Clinical trial results:
Immunological Responses after Vaccination for COVID-19 with the mRNA Vaccine Comirnaty in Immunosuppressed and Immunocompetent Individuals. An open, non-randomized , phase IV multicenter study

Summary

EudraCT number	2021-000175-37
Trial protocol	SE
Global end of trial date	08 May 2024

Results information

Result version number	v1 (current)
This version publication date	13 July 2025
First version publication date	13 July 2025

Trial information

Trial identification

Sponsor protocol code	2021-000175-37

Additional study identifiers

ISRCTN number	-
ClinicalTrials.gov id (NCT number)	NCT04780659
WHO universal trial number (UTN)	-

Notes:

Sponsors

Sponsor organisation name	Karolinska University Hospital
Sponsor organisation address	Hälsovägen 13, Huddinge, Sweden, 141 57
Public contact	Sponsor representative, Soo Aleman, Karolinska University Hospital, +46 72595 7225, soo.aleman@regionstockholm.se
Scientific contact	Sponsor representative, Soo Aleman, Karolinska University Hospital, +46 72595 7225, soo.aleman@regionstockholm.se

Notes:

Paediatric regulatory details

Is trial part of an agreed paediatric investigation plan (PIP)	No
Does article 45 of REGULATION (EC) No 1901/2006 apply to this trial?	No
Does article 46 of REGULATION (EC) No 1901/2006 apply to this trial?	No

Notes:

Results analysis stage

Analysis stage	Final
Date of interim/final analysis	15 October 2021
Is this the analysis of the primary completion data?	Yes
Primary completion date	15 October 2021
Global end of trial reached?	Yes
Global end of trial date	08 May 2024
Was the trial ended prematurely?	No

Notes:

General information about the trial

Main objective of the trial:

The primary objective was to investigate immunological efficacy of Comirnaty, by measuring the incidence of seroconversion (development of antibodies against SARS-CoV-2 upon vaccination in seronegative individuals) after 2 vaccine doses.

Protection of trial subjects:

The study was conducted in compliance with the protocol, regulatory requirements, good clinical practice (GCP) and the ethical principles of the latest revision of the Declaration of Helsinki as adopted by the World Medical Association.

Background therapy:

Concomitant medications not mentioned in the exclusion criteria were permitted.

Ongoing drug treatments for the underlying disease, and recently completed immunosuppressive therapy (i.e., within 4 weeks prior to inclusion) were recorded at the screening visit. Ongoing immunosuppressive treatments were categorized as either steroid or non-steroidal treatments.

All newly initiated medications from the day of vaccination to 14 days after each vaccine dose were registered (i.e., following both vaccine dose 1 and dose 2). The rationale for this time frame was to enable assessment of potential causality between observed adverse events and either study drugs or concomitant medications during the AE observation period. Although no formal interaction studies had been performed in previous clinical trials, no drug interactions between the study drug and other medications were expected. Subjects scheduled to receive any other vaccination were already excluded per the exclusion criteria.

However, newly initiated immunosuppressive or immunoglobulin treatments after Day 0 (screening) were recorded, as these could influence vaccine efficacy.

Any concomitant use of other medications was documented in the Case Report Form (CRF).

Evidence for comparator: -	
Actual start date of recruitment	18 February 2021
Long term follow-up planned	No
Independent data monitoring committee (IDMC) involvement?	No

Notes:

Population of trial subjects

Subjects enrolled per country

Country: Number of subjects enrolled	Sweden: 539
Worldwide total number of subjects	539
EEA total number of subjects	539

Notes:

Subjects enrolled per age group	
In utero	0
Preterm newborn - gestational age < 37 wk	0
Newborns (0-27 days)	0
Infants and toddlers (28 days-23 months)	0
Children (2-11 years)	0
Adolescents (12-17 years)	0
Adults (18-64 years)	208
From 65 to 84 years	331
85 years and over	0

Subject disposition

Recruitment

Recruitment details: -

Pre-assignment

Screening details:

781 participants were screened for the study at at Karolinska University Hospital between February 12th and 22nd, 2021 and 539 were included and recived the first vaccin dose. The main reasons for screening failure were previous COVID-19 infection, patient refusal, and that some study subjects already had been vaccinated outside the study.

Period 1

Period 1 title	Intervention period (overall period)
Is this the baseline period?	Yes
Allocation method	Non-randomised - controlled
Blinding used	Not blinded

Arms

Are arms mutually exclusive?	Yes
Arm title	All immunocompromised patients

Arm description:

This arm consists of five different primary immunodeficiency disorders; (n=90) HIV: human immunodeficiency virus, (n=90) HSCT: hematopoietic stem cell transplantation, (n=90) CLL: chronic lymphocytic leukemia,(n=89) SOT: solid organ transplantation. The different transplants in the SOT-grou were: n=57 liver, n=26 kidney, n=6 kidney and pancreas.

Arm type	Experimental
Investigational medicinal product name	Comirnaty
Investigational medicinal product code	J07BX03
Other name	
Pharmaceutical forms	Concentrate for solution for injection
Routes of administration	Intramuscular use

Dosage and administration details:

Comirnaty is administered intramuscularly after dilution with sodium chloride as a vaccination series consisting of 2 doses (0.3 ml each) at least 21 days apart. One dose contains 30 micrograms of mRNA vaccine.

Arm title	Controls

Arm description:

The control group consisted of individuals without a primary immunodeficiency disorder. The group was stratified by age: 18–39 years (n=30), 40–59 years (n=30), and ≥60 years (n=30).

Arm type	Active comparator
Investigational medicinal product name	Comirnaty
Investigational medicinal product code	J07BX03
Other name	
Pharmaceutical forms	Concentrate for solution for injection
Routes of administration	Intramuscular use

Dosage and administration details:

Comirnaty is administered intramuscularly after dilution with sodium chloride as a vaccination series consisting of 2 doses (0.3 ml each) at least 21 days apart. One dose contains 30 micrograms of mRNA vaccine.

Number of subjects in period 1	All immunocompromised patients	Controls
Started	449	90
Completed	439	90
Not completed	10	0
Adverse event, serious fatal	3	-
Consent withdrawn by subject	3	-
Physician decision	1	-
Leukemia relapse (more than 6 weeks after dose 2)	1	-
Died in original disease	2	-

Baseline characteristics

Reporting groups	
Reporting group title	All immunocompromised patients
Reporting group description:	
This arm consists of five different primary immunodeficiency disorders; (n=90) HIV: human immunodeficiency virus, (n=90) HSCT: hematopoietic stem cell transplantation, (n=90) CLL: chronic lymphocytic leukemia,(n=89) SOT: solid organ transplantation. The different transplants in the SOT-grou were: n=57 liver, n=26 kidney, n=6 kidney and pancreas.	
Reporting group title	Controls
Reporting group description:	
The control group consisted of individuals without a primary immunodeficiency disorder. The group was stratified by age: 18–39 years (n=30), 40–59 years (n=30), and ≥60 years (n=30).	

Reporting group values	All immunocompromised patients	Controls	Total
Number of subjects	449	90	539
Age categorical Units: Subjects			
<65 years	268	63	331
18-65 years	181	27	208
Gender categorical Units: Subjects			
Female	242	51	293
Male	207	39	246
Ongoing immunosuppression			
Ongoing immunosuppression at baseline			
Units: Subjects			
Corticosteroids	26	0	26
Other immunosuppressive agents	159	0	159
No ongoing immunosuppression at baseline	264	90	354
Laboratory parameters at baseline Units: IgG (g/L)			
median	9.9	11.0	
full range (min-max)	1.0 to 34.4	7.2 to 21.2	-
Laboratory parameters at baseline, Absolute lymphocyte count (x109/L)			
Controls n=87, Immunocompromised n=446			
Units: x109/L			
median	1.6	1.8	
full range (min-max)	0.2 to 112.6	1.0 to 4.1	-

End points

End points reporting groups

Reporting group title	All immunocompromised patients
Reporting group description:	
This arm consists of five different primary immunodeficiency disorders; (n=90) HIV: human immunodeficiency virus, (n=90) HSCT: hematopoietic stem cell transplantation, (n=90) CLL: chronic lymphocytic leukemia,(n=89) SOT: solid organ transplantation. The different transplants in the SOT-grou were: n=57 liver, n=26 kidney, n=6 kidney and pancreas.	
Reporting group title	Controls
Reporting group description:	
The control group consisted of individuals without a primary immunodeficiency disorder. The group was stratified by age: 18–39 years (n=30), 40–59 years (n=30), and ≥60 years (n=30).	

Primary: Proportion (95% CI) that seroconverts to positive response to SARS-CoV-2 IgG serology specimen after two doses of vaccine

End point title	Proportion (95% CI) that seroconverts to positive response to SARS-CoV-2 IgG serology specimen after two doses of vaccine
End point description:	
End point type	Primary
End point timeframe:	
Measured 2 weeks after second vaccine dose	

End point values	All immunocompromised patients	Controls		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	388	78		
Units: Proportion				
Seroconverted	280	78		
Seronegative	108	0		

Statistical analyses

Statistical analysis title	Comparison of seroconversion between cohorts
Comparison groups	All immunocompromised patients v Controls
Number of subjects included in analysis	466
Analysis specification	Pre-specified
Analysis type	other
P-value	< 0.05
Method	Fisher exact

Secondary: Proportion (95% CI) who experience adverse events, with AE/SAE/SUSAR (after dose 2)

End point title	Proportion (95% CI) who experience adverse events, with AE/SAE/SUSAR (after dose 2)

End point description:

The endpoint was assessed descriptively; no statistical testing was conducted to compare the cohorts.

End point type	Secondary

End point timeframe:

During the intervention period

End point values	All immunocompromised patients	Controls		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	446	88		
Units: Proportion				
AE	87	5		
SAE	13	0		
SUSAR	0	0		
No AE/SAE/SUSAR	346	83		

Statistical analyses

No statistical analyses for this end point

Secondary: Number and proportion (95% CI) who experience local and systemic reactions (after dose 1)

End point title	Number and proportion (95% CI) who experience local and systemic reactions (after dose 1)

End point description:

End point type	Secondary

End point timeframe:

During the study period

End point values	All immunocompromised patients	Controls		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	444	89		
Units: Proportion				
Any reaction (grade 1 – 4)	378	71		
No reaction	66	18		

Statistical analyses

Statistical analysis title	Comparison of reactions between cohorts
Comparison groups	All immunocompromised patients v Controls
Number of subjects included in analysis	533
Analysis specification	Pre-specified
Analysis type	other
P-value	< 0.05
Method	Chi-squared

Secondary: Proportion (95% CI) diagnosed with a new SARS-CoV-2 infection confirmed by a positive PCR test

End point title	Proportion (95% CI) diagnosed with a new SARS-CoV-2 infection confirmed by a positive PCR test

End point description:

The endpoint was assessed descriptively; no statistical testing was conducted to compare the cohorts.

End point type	Secondary

End point timeframe:

During the study period

End point values	All immunocompromised patients	Controls		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	388	78		
Units: Proportion				
Yes	18	2		
No	370	76		

Statistical analyses

No statistical analyses for this end point

Secondary: Proportion (95% CI) who experience adverse events, with AE/SAE/SUSAR (after dose 1)

End point title	Proportion (95% CI) who experience adverse events, with AE/SAE/SUSAR (after dose 1)

End point description:

The endpoint was assessed descriptively; no statistical testing was conducted to compare the cohorts.

End point type	Secondary
End point timeframe: During the study	

End point values	All immunocompromised patients	Controls		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	449	90		
Units: Proportion				
AE	94	6		
SAE	10	0		
SUSAR	1	0		
No AE/SAE/SUSAR	344	84		

Statistical analyses

No statistical analyses for this end point

Secondary: Number and proportion (95% CI) who experience local and systemic reactions (after dose 2)

End point title	Number and proportion (95% CI) who experience local and systemic reactions (after dose 2)
End point description:	

End point type	Secondary
End point timeframe: During the intervention period	

End point values	All immunocompromised patients	Controls		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	422	87		
Units: Proportion				
Any reaction (grade 1 – 4)	337	74		
No reaction	85	13		

Statistical analyses

Statistical analysis title	Comparisson of reactions between the cohorts
Comparison groups	All immunocompromised patients v Controls

Number of subjects included in analysis	509
Analysis specification	Pre-specified
Analysis type	other
P-value	< 0.05
Method	Chi-squared

Adverse events

Adverse events information

Timeframe for reporting adverse events:

Adverse events (AEs) were recorded from the time of inclusion until visit 4, which occurred two weeks after administration of the second vaccine dose. Serious Adverse events (SAE) were documented up to visit 5, six weeks after the second vaccine dose.

Adverse event reporting additional description:

A total of 273 adverse events (AEs), 30 serious adverse events (SAEs) and one SUSAR were reported in the immunosuppressed group. In the control group, 11 AEs were reported, with no SAEs or SUSAR.

Assessment type	Systematic

Dictionary used

Dictionary name	CTCAE
Dictionary version	5.0

Reporting groups

Reporting group title	All immunocompromised patients
Reporting group description: -	
Reporting group title	Controlls

Reporting group description: -

Serious adverse events	All immunocompromised patients	Controlls	
Total subjects affected by serious adverse events			
subjects affected / exposed	23 / 449 (5.12%)	0 / 90 (0.00%)	
number of deaths (all causes)	5	0	
number of deaths resulting from adverse events	3	0	
Investigations			
Increased CRP			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cardiac disorders			
Myocardial infarction			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Atrial fibrillation			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	

Heard failure			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 2	0 / 0	
deaths causally related to treatment / all	0 / 1	0 / 0	
Surgical and medical procedures			
Surgery for colon carcinoma			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Nervous system disorders			
Syncope			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	2 / 2	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
General disorders and administration site conditions			
Organ rejection			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	1 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Gastrointestinal disorders			
Ileus			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pancreatitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 1	0 / 0	
Abdominal pain			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Hepatobiliary disorders			
Alanine aminotransferase increase/aspartate aminotransferase increase			

subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	1 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory, thoracic and mediastinal disorders			
Pneumonitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	2 / 2	0 / 0	
deaths causally related to treatment / all	1 / 1	0 / 0	
Renal and urinary disorders			
Urinary tract obstruction			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 2	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Musculoskeletal and connective tissue disorders			
Back pain			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Infections and infestations			
COVID-19			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 3	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Bone infection			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Urinary tract infection			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Sepsis			

subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 3	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Sinusitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Catheter related infection			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Metabolism and nutrition disorders			
Dehydration			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Hyperglycemia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	

Frequency threshold for reporting non-serious adverse events: 0 %

Non-serious adverse events	All immunocompromised patients	Controlls	
Total subjects affected by non-serious adverse events			
subjects affected / exposed	173 / 449 (38.53%)	11 / 90 (12.22%)	
Vascular disorders			
Hypertension			
subjects affected / exposed	13 / 449 (2.90%)	0 / 90 (0.00%)	
occurrences (all)	13	0	
Superficial thrombophlebitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Hematoma			

subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Surgical and medical procedures			
Lymph node punction			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
General disorders and administration site conditions			
Increase thirst			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Localized edema			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Injection site reaction			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Flu like symptoms			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Fever			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Vaccination site lymphadenopathy			
subjects affected / exposed	6 / 449 (1.34%)	1 / 90 (1.11%)	
occurrences (all)	6	1	
Chest pain			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Fatigue			
subjects affected / exposed	10 / 449 (2.23%)	3 / 90 (3.33%)	
occurrences (all)	10	3	
Reproductive system and breast disorders			
Vaginal dryness			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Breast pain			

subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Respiratory, thoracic and mediastinal disorders			
Dyspnea			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	4	0	
Hoarseness			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Unpleasantness while breathing			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Rhinorrhea			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Tachypnea			
subjects affected / exposed	6 / 449 (1.34%)	0 / 90 (0.00%)	
occurrences (all)	6	0	
Allergic rhinitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Development of bronchiolitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Epistaxis			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Cough			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Psychiatric disorders			
Insomnia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Confusion			

subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Nightmares			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Investigations			
Lymphocyte count decreased			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	4	0	
Cholesterol high			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Leukopenia			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Platelet count decreased			
subjects affected / exposed	17 / 449 (3.79%)	0 / 90 (0.00%)	
occurrences (all)	17	0	
Pancytopenia			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Monocyte count increased			
subjects affected / exposed	6 / 449 (1.34%)	0 / 90 (0.00%)	
occurrences (all)	6	0	
Neutrophil count deceased			
subjects affected / exposed	5 / 449 (1.11%)	0 / 90 (0.00%)	
occurrences (all)	5	0	
Increased lymphocyte count			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Creatinine increased			
subjects affected / exposed	17 / 449 (3.79%)	2 / 90 (2.22%)	
occurrences (all)	17	2	
Blood bilirubin increased			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	

Cardiac disorders			
Tachycardia			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	4	0	
Nervous system disorders			
Vasovagal reaction			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Migraine			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Headache			
subjects affected / exposed	6 / 449 (1.34%)	0 / 90 (0.00%)	
occurrences (all)	6	0	
Memory impairment			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Dizziness			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Blood and lymphatic system disorders			
Increased neutrophil count			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Leukocytosis			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	4	0	
Anemia			
subjects affected / exposed	7 / 449 (1.56%)	0 / 90 (0.00%)	
occurrences (all)	7	0	
Ear and labyrinth disorders			
External otitis			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Tinnitus			
subjects affected / exposed	1 / 449 (0.22%)	1 / 90 (1.11%)	
occurrences (all)	1	1	

Eye disorders			
GVHD in eye			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Gastrointestinal disorders			
Rectal hemorrhage			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Gastritis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Dysphagia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Dry mouth			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Diarrhea			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Abdominal pain			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Vomiting			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	4	0	
Mucositis			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	5	0	
Hepatobiliary disorders			
Increased LFTs			
subjects affected / exposed	9 / 449 (2.00%)	0 / 90 (0.00%)	
occurrences (all)	9	0	
Increased AST/ALT			
subjects affected / exposed	11 / 449 (2.45%)	0 / 90 (0.00%)	
occurrences (all)	11	0	
Skin and subcutaneous tissue disorders			

Pruritus			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Hyperhidrosis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Skin rash			
subjects affected / exposed	4 / 449 (0.89%)	0 / 90 (0.00%)	
occurrences (all)	4	0	
Skin ulceration			
subjects affected / exposed	1 / 449 (0.22%)	1 / 90 (1.11%)	
occurrences (all)	1	1	
GVHD			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Endocrine disorders			
Enlarged thyroid gland			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Musculoskeletal and connective tissue disorders			
Pain in extremity			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Neck pain			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Myalgia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Muscle cramp			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Traumatic knee injury			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Tenditits			

subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Back pain			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Arthralgia			
subjects affected / exposed	2 / 449 (0.45%)	1 / 90 (1.11%)	
occurrences (all)	2	1	
Infections and infestations			
Covid-19			
subjects affected / exposed	4 / 449 (0.89%)	2 / 90 (2.22%)	
occurrences (all)	4	2	
Shingles			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
BK-viremia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Bronchiolitis obliterans			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Conjunctivitis			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Bacterial infection			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Urinary tract infection			
subjects affected / exposed	6 / 449 (1.34%)	0 / 90 (0.00%)	
occurrences (all)	6	0	
Upper respiratory infection			
subjects affected / exposed	21 / 449 (4.68%)	0 / 90 (0.00%)	
occurrences (all)	22	0	
Sinusitis			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	

Strongyloides infection			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Bacterial infection UNS			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Herpes simplex reactivation			
subjects affected / exposed	3 / 449 (0.67%)	0 / 90 (0.00%)	
occurrences (all)	3	0	
Cytomegalovirus infection reactivation			
subjects affected / exposed	2 / 449 (0.45%)	0 / 90 (0.00%)	
occurrences (all)	2	0	
Metabolism and nutrition disorders			
Hypercalcemia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Hyperuricemia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	1	0	
Hyperglycemia			
subjects affected / exposed	1 / 449 (0.22%)	0 / 90 (0.00%)	
occurrences (all)	2	0	

More information

Substantial protocol amendments (globally)

Were there any global substantial amendments to the protocol? Yes

Date	Amendment
02 December 2021	The study was extended to include blood sample collection at 12, 18, 20, and 24 months after the second vaccine dose, a modification of the total blood sample volume, and a change of sponsor representative. A new version of the informed consent form and study protocol was implemented accordingly.
10 July 2023	The study was further extended to include sample collection at 30 to 36 months post-second vaccine dose. A new version of the informed consent form and study protocol was implemented accordingly.

Notes:

Interruptions (globally)

Were there any global interruptions to the trial? No

Limitations and caveats

Limitations of the trial such as small numbers of subjects analysed or technical problems leading to unreliable data.

None reported

Notes: