The wrong pooling information had no impact on the conclusions drawn in version 01 of this R&D report.
Appendix	n/a	Box plot representation of $CD4^+$ and $CD8^+$ T cell data for BNT162b1 (Appendix 1) and BNT162b2 (Appendix 2)	Request from MHRA reviewer

8 REFERENCES

GA-RB-022-01A GC(L)P Analytical Study Interim Report (Biolytics-GCP), Version 03

9 APPENDIX

Appendix 1: BNT162b1-induced CD4+ and CD8+ T-cell response data plotted as Box-Whisker plots

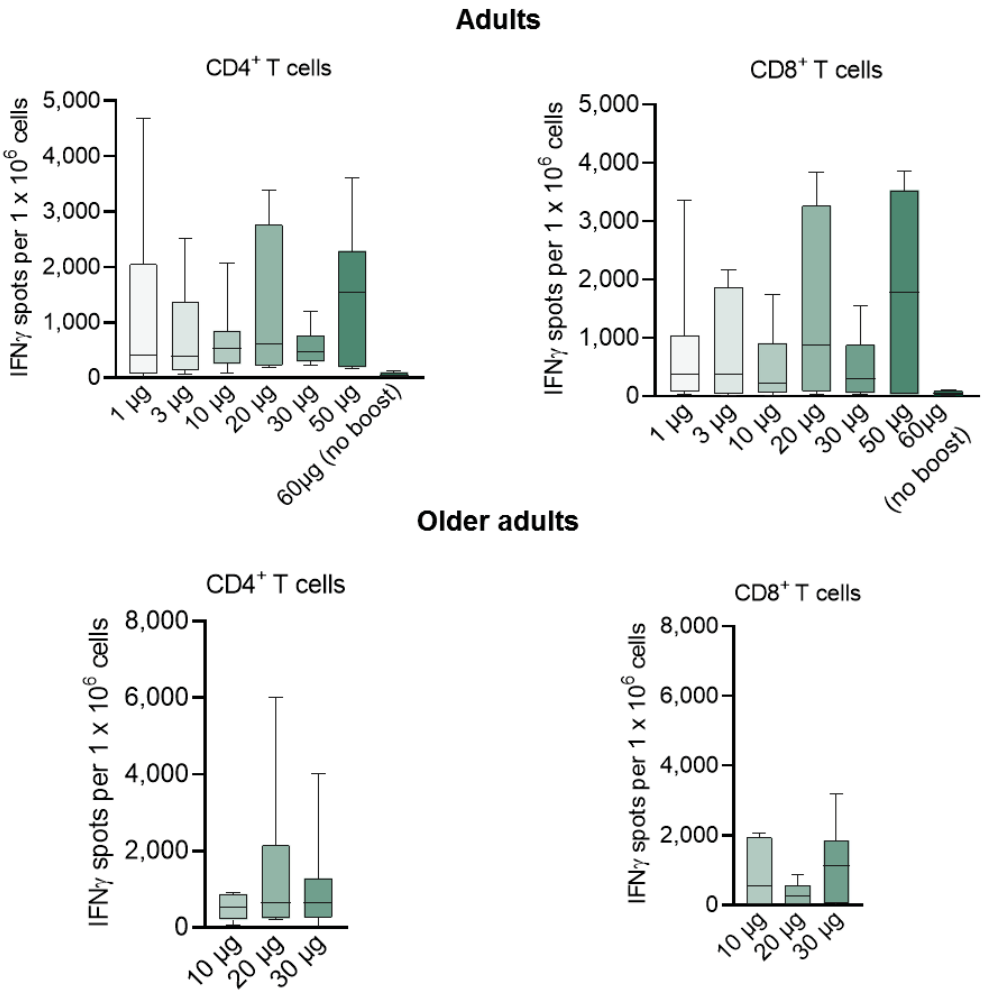


Figure 12: Magnitude of BNT162b1-induced CD4+ and CD8+ T-cell responses

PBMCs obtained on Day 1 (pre-Dose 1) and on Day 29 (7 days post-Dose 2 for the 1 µg to 50 µg dose groups, or 28 days after Dose 1 for the 60 µg dose group) were analyzed in *ex vivo* IFNγ ELISpot (see GA-RB-022-01A). Cell culture medium served as negative control. Normalized mean spot count data from duplicate wells after subtraction of the medium-only control are shown (same data as in Figure 6a). Box-Whisker plots indicating the minimum and maximum values, lines in the boxes indicate the median values, + indicates the mean values, no boost = no Dose 2

Appendix 2: BNT162b2-induced CD4+ and CD8+ T-cell response data plotted as Box-Whisker plots

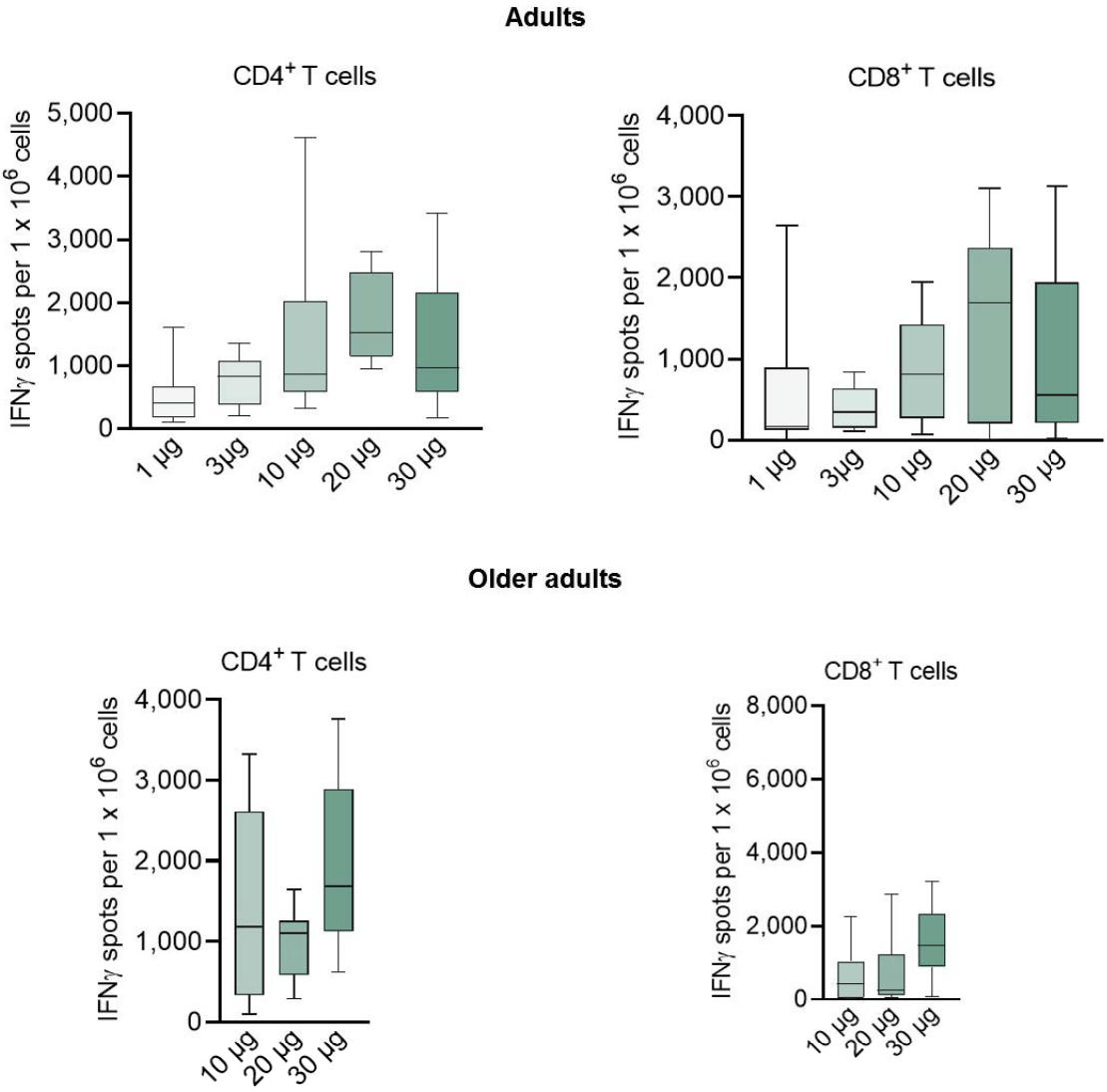


Figure 13: Magnitude of BNT162b1-induced CD4+ and CD8+ T-cell responses

PBMCs obtained on Day 1 (pre-Dose 1) and on Day 29 (7 days post-Dose 2 for the 1 µg to 50 µg dose groups, or 28 days after Dose 1 for the 60 µg dose group) were analyzed in *ex vivo* IFNγ ELISpot (see GA-RB-022-01A). Cell culture medium served as negative control. Normalized mean spot count data from duplicate wells after subtraction of the medium-only control are shown (same data as in Figure 8a). Box-Whisker plots indicating the minimum and maximum values, lines in the boxes indicate the median values, + indicates the mean values