

NEW ZEALAND DATA SHEET

1. PRODUCT NAME

Comirnaty® Original/Omicron BA.4-5, 1.5/1.5 micrograms/0.2 mL dose, concentrate for suspension for injection (maroon cap), for age 6 months to 4 years

2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with a maroon cap. **Must be diluted before use.**

One vial (0.4 mL) contains 10 doses of 0.2 mL after dilution, see Section 4.2 Dose and method of administration and Section 6.6 Special precautions for disposal and other handling.

1 dose (0.2 mL) contains 1.5 micrograms of tozinameran and 1.5 micrograms of famtozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran and famtozinameran are single-stranded, 5'-capped messenger RNA (mRNA) produced using a cell-free *in vitro* transcription from the corresponding DNA templates, encoding the viral spike (S) protein of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Original and Omicron BA.4-5).

For the full list of excipients, see Section 6.1 List of excipients.

3. PHARMACEUTICAL FORM

Concentrate for Suspension for injection.

The vaccine is a white to off-white frozen suspension.

4. CLINICAL PARTICULARS

4.1 Therapeutic indications

Comirnaty Original/Omicron BA.4-5 (Maroon cap) vaccine has provisional consent (see section 5.1) for the indication below:

A booster dose for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in individuals 6 months to 4 years of age who have previously received at least a primary vaccination course against COVID-19.

The use of this vaccine should be in accordance with official recommendations.

4.2 Dose and method of administration

Dose

The dose of Comirnaty Original/Omicron BA.4-5 in infants and children 6 months to 4 years of age is 1.5/1.5 micrograms/0.2 mL given intramuscularly.

Booster dose in individuals 6 months to 4 years of age

A booster dose of Comirnaty Original/Omicron BA.4-5 may be administered intramuscularly at least 3 months after the primary course in individuals 6 months to 4 years of age.

If required, any subsequent booster dose may be administered as early as 3 months after last administration of a booster dose.

The decision when and for whom to implement a booster dose of Comirnaty Original/Omicron BA.4-5 should be made in accordance with official recommendations (see Sections 4.4 Special warnings and precautions for use and 5.1 Pharmacodynamic properties).

Primary vaccination course

Comirnaty Original/Omicron BA.4-5 is indicated only for booster doses.

For details on the primary vaccination course for ages 6 months to 4 years, please refer to the Data sheet for Comirnaty 3 micrograms/dose for injection.

Elderly population

Refer to the Data Sheet for Comirnaty Original/Omicron BA.4-5, suspension for injection, 12 years of age and older (15/15 micrograms/dose).

Paediatric population

There are paediatric formulations available for children 5 to 11 years of age. Please refer to the data sheet for Comirnaty Original/Omicron BA.4-5, 5/5 micrograms/dose (orange and blue caps). The safety and efficacy of the vaccine in infants aged less than 6 months have not yet been established.

Method of administration

Comirnaty Original/Omicron BA.4-5 (Maroon cap) should be administered intramuscularly after dilution.

In individuals from 6 to less than 12 months of age, the recommended injection site is the anterolateral aspect of the thigh. In individuals 1 year of age and older, the recommended injection site is the anterolateral aspect of the thigh or the deltoid muscle.

Do not inject the vaccine intravascularly, subcutaneously or intradermally.

Comirnaty Original/Omicron BA.4-5 should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering Comirnaty Original/Omicron BA.4-5, see Section 4.4 Special warnings and precautions for use.

Comirnaty Original/Omicron BA.4-5 (Maroon cap)

After dilution, vials of Comirnaty Original/Omicron BA.4-5 (Maroon cap) contain 10 doses of 0.2 mL of vaccine. In order to extract 10 doses from a single vial, low dead-volume syringes and/or needles should be used. The low dead-volume syringe and needle combination should have a dead volume of no more than 35 microlitres. If standard syringes and needles are used,

there may not be sufficient volume to extract 10 doses from a single vial. Irrespective of the type of syringe and needle:

- Each dose must contain 0.2 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.2 mL, discard the vial and any excess volume.
- Do not pool excess vaccine from multiple vials.

For instructions on thawing, handling and dose preparation of Comirnaty Original/Omicron BA.4-5, see Section 6.6 Special precautions for disposal and other handling.

4.3 Contraindications

Hypersensitivity to the active substance or to any of the excipients listed in Section 6.1 List of excipients.

4.4 Special warnings and precautions for use

Traceability

In order to improve the traceability of biological medicinal products, the name and the batch number of the administered product should be clearly recorded.

General recommendations

Hypersensitivity and anaphylaxis

Events of anaphylaxis have been reported. Appropriate medical treatment and supervision should always be readily available in case of an anaphylactic reaction following the administration of the vaccine.

The individual should be kept under close observation for at least 15 minutes following vaccination. Comirnaty Original/Omicron BA.4-5 should not be given to those who have experienced anaphylaxis to the first dose of Comirnaty.

Myocarditis and pericarditis

Very rare cases of myocarditis and pericarditis have been observed following vaccination with Comirnaty. These cases have primarily occurred within 14 days following vaccination, more often after the second vaccination, and more often, but not exclusively in younger men. There have been reports in females. Based on accumulating data, the reporting rates of myocarditis and pericarditis after primary series in children ages 5 to 11 years are lower than in ages 12 to 17 years. Rates of myocarditis and pericarditis in booster doses do not appear to be higher than after the second dose in the primary series. The cases are generally mild and individuals tend to recover within a short time following standard treatment and rest. Cases of myocarditis and pericarditis following vaccination have rarely been associated with severe outcomes including death.

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis, including atypical presentations. Vaccinees should be instructed to seek immediate medical attention if they develop symptoms indicative of myocarditis or pericarditis such as (acute and persisting) chest pain, shortness of breath, or palpitations following vaccination. Non-specific symptoms of myocarditis and pericarditis also include fatigue,

nausea and vomiting, abdominal pain, dizziness or syncope, oedema and cough. Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

Stress-related responses

Some individuals may have stress-related responses associated with the process of vaccination itself. Stress-related responses are temporary and resolve on their own. They may include dizziness, fainting, palpitations, increases in heart rate, alterations in blood pressure, feeling short of breath, tingling sensations, sweating and/or anxiety. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation and precautions should be in place to avoid injury from fainting.

Concurrent illness

Vaccination should be postponed in individuals suffering from acute severe febrile illness or acute infection. The presence of a minor infection and/or low grade fever should not delay vaccination.

Thrombocytopenia and coagulation disorders

As with other intramuscular injections, the vaccine should be given with caution in individuals receiving anticoagulant therapy or those with thrombocytopenia or any coagulation disorder (such as haemophilia) because bleeding or bruising may occur following an intramuscular administration in these individuals.

Immunocompromised individuals

Immunocompromised persons, including individuals receiving immunosuppressant therapy, may have a diminished immune response to the vaccine.

Clinical data on safety and immunogenicity after administration of Comirnaty (tozinameran) in immunocompromised participants are available in 37 participants 2 through 4 years old, 65 participants 5 through <12 years old, 15 participants 12 through <18 years old, and 7 participants 18 years of age and older (see Sections 4.8 Undesirable effects and 5.1 Pharmacodynamic properties).

Duration of protection

The duration of protection afforded by the vaccine is unknown as it is still being determined by ongoing clinical trials.

Limitations of vaccine effectiveness

As with any vaccine, vaccination with Comirnaty Original/Omicron BA.4-5 may not protect all vaccine recipients.

Use in the elderly

Clinical study of Comirnaty Original/Omicron BA.4-5 (C4591044) include participants 56 years of age and older and their data contributes to the overall assessment of safety and efficacy. See Section 5.1 Pharmacodynamic properties, Clinical trials, Efficacy against COVID-19. No dosage adjustment is required in elderly individuals ≥ 65 years of age.

The data for use in the frail elderly is limited. The potential benefits of vaccination versus the potential risk and clinical impact of even relatively mild systemic adverse events in the frail elderly should be carefully assessed on a case-by-case basis.

The safety of a booster dose of Comirnaty in individuals 65 years of age and older is based on safety data in 12 booster dose recipients 65 to 85 years of age in Study C4591001, 306 booster dose recipients 18 to 55 years of age in Study C4591001, and 1,175 booster dose recipients 65 years of age and older in Study C4591031. The safety of Comirnaty Original/Omicron BA.4-5 as a second booster in individuals 65 years of age and older is based on safety data in 159 booster dose recipients 65 years of age and older and 35 booster dose recipients 75 years of age and older in C4591044. The effectiveness of a booster dose of Comirnaty in individuals 65 years of age and older is based on effectiveness data in 306 booster dose recipients 18 to 55 years of age in Study C4591001, and an efficacy analysis from participants 16 years of age and older in 9,945 participants in Study C4591031.

Paediatric use

The safety and efficacy of Comirnaty Original/Omicron BA.4-5 in children aged less than 6 months of age have not yet been established.

Effects on laboratory tests

No data available.

4.5 Interactions with other medicines and other forms of interactions

No interaction studies have been performed.

Concomitant administration of Comirnaty with other vaccines has not been studied for children younger than 12 years..

4.6 Fertility, pregnancy and lactation

Comirnaty Original/Omicron BA.4-5 (1.5/1.5 micrograms)/dose concentrate for suspension for injection is not intended for individuals older than 5 years of age.

For details for use in individuals older than 5 years of age, please refer to the Data sheet for those formulations.

4.7 Effects on ability to drive and use machines

Comirnaty Original/Omicron BA.4-5 has no, or negligible, influence on the ability to drive and use machines. However, some of the effects mentioned under Section 4.8 Undesirable effects may temporarily affect the ability to drive, cycle and use machines.

4.8 Undesirable effects

Summary of safety profile

Comirnaty Original/Omicron BA.4-5 (tozinameran/famtozinameran)

Participants 6 months to 23 months of age – after bivalent Omicron BA.4-5 booster dose

In 2 groups in Study C4591048 (Phase 3, Groups 2 and 3), 160 participants 6 to 23 months of age who had completed a 3-dose primary series, received a booster dose of Comirnaty Original/Omicron BA.4-5 (1.5/1.5 micrograms) 2.1 to 8.6 months after receiving Dose 3 for Group 2 and 3.8 to 12.5 months after receiving Dose 3 for Group 3. Participants who received

a booster dose of Comirnaty Original/Omicron BA.4-5 had a median follow-up time of 4.4 months up to a data cut-off date of 03 March 2023 for Group 2 and had a median follow up time of 6.4 months for up to a data cut-off date of 08 February 2024 for Group 3.

The overall safety profile for the Comirnaty Original/Omicron BA.4-5 booster was similar to that seen after 3 doses of Comirnaty. The most frequent adverse reactions in participants 6 to 23 months of age were irritability (>30%), decreased appetite (>20%), tenderness at the injection site (>10%), and fever (>10%).

Participants 2 to 4 years of age – after bivalent Omicron BA.4-5 booster dose

In 2 groups in Study C4591048 (Phase 3, Groups 2 and 3), 1,207 participants 2 to 4 years of age who had completed a 3-dose primary series, received a booster dose of Comirnaty Original/Omicron BA.4-5 (1.5/1.5 micrograms) 2.1 to 8.6 months after receiving Dose 3 for Group 2 and 2.8 to 17.5 months after receiving Dose 3 for Group 3. Participants who received a booster dose of Comirnaty Original/Omicron BA.4-5 had a median follow-up time of 4.6 months up to a data cut-off date of 03 March 2023 for Group 2 and had a median follow-up time of 6.3 months for up to a data cut off date of 08 February 2024 for Group 3.

The overall safety profile for the Comirnaty Original/Omicron BA.4-5 booster was similar to that seen after 3 doses of Comirnaty. The most frequent adverse reactions in participants 2 to <5 years of age were injection site pain (>30%) and fatigue (>20%).

Participants 5 to 11 years of age – after bivalent Omicron BA.4-5 booster dose

In a subset from Study C4591048 (Phase 3), 113 participants 5 to 11 years of age who had completed a 2-dose primary series and 1 booster dose of Comirnaty (tozinameran), received a second booster dose of Comirnaty Original/Omicron BA.4-5 (5/5 micrograms) 2.6 to 8.5 months after receiving the first booster dose. Participants who received a booster dose of Comirnaty Original/Omicron BA.4-5 had a median follow-up time of 6.3 months up to a data cut-off date of 20 April 2023.

The overall safety profile for the Comirnaty Original/Omicron BA.4-5 booster was similar to that seen after 3 doses of Comirnaty (tozinameran). The most frequent adverse reactions in participants 5 to 11 years of age were injection site pain (>60%), fatigue (>40%), headache (>20%), and myalgia (>10%).

Participants 12 years of age and older – after bivalent Omicron BA.4-5 booster dose

In a subset from Study C4591044 (Phase 2/3), 107 participants 12 to 17 years of age, 313 participants 18 to 55 years of age and 306 participants 56 years of age and older previously vaccinated with a 2-dose primary series and 1 booster dose of Comirnaty (tozinameran) went on to receive a second booster dose with Comirnaty Original/Omicron BA.4-5 (15/15 micrograms) 5.4 to 16.9 months after receiving the first booster dose and had a median follow up time of at least 1.5 months up to a data cut-off date 12 October 2022 (Cohort 2) and 31 October 2022 (Cohort 3).

The overall safety profile for the Comirnaty Original/Omicron BA.4-5 booster (fourth dose) was similar to that seen after the Comirnaty (tozinameran) booster (third dose). The most frequent adverse reactions in participants 12 years of age and older were injection site pain (> 60%), fatigue (> 50%), headache (> 40%), myalgia (> 20%), chills (> 10%) and arthralgia (> 10%). No new adverse reactions were identified for Comirnaty Original/Omicron BA.4-5.

Comirnaty (tozinameran)

The safety of Comirnaty (tozinameran) was evaluated in participants aged 6 months and older in clinical studies (comprised of 22,026 participants 16 years of age and older and 1,131 adolescents 12 to 15 years of age from Study C4591001, and 3,109 children 5 to <12 years of age, 2,368 participants 2 to <5 years of age and 1,458 participants 6 months to <2 years of age from Study C4591007) that have received at least one dose of Comirnaty (tozinameran).

Additionally, 306 existing Phase 3 participants at 18 to 55 years of age received a booster dose of Comirnaty (tozinameran) approximately 6 months after the second dose in the non-placebo-controlled booster dose portion of Study C4591001. The overall safety profile for the booster dose was similar to that seen after 2 doses.

In Study C4591031, a placebo-controlled booster study, 5,081 participants 16 years of age and older were recruited from Study C4591001 to receive a booster dose of Comirnaty (tozinameran) at least 6 months after the second dose. The overall safety profile for the booster dose was similar to that seen after 2 doses.

In a subset of C4591007 Phase 2/3 participants, 2,408 participants 5 to 11 years of age received a booster dose of Comirnaty (tozinameran) at least 5 months (range 5.3 to 19.4 months) after completing the primary series. The overall safety profile for the booster dose was similar to that seen after the primary series.

Infants 6 to 23 months of age – after 3 doses

In an analysis of Study C4591007 (Phase 2/3), 2,176 infants [1,458 Comirnaty (tozinameran) 3 micrograms; 718 placebo] were 6 to 23 months of age. Based on data in the blinded placebo-controlled follow-up period up to the cutoff date of 28 February 2023, 720 infants 6 to 23 months of age who received a 3-dose primary course [483 Comirnaty (tozinameran) 3 micrograms; 237 placebo] have been followed for a median of 1.7 months after the third dose.

The most frequent adverse reactions in infants 6 to 23 months of age that received any primary course dose included irritability (> 60%), decrease appetite (> 30%), tenderness at the injection site (> 20%), injection site redness and fever (> 10%).

Children 2 to 4 years of age – after 3 doses

In an analysis of Study C4591007 (Phase 2/3), 3,541 children [2,368 Comirnaty (tozinameran) 3 micrograms; 1,173 placebo] were 2 to 4 years of age. Based on data in the blinded placebo-controlled follow-up period up to the cutoff date of 28 February 2023, 1,268 children 2 to 4 years of age who received a 3-dose primary course [863 Comirnaty (tozinameran) 3 micrograms; 405 placebo] have been followed a median of 2.2 months after the third dose.

The most frequent adverse reactions in children 2 to 4 years of age that received any primary course dose included pain at injection site and fatigue (> 40%), injection site redness and fever (> 10%).

Children 5 to 11 years of age – after 2 doses

In an analysis of Study C4591007 Phase 2/3, 4,647 children [3,109 Comirnaty (tozinameran) 10 micrograms; 1,538 placebo] were 5 to 11 years of age. Of these, 2,206 [1,481 Comirnaty (tozinameran) 10 micrograms and 725 placebo] children have been followed for >4 months after the second dose in the placebo-controlled blinded follow-up period. The safety evaluation in Study C4591007 is ongoing.

The most frequent adverse reactions in children 5 to 11 years of age that received 2 doses included injection site pain (>80%), fatigue (>50%), headache (>30%), injection site redness and swelling (≥20%), myalgia, chills and diarrhoea (>10%).

Adolescents 12 to 15 years of age – after 2 doses

In an analysis of long term safety follow-up in Study C4591001, 2,260 adolescents [1,131 Comirnaty (tozinameran) 30 micrograms; 1,129 placebo] were 12 to 15 years of age. Of these, 1,559 adolescents [786 Comirnaty (tozinameran) and 773 placebo] were followed for ≥ 4 months after the second dose of Comirnaty (tozinameran).

The most frequent adverse reactions in adolescents 12 to 15 years of age that received 2 doses were injection site pain (>90%), fatigue and headache (>70%), myalgia and chills (>40%), arthralgia and pyrexia (>20%).

Participants 16 years of age and older – after 2 doses

In Study C4591001, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty (tozinameran) 30 micrograms and a total of 22,021 participants 16 years of age or older received placebo (including 138 and 145 adolescents 16 and 17 years of age in the Comirnaty (tozinameran) and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty (tozinameran).

At the time of the analysis of Study C4591001 with a data cut-off of 13 March 2021 for the placebo-controlled blinded follow-up period up to the participants' unblinding dates, a total of 25,651 (58.2%) participants [13,031 Comirnaty (tozinameran) and 12,620 placebo] 16 years of age and older were followed up for ≥4 months after the second dose. This included a total of 15,111 [7,704 Comirnaty (tozinameran) and 7,407 placebo] participants 16 to 55 years of age and a total of 10,540 [5,327 Comirnaty (tozinameran) and 5,213 placebo] participants 56 years and older.

The most frequent adverse reactions in participants 16 years of age and older that received 2 doses were injection site pain (>80%), fatigue (>60%), headache (>50%), myalgia (>40%), chills (>30%), arthralgia (>20%), pyrexia and injection site swelling (>10%) and were usually mild or moderate in intensity and resolved within a few days after vaccination. A slightly lower frequency of reactogenicity events was associated with greater age.

The safety profile in 545 subjects receiving Comirnaty (tozinameran), that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

Study C4591001 also included 200 participants with confirmed stable human immunodeficiency virus (HIV) infection. The safety profile of the participants receiving Comirnaty (n=100) in the individuals with stable HIV infection was similar to that seen in the general population.

Children 5 to 11 years of age – after booster dose

In a subset from C4591007, a total of 2,408 children 5 to 11 years of age received a booster dose of Comirnaty (tozinameran) 10 micrograms at least 5 months (range 5.3 to 19.4 months) after completing the primary series. The analysis of the C4591007 Phase 2/3 subset is based on data up to the cut-off date of 28 February 2023 (median follow-up time of 6.4 months).

The most frequent adverse reactions in participants 5 to 11 years of age were injection site pain (>60%), fatigue (>30%), headache (>20%), myalgia, chills, injection site redness, and swelling

(>10%). A higher frequency of lymphadenopathy was observed in C4591007 in participants receiving a booster dose compared to participants receiving 2 doses (2.5% vs. 0.7%).

Participants 12 years of age and older – after booster dose

A subset from Study C4591001 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty (tozinameran) 2-dose course, received a booster dose of Comirnaty (tozinameran) approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2. Of these, 301 participants have been followed for ≥ 4 months after the booster dose of Comirnaty (tozinameran).

The most frequent adverse reactions in participants 18 to 55 years of age were injection site pain (>80%), fatigue (>60%), headache (>40%), myalgia (>30%), chills and arthralgia (>20%).

In Study C4591031, a placebo-controlled booster study, participants 16 years of age and older recruited from Study C4591001 received a booster dose of Comirnaty (tozinameran) (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty (tozinameran). Overall, participants who received a booster dose, had a median follow-up time of 2.8 months (range 0.3 to 7.5 months) after the booster dose in the blinded placebo-controlled follow-up period to the cut-off date (8 February 2022). Of these, 1281 participants [895 Comirnaty (tozinameran) and 386 placebo] were followed for ≥ 4 months after the booster dose of Comirnaty (tozinameran). The overall safety profile for the booster dose was similar to that seen after 2 doses.

In another subset from Study C4591001, 825 adolescents 12 to 15 years of age who completed the Comirnaty (tozinameran) 2-dose course, received a booster dose of Comirnaty (tozinameran) approximately 11.2 months (range of 6.3 to 20.1 months) after receiving Dose 2. Overall, participants who received a booster dose, had a median follow-up time of 9.5 months (range 1.5 to 10.7 months) based on data up to the cut-off date (3 November 2022). No new adverse reactions of Comirnaty (tozinameran) were identified.

Participants 18 years of age and older – after subsequent booster doses

In a subset from study C4591031 (Phase 3), 325 adults 18 to ≤ 55 years of age who had completed 3 doses of Comirnaty (tozinameran), received a booster (fourth dose) of Comirnaty (tozinameran 30 micrograms) 90 to 180 days after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty (tozinameran 30 micrograms) had a median follow-up time of 1.4 months. The most frequent adverse reactions in these participants were injection site pain (>70%), fatigue (>60%), headache (>40%), myalgia and chills (>20%) and arthralgia (>10%).

In a subset from Study C4591031 (Phase 3), 305 adults greater than 55 years of age who had completed 3 doses of Comirnaty (tozinameran), received a booster (fourth dose) of Comirnaty (tozinameran 30 micrograms) 5.3 to 13.1 months after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty (tozinameran 30 micrograms) had a median follow-up time of at least 1.7 months up to a data cutoff date of 16 May 2022. The most frequent adverse reactions in participants greater than 55 years of age were injection site pain (60%), fatigue (>40%), headache (>20%), myalgia and chills (>10%).

Tabulated list of adverse reactions from clinical studies and post-authorisation experience

Adverse reactions observed during clinical studies are listed below according to the following frequency categories:

Very common ($\geq 1/10$),

Common ($\geq 1/100$ to $< 1/10$),

Uncommon ($\geq 1/1,000$ to $< 1/100$),

Rare ($\geq 1/10,000$ to $< 1/1,000$),

Very rare ($< 1/10,000$),

Not known (cannot be estimated from the available data).

Table 1: Adverse reactions from Comirnaty Original/Omicron BA.4-5 clinical trial (C4591048 SSB): Individuals 6 Months to 23 months of Age (30 November 2022 Data Cut-off Date)

System Organ Class	Very common ($\geq 1/10$)	Common ($\geq 1/100$ to $< 1/10$)	Uncommon ($\geq 1/1,000$ to $< 1/100$)	Rare ($\geq 1/10,000$ to $< 1/1,000$)	Not known (cannot be estimated from the available data)
Metabolism and nutrition disorders	Decreased appetite ^a				
Psychiatric disorders	Irritability ^a				
Gastrointestinal disorders		Diarrhoea; Vomiting			
General disorders and administration site conditions		Pyrexia ^a ; Injection site tenderness ^a ; Fatigue ^a ; Injection site swelling ^a ; Injection site redness ^a			

a. These adverse reactions were identified in the post-authorisation period. At the time of the data cut-off date, the following reactions were not reported in participants 6 months to < 2 years of age in Study C4591048: pruritus, angioedema, dizziness, lethargy, myocarditis, pericarditis, hyperhidrosis, night sweats, and malaise but are still considered ADRs for this age group.

Table 2: Adverse reactions from Comirnaty Original/Omicron BA.4-5 clinical trial (C4591048 SSB): Individuals 2 Years to 4 Years of Age (30 November 2022 Data Cut-off Date)

System Organ Class	Very common ($\geq 1/10$)	Common ($\geq 1/100$ to $< 1/10$)	Uncommon ($\geq 1/1,000$ to $< 1/100$)	Rare ($\geq 1/10,000$ to $< 1/1,000$)	Not known (cannot be estimated from the available data)
Nervous system disorders		Headache ^a			
Gastrointestinal disorders		Vomiting ^a ; Diarrhoea ^a			
Musculoskeletal and connective tissue disorders		Myalgia ^a ; Arthralgia ^a			
General disorders and administration site conditions	Injection site pain; ^a Fatigue ^a	Pyrexia ^a ; Injection site redness ^a ; Chills ^a ; Injection site swelling ^a			

a. These adverse reactions were identified in the post-authorisation period.

Table 3: Adverse reactions from Comirnaty Original/Omicron BA.4-5 clinical trial (C4591048 SSD): Individuals 5 to 11 years of age (25 November 2022 Data Cut-off Date)

System Organ Class	Very common (≥1/10)	Common (≥1/100 to <1/10)	Uncommon (≥1/1,000 to <1/100)	Rare (≥1/10,000 to <1/1,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy		
Nervous system disorders	Headache				
Gastrointestinal disorders		Diarrhoea ^a ; Vomiting ^a			
Musculoskeletal and connective tissue disorders	Myalgia	Arthralgia			
General disorders and administration site conditions	Injection site pain; Fatigue	Pyrexia; Chills; Injection site swelling; Injection site redness			

^a. These adverse reactions were identified in the post-authorisation period

Table 4: Adverse reactions from Comirnaty Original/Omicron BA.4-5 clinical trial (C4591044 Cohort 2): Individuals 12 to 17 years of age (12 October 2022 Data Cut-off Date)

System Organ Class	Very common (≥1/10)	Common (≥1/100 to <1/10)	Uncommon (≥1/1,000 to <1/100)	Rare (≥1/10,000 to <1/1,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders					
Nervous system disorders	Headache				
Gastrointestinal disorders		Diarrhoea ^a ; Vomiting ^a			
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia				
General disorders and administration site conditions	Injection site pain; Fatigue; Chills	Pyrexia; Injection site swelling; Injection site redness			

^a These adverse reactions were identified in the post-authorisation period.

Table 5: Adverse reactions from Comirnaty Original/Omicron BA.4-5 clinical trial (C4591044 Cohort 2 and Cohort 3 combined): Individuals 18 to 55 years and >55 years of age (Cohort 2 12 October 2022 Data Cut-off Date and Cohort 3 31 October 2022 Data Cut-off Date)

System Organ Class	Very common (≥1/10)	Common (≥1/100 to <1/10)	Uncommon (≥1/1,000 to <1/100)	Rare (≥1/10,000 to <1/1,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy ⁽¹⁸⁻⁵⁵⁾	Lymphadenopathy ^(>55)	
Immune system disorders				Urticaria ^{b (18-55)} Pruritus ^{b (>55)}	
Nervous system disorders	Headache				
Gastrointestinal disorders		Vomiting ^a Diarrhoea ^{a (>55)}	Diarrhoea ^{a (18-55)}		
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia			Pain in extremity (arm) ^{b (>55)}	
General disorders and administration site conditions	Injection site pain; Fatigue; Chills	Pyrexia; Injection site swelling; Injection site redness			

a. These adverse reactions were identified in the post-authorisation period.

b. The following events are categorised as hypersensitivity reactions: urticaria, pruritus, rash, and angioedema.

Table 6. Adverse Reactions from Comirnaty clinical trial (C4591007): Individuals 6 Months to 23 Months of Age (28 February 2023 Data Cut-off Date)

System Organ Class	Very Common (≥1/10 (≥10%))	Common (≥1/100 to <1/10 (≥1% to <10%))	Uncommon (≥1/1,000 to <1/100 (≥0.1% to <1%))	Rare (≥1/10,000 to <1/1,000 (≥0.01% to <0.1%))	Very Rare (<1/10,000 (<0.01%))	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy			
Immune system disorders		Rash ^{a,b}	Urticaria ^{a,b} ;			Anaphylaxis ^a
Metabolism and nutrition disorders	Decreased appetite					
Psychiatric disorders	Irritability					
Nervous system disorders			Headache Lethargy			
Gastrointestinal disorders		Vomiting ^a ; Diarrhoea ^a				
General disorders and administration site conditions	Injection site tenderness; Injection site redness; Pyrexia	Injection site swelling	Fatigue; Chills			

* CIOMS frequency categories are based on clinical trial C4591007 crude incidence and was reported to only one significant figure.

a. These adverse reactions were identified in the post-authorisation period. At the time of data-lock, the following events were not reported in participants 6 to 23 months of Age in Study C4591007: pruritus, angioedema, nausea, hyperhidrosis, night sweats, myalgia, arthralgia, pain in extremity (arm), malaise, and asthenia but are still considered adverse reactions for this age group.

b. The following events are categorised as hypersensitivity reactions: rash and urticaria

Table 7. Adverse Reactions from Comirnaty clinical trial (C4591007): Individuals 2 to 4 Years of Age (28 February 2023 Data Cut-off Date)

System Organ Class	Very Common ≥1/10 (≥10%)	Common ≥1/100 to <1/10 (≥1% to <10%)	Uncommon ≥1/1,000 to <1/100 (≥0.1% to <1%)	Rare ≥1/10,000 to <1/1,000 (≥0.01% to <0.1%)	Very Rare <1/10,000 (<0.01%)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders				Lymphadenopathy		
Immune system disorders			Rash ^{a,b} ; Urticaria ^{a,b}			Anaphylaxis ^a
Metabolism and nutrition disorders				Decreased appetite		
Nervous system disorders		Headache				
Gastrointestinal disorders	Diarrhoea ^a	Vomiting ^a	Nausea			
Musculoskeletal and connective tissue disorders		Myalgia Arthralgia	Pain in extremity (arm) ^a			
General disorders and administration site conditions	Injection site pain; Fatigue; Injection site redness; Pyrexia	Injection site swelling; Chills		Asthenia		

* CIOMS frequency categories are based on clinical trial C4591007 crude incidence and was reported to only one significant figure.

a. These adverse reactions were identified in the post-authorisation period. At the time of the data-lock, the following reactions were not reported in participants 2 to 4 Years of Age in Study C4591007: pruritus, angioedema, lethargy, myocarditis, pericarditis, hyperhidrosis, night sweats, and malaise but are still considered adverse reactions for this age group.

b. The following events are categorised as hypersensitivity reactions: rash and urticaria

Table 8. Adverse Reactions from Comirnaty clinical trial (C4591007): Individuals 5 to 11 Years of Age (22 May 2022 Data Cut-off Date)

System Organ Class	Very Common ≥1/10	Common ≥1/100 to <1/10	Uncommon ≥1/1,000 to <1/100	Rare ≥1/10,000 to <1/1,000	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy ^a		
Immune system disorders			Urticaria ^{b,c} ; Pruritus ^{b,c} ; Rash ^{b,c}	Angioedema ^{b,c}	Anaphylaxis ^b

Metabolism and nutrition disorders			Decreased appetite		
Nervous system disorders	Headache				
Gastrointestinal disorders	Diarrhoea ^b	Vomiting ^b	Nausea		
Skin and subcutaneous tissue disorders				Night sweats	
Musculoskeletal and connective tissue disorders	Myalgia	Arthralgia	Pain in extremity (arm) ^b		
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Injection site swelling; Injection site redness	Pyrexia	Malaise		

- a. A higher frequency of lymphadenopathy was observed in C4591007 (2.5% vs. 0.7%) in participants receiving a booster dose compared to participants receiving 2 doses.
- b. These adverse reactions were identified in the post-authorisation period. The following events were not reported in participants 5 to 11 Years of Age in Study C4591007 but were reported in individuals ≥ 16 years of age in Study C4591001: angioedema, lethargy, asthenia, hyperhidrosis, and night sweats.
- c. The following events are categorised as hypersensitivity reactions: urticaria, pruritus, rash and angioedema

Table 9: Adverse reactions from Comirnaty clinical trial (C4591001): Individuals 12 years of age and older

System Organ Class	Very common ($\geq 1/10$)	Common ($\geq 1/100$ to $< 1/10$)	Uncommon ($\geq 1/1,000$ to $< 1/100$)	Rare ($\geq 1/10,000$ to $< 1/1,000$)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy ^a		
Psychiatric disorders			Insomnia		
Metabolism and nutrition disorders			Decreased appetite		
Nervous system disorders	Headache		Lethargy	Acute peripheral facial paralysis ^b	
Gastrointestinal disorders		Nausea			
Skin and subcutaneous disorders			Hyperhidrosis Night sweats		
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia				
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Pyrexia ^c ; Injection site swelling	Injection site redness	Asthenia Malaise		Facial swelling ^d

^a A higher frequency of lymphadenopathy (5.2% vs 0.4%) was observed in participants receiving a booster dose compared to participants receiving 2 doses.

^b Through the clinical trial safety follow-up period to 14 November 2020, acute peripheral facial paralysis (or palsy) was reported by four participants in the Comirnaty group. Onset was Day 37 after Dose 1 (participant did not receive Dose 2) and Days 3, 9, and 48 after Dose 2. No cases of acute peripheral facial paralysis (or palsy) were reported in the placebo group.

^c A higher frequency of pyrexia was observed after the second dose.

^d Facial swelling in vaccine recipients with a history of injection of dermatological fillers

The safety profile in 545 subjects receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

Special populations

Immunocompromised participants (adults and children)

In study C4591024, 37 participants 2 through 4 years old, 65 participants 5 through <12 years old, 15 participants 12 through <17 years old, and 7 participants 18 years of age and older from 5 different immunocompromised disease subsets (immunomodulatory therapy, solid organ transplant, stem cell transplant, non-small cell lung cancer (NSCLC)/chronic lymphocytic leukaemia (CLL) and haemodialysis) received at least 1 and up to 4 doses of Comirnaty (tozinameran) (Doses 1 and 2 were separated by 21 days, Doses 2 and 3 were separated by 28 days and Dose 4 was administered 3 to 6 months after Dose 3).

The safety profile in immunocompromised participants 2 years of age and older who received Comirnaty (tozinameran) was similar to that in non-immunocompromised participants in other clinical studies, with no newly identified adverse reactions.

Post-marketing experience

Although the events listed in Table 10 were not observed in the clinical trials, they are considered adverse drug reactions for Comirnaty as they were reported in the post-marketing experience. As these reactions were derived from spontaneous reports, the frequencies could not be determined and are thus considered as not known.

Table 10: Adverse reactions from Comirnaty post marketing experience

System Organ Class	Adverse Drug Reaction
Immune system disorders	Anaphylaxis Hypersensitivity reactions (e.g. rash, pruritis, urticaria, angioedema)
Cardiac disorders	Myocarditis Pericarditis
Nervous system disorder	Dizziness
Gastrointestinal disorders	Diarrhoea Vomiting
Musculoskeletal and connective tissue disorders	Pain in extremity (arm) ^a
General disorders and administration site conditions	Extensive swelling of vaccinated limb
Reproductive system and breast disorders	Heavy menstrual bleeding ^b

^a A higher frequency of pain in extremity (1.1% vs. 0.8%) was observed in participants receiving a booster dose in Study C4591031 compared to participants receiving 2 doses.

^b Most cases appear to be non-serious and temporary in nature.

Reporting suspected adverse effects

Reporting suspected adverse reactions after authorisation of the medicine is important. It allows continued monitoring of the benefit/risk balance of the medicine. Healthcare professionals are asked to report any suspected adverse reactions at <https://pophealth.my.site.com/carmreportnz/s/>.

4.9 Overdose

In clinical trials, participants who received up to 2 times the recommended dose of Comirnaty did not have an increase in reactivity or adverse reactions.

In post-authorisation experience, there have been reports of higher than recommended doses of Comirnaty. In general, adverse events reported with overdoses have been similar to the known adverse reaction profile of Comirnaty.

In the event of overdose, monitoring of vital functions and individualised symptomatic treatment is recommended.

For advice on the management of overdose please contact the National Poisons Centre on 0800 POISON (0800 764766).

5. PHARMACOLOGICAL PROPERTIES

5.1 Pharmacodynamic properties

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BN01.

Mechanism of action

The nucleoside-modified messenger RNA in the vaccine is formulated in lipid nanoparticles, which enable delivery of the non-replicating RNA into host cells to direct transient expression of the SARS-CoV-2 spike (S) antigen. The mRNA codes for membrane-anchored, full-length S with two point mutations within the central helix. Mutation of these two amino acids to proline locks S in an antigenically preferred prefusion conformation. The vaccine elicits both neutralising antibody and cellular immune responses to the antigen, which may contribute to protection against COVID-19.

Clinical efficacy and safety

Comirnaty Original/Omicron BA.4-5 (tozinameran/famtozinameran)

Immunogenicity in participants 6 months to 4 years of age – after bivalent Omicron BA.4-5 (booster dose)

In an analysis of a subset from Study C4591048, 310 participants 6 months to 4 years of age received Comirnaty Original/Omicron BA.4-5 (1.5/1.5 micrograms) as a booster dose after receiving 3 prior doses of Comirnaty (tozinameran). Results include immunogenicity data from a comparator subset of participants 6 months to 4 years of age in Study C4591007 who received 3 doses of Comirnaty (tozinameran).

Analyses of NT50 against Omicron BA.4/BA.5 and against reference strain among participants 6 months through 5 years of age who received COMIRNATY Original/Omicron BA.4-5 (1.5/1.5 micrograms) as a booster dose in Study C4591048 compared to a subset of participants from Study C4591007 who received 3 doses of COMIRNATY (tozinameran) demonstrated superiority of anti Omicron BA.4/BA.5 response based on GMR and noninferiority based on difference in seroresponse rates, and noninferiority of anti-reference strain immune response based on GMR and difference in seroresponse rates (Table 11).

Table 11. Substudy B group 2 – Geometric mean ratios and difference in percentages of participants with seroresponse (1 month after dose 4 study 6/1 month after dose 3 study C4591007) - participants with or without evidence of infection - 6 months to 4 years of age - evaluable immunogenicity population

Geometric mean ratios (1 month after dose 4 study 6/1 month after dose 3 study C4591007)					
Assay^f	Comirnaty (Bivalent BA.4-5) (3 micrograms) Study C4591048		Comirnaty (3 micrograms) Subset of Study C4591007		Comirnaty (Bivalent BA.4-5) (3 micrograms) / Comirnaty (3 micrograms)
	n^a	GMT^b (95% CI^b)	n^a	GMT^b (95% CI^b)	GMR^c (95% CI)^c
SARS-CoV-2 neutralisation assay - Omicron BA.4-5 - NT50 (titre)	223	1 839.3 (1 630.5, 2 074.9)	238	941.0 (838.1, 1 058.2)	1.95 (1.65, 2.31) ^d
SARS-CoV-2 neutralisation assay – reference strain - NT50 (titre)	223	6 636.3 (6 017.5, 7 318.8)	238	7 305.4 (6 645.5, 8 030.7)	0.91 (0.79, 1.04) ^e
Difference in percentages of participants with seroresponse (1 month after dose 4 study 6/1 month after dose 3 study C4591007)					
Assay^f	Comirnaty (Bivalent BA.4-5) (3 micrograms) Study C4591048		Comirnaty (3 micrograms) Subset of Study C4591007		Difference
	N^g	n^h (%) (95% CIⁱ)	N^g	n^h (%) (95% CIⁱ)	%^j (95% CI)^k
SARS-CoV-2 neutralisation assay - Omicron BA.4-5 - NT50 (titre)	223	149 (66.8) (60.2, 73.0)	238	120 (50.4) (43.9, 56.9)	19.99 (11.61, 28.36) ^l
SARS-CoV-2 neutralisation assay – reference strain – NT50 (titre)	223	110 (49.3) (42.6, 56.1)	238	141 (59.2) (52.7, 65.5)	-0.15 (-7.79, 7.48) ^m

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; LSMeans = least square means; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Seroresponse is defined as achieving a ≥ 4 -fold rise from baseline (before the first dose of study vaccination). If the baseline measurement is below the LLOQ, the postvaccination measure of $\geq 4 \times$ LLOQ is considered seroresponse.

- n = Number of participants with valid and determinate assay results for the specified assay at the given sampling time point.
- GMTs and 2-sided CIs were calculated by exponentiating the LSMeans and the corresponding CIs based on analysis of log-transformed assay results using a linear regression model with baseline log-transformed neutralising titres, postbaseline infection status, age group (for ≥ 6 Months to < 5 Years only) and vaccine group as covariates. Assay results below the LLOQ were set to $0.5 \times$ LLOQ.
- GMRs and 2-sided CIs were calculated by exponentiating the difference of LSMeans for the assay and the corresponding CIs based on the same regression model as stated above.
- Superiority is declared if the lower bound of the 2-sided 95% CI for the GMR is greater than 1.

- e. Noninferiority is declared if the lower bound of the 2-sided 95% CI for the GMR is greater than 0.67 and the point estimate of the GMR is ≥ 0.8 .
- f. SARS-CoV-2 NT50 were determined using a validated 384-well assay platform (original strain [USA- WA1/2020, isolated in January 2020] and Omicron B.1.1.529 subvariant BA.4/BA.5).
- g. N = Number of participants with valid and determinate assay results for the specified assay at both the pre-vaccination time point and the given sampling time point. These values are the denominators for the percentage calculations.
- h. n = Number of participants with seroresponse for the given assay at the given sampling time point.
- i. Exact 2-sided CI based on the Clopper and Pearson method
- j. Adjusted difference in proportions, based on the Miettinen and Nurminen stratified by baseline neutralising titre category (< median, \geq median), expressed as a percentage Comirnaty (Bivalent BA.4-5) [3 micrograms] – Comirnaty [3 micrograms]. The median of baseline neutralising titres was calculated based on the pooled data in 2 comparator groups.
- k. 2-sided CI based on the Miettinen and Nurminen method for the difference in proportions stratified by baseline neutralising titre category (< median, \geq median), expressed as a percentage.
- l. Noninferiority is declared if the lower bound of the 2-sided 95% CI for the difference in percentages of participants with seroresponse is $> -5\%$.
- m. Noninferiority is declared if the lower bound of the 2-sided 95% CI for the difference in percentages of participants with seroresponse is $> -10\%$.

Relative vaccine immunogenicity in participants 5 to 11 years of age– after bivalent Omicron BA.4-5 (second booster dose)

In an analysis of a subset from Study C4591048, 103 participants 5 to 11 years of age who had previously received a 2-dose primary series and a booster dose with Comirnaty (tozinameran) received Comirnaty Original/Omicron BA.4-5 (5/5 micrograms) as a second booster. Results include immunogenicity data from a comparator subset of participants 5 to 11 years of age in Study C4591007 who received 3 doses of Comirnaty (tozinameran).

The immune response 1 month after a booster dose, Comirnaty Original/Omicron BA.4-5 elicited generally similar Omicron BA.4-5-specific neutralising titres compared with the titres in the comparator group who received 3 doses of Comirnaty (tozinameran). Comirnaty Original/Omicron BA.4-5 also elicited similar reference strain-specific titres compared with the titres in the comparator group.

The vaccine immunogenicity results after a booster dose in participants 5 to 11 years of age are presented in Table 12.

Table 12: Study C4591048 SSD – Geometric Mean Titres, by Baseline (Dose 4 Study C4591048/Dose 3 Study C4591007) SARS-CoV-2 Status – Participants With or Without Evidence of Infection – 5 to 11 Years of Age – Evaluable Immunogenicity Population

SARS-CoV-2 neutralisation Assay	Baseline SARS-CoV-2 Status	Sampling Time Point ^a	Vaccine Group (as Assigned/Randomised)			
			C4591048 SSD Comirnaty Original/Omicron BA.4-5 5/5 micrograms Dose 4 and 1 Month After Dose 4		C4591007 Comirnaty 10 micrograms Dose 3 and 1 Month After Dose 3	
			n ^b	GMT ^c (95% CI) ^c	n ^b	GMT ^c (95% CI) ^c
Omicron BA.4-5 - NT50 (titre) ^f	Overall	Pre-vaccination	102	488.3 (361.9, 658.8)	112	248.3 (187.2, 329.5)
		1 Month	102	2189.9 (1742.8, 2751.7)	112	1393.6 (1175.8, 1651.7)
	Positive ^d	Pre-vaccination	58	1069.2 (782.4, 1461.1)	65	695.0 (538.4, 897.3)
		1 Month	58	3465.6 (2682.8, 4476.7)	65	1893.9 (1547.6, 2317.7)

Reference strain - NT50 (titre) ^f	Negative ^e	Pre-vaccination	44	173.8 (117.3, 257.4)	47	59.8 (49.0, 73.1)
		1 Month	44	1195.8 (850.2, 1681.9)	47	905.8 (703.0, 1167.2)
	Overall	Pre-vaccination	102	2904.0 (2372.6, 3554.5)	113	1323.1 (1055.7, 1658.2)
		1 Month	102	8245.9 (7108.9, 9564.9)	113	7235.1 (6331.5, 8267.8)
	Positive ^d	Pre-vaccination	58	4198.4 (3342.9, 5272.8)	66	2672.7 (2122.4, 3365.6)
		1 Month	58	9228.4 (7707.0, 11050)	66	7632.5 (6471.6, 9001.5)
	Negative ^e	Pre-vaccination	44	1786.4 (1305.0, 2445.5)	47	492.9 (390.9, 621.6)
		1 Month	44	7108.8 (5534.0, 9131.8)	47	6711.9 (5345.4, 8427.7)

Abbreviations: GMT = geometric mean titre; LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

a. Protocol-specified timing for blood sample collection.

b. n = Number of participants with valid and determinate assay results for the specified assay at the given sampling time point.

c. GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times$ LLOQ.

d. For Study 6: positive N-binding antibody result at the Dose 4 visit, positive NAAT result at the Dose 4 visit, or medical history of COVID-19. For Study 3: positive N-binding antibody result at the Dose 1, 1-month post-Dose 2 (if available), or Dose 3 visit, positive NAAT result at the Dose 1, Dose 2, Dose 3, or any unscheduled illness visit up to the Dose 3 visit, or medical history of COVID-19.

e. For Study 6: negative N-binding antibody result at the Dose 4 visit, negative NAAT result at the Dose 4 visit, and no medical history of COVID-19. For Study 3: negative N-binding antibody result at the Dose 1, 1-month post-Dose 2 (if available), and Dose 3 visits, negative NAAT result at the Dose 1, Dose 2, Dose 3, and any unscheduled illness visits up to the Dose 3 visit, and no medical history of COVID-19.

f. SARS-CoV-2 NT50 were determined using a validated 384-well assay platform (original strain [USA-WA1/2020, isolated in January 2020] and Omicron B.1.1.529 subvariant BA.4/BA.5).

Relative vaccine immunogenicity in participants 12 years of age and older – after bivalent Omicron BA.4-5 (second booster dose)

In an analysis of a subset from Study C4591044, 105 participants 12 to 17 years of age, 297 participants 18 to 55 years of age, and 286 participants 56 years of age and older who had previously received a 2-dose primary series and booster dose with Comirnaty (tozinameran) received Comirnaty Original/Omicron BA.4-5 (15/15 micrograms) as a second booster. In participants 12 to 17 years of age, 18 to 55 years of age, and 56 years of age and older, 75.2%, 71.7% and 61.5% were positive for SARS-CoV-2 at baseline, respectively.

Analyses of 50% neutralising antibody titres (NT50) against Omicron BA.4-5 and against reference strain among participants 56 years of age and older who received Comirnaty Original/Omicron BA.4-5 as a second booster in Study C4591044 compared to a subset of participants from Study C4591031 who received a second booster of Comirnaty (tozinameran) demonstrated superiority of Comirnaty Original/Omicron BA.4-5 to Comirnaty (tozinameran) based on geometric mean ratio (GMR) and noninferiority based on difference in seroresponse rates with respect to anti-Omicron BA.4-5 response, and noninferiority of anti-reference strain immune response based on GMR (Table 13 and Table 14).

Analyses of NT50 against Omicron BA.4-5 among participants 18 to 55 years of age compared to participants 56 years of age and older who received Comirnaty Original/Omicron BA.4-5 as a booster dose in Study C4591044 demonstrated noninferiority of anti-Omicron BA.4-5 response among participants 18 to 55 years of age compared to participants 56 years of age and older for both GMR and difference in seroresponse rates (Table 13 and Table 14).

The study also assessed the level of NT50 of the anti-Omicron BA.4-5 and original SARS-CoV-2 strains pre-vaccination and 1 month after vaccination in participants who received Comirnaty Original/Omicron BA.4-5 as a second booster dose (Table 15).

Table 13: Geometric Mean Ratios – Study C4591044 – Participants With or Without Evidence of Infection - Evaluable Immunogenicity Population

SARS-CoV-2 neutralisation assay	Sampling time point ^a	Comirnaty Original/Omicron BA.4-5 C4591044				Comirnaty Subset of C4591031		Age group comparison	Vaccine group comparison ≥ 56 years
		18 - 55 years of age		≥ 56 years of age		≥ 56 years of age		Comirnaty Original/Omicron BA.4-5 18 - 55 years / ≥ 56 years of age	Comirnaty Original/Omicron BA.4-5 /Comirnaty
		n ^b	GMT ^c (95% CI ^c)	n ^b	GMT ^c (95% CI ^c)	n ^b	GMT ^c (95% CI ^c)	GMR ^d (95% CI ^d)	GMR ^d (95% CI ^d)
Omicron BA.4-5 - NT50 (titre) ^e	1 month	297	4455.9 (3851.7, 5154.8)	284	4158.1 (3554.8, 4863.8)	282	938.9 (802.3, 1098.8)	0.98 (0.83, 1.16) ^f	2.91 (2.45, 3.44) ^g
Reference strain - NT50 (titre) ^e	1 month	-	-	286	16250.1 (14499.2, 18212.4)	289	10415.5 (9366.7, 11581.8)	-	1.38 (1.22, 1.56) ^h

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; LS = least square; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

- Protocol-specified timing for blood sample collection.
- n = Number of participants with valid and determinate assay results for the specified assay at the given sampling time point.
- GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times$ LLOQ.
- GMRs and 2-sided 95% CIs were calculated by exponentiating the difference of LS means and corresponding CIs based on analysis of logarithmically transformed neutralising titres using a linear regression model with terms of baseline neutralising titre (log scale) and vaccine group or age group.
- SARS-CoV-2 NT50 were determined using a validated 384-well assay platform (original strain [USA-WA1/2020, isolated in January 2020] and Omicron B.1.1.529 subvariant BA.4/BA.5).
- Noninferiority is declared if the lower bound of the 2-sided 95% CI for the GMR is greater than 0.67.
- Superiority is declared if the lower bound of the 2-sided 95% CI for the GMR is greater than 1.
- Noninferiority is declared if the lower bound of the 2-sided 95% CI for the GMR is greater than 0.67 and the point estimate of the GMR is ≥ 0.8 .

Table 14: Difference in Percentages of Participants with Seroresponse of Comirnaty Original/Omicron BA.4-5 from Study C4591044 and Comirnaty from Subset of Study C4591031 – Participants With or Without Evidence of Infection – Evaluable Immunogenicity Population

SARS-CoV-2 neutralisation assay	Sampling time point ^a	Comirnaty Original/Omicron BA.4-5 C4591044				Comirnaty Subset of C4591031		Age group comparison	Vaccine group comparison ≥ 56 years
		18 - 55 years of age		≥ 56 years of age		≥ 56 years of age		Comirnaty Original/Omicron BA.4-5 18 - 55 years / ≥ 56 years of age	Comirnaty Original/Omicron BA.4-5 /Comirnaty
		n ^b	N ^c (%) (95% CI ^d)	n ^b	N ^c (%) (95% CI ^d)	n ^b	N ^c (%) (95% CI ^d)	Difference ^e (95% CI ^f)	Difference ^e (95% CI ^f)
Omicron BA.4-5 - NT50 (titre) ^g	1 month	294	180 (61.2, 55.4, 66.8)	282	188 (66.7, 60.8, 72.1)	273	127 (46.5, 40.5, 52.6)	-3.03 (-9.68, 3.63) ^h	26.77 (19.59, 33.95) ⁱ

Abbreviations: CI = confidence interval; LLOQ = lower limit of quantitation; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Seroresponse is defined as achieving a ≥ 4 -fold rise from baseline. If the baseline measurement is below the LLOQ, a postvaccination assay result $\geq 4 \times$ LLOQ is considered a seroresponse.

- a. Protocol-specified timing for blood sample collection.
- b. N = Number of participants with valid and determinate assay results for the specified assay at both the prevaccination time point and the given sampling time point. This value is the denominator for the percentage calculation.
- c. n = Number of participants with seroresponse for the given assay at the given sampling time point.
- d. Exact 2-sided CI, based on the Clopper and Pearson method.
- e. Difference in proportions, expressed as a percentage.
- f. 2-sided CI based on the Miettinen and Nurminen method stratified by baseline neutralising titre category (< median, ≥ median) for the difference in proportions. The median of baseline neutralising titres was calculated based on the pooled data in 2 comparator groups.
- g. SARS-CoV-2 NT50 were determined using a validated 384-well assay platform (Omicron B.1.1.529 subvariant BA.4/BA.5).
- h. Noninferiority is declared if the lower bound of the 2-sided 95% CI for the difference in percentages of participants with seroresponse is > -10%.
- i. Noninferiority is declared if the lower bound of the 2-sided 95% CI for the difference in percentages of participants with seroresponse is > -5%.

Table 15: Geometric Mean Titres by Baseline SARS-CoV-2 Status – Subsets of Study C4591044 – Prior to and 1 month after Comirnaty Original/Omicron BA.4-5 as a Second Booster – Participants 12 years of age and older – Evaluable Immunogenicity Population

SARS-CoV-2 neutralisation assay	Baseline SARS-CoV-2 Status	Sampling time point ^a	Comirnaty Original/Omicron BA.4-5					
			12 - 17 years of age		18 - 55 years of age		≥ 56 years of age	
			n ^b	GMT ^c (95% CI ^c)	n ^b	GMT ^c (95% CI ^c)	n ^b	GMT ^c (95% CI ^c)
Omicron BA.4-5 - NT50 (titre) ^f	All	Pre-vaccination	104	1105.8 (835.1, 1464.3)	294	569.6 (471.4, 688.2)	284	458.2 (365.2, 574.8)
		1 month	105	8212.8 (6807.3, 9908.7)	297	4455.9 (3851.7, 5154.8)	284	4158.1 (3554.8, 4863.8)
	Positive ^d	Pre-vaccination	78	1791.1 (1379.6, 2325.3)	210	1181.4 (1005.3, 1388.3)	174	1291.7 (1027.5, 1623.8)
		1 month	79	9892.5 (8114.6, 12059.8)	213	6031.6 (5203.9, 6991.0)	176	6688.9 (5664.4, 7898.8)
	Negative ^e	Pre-vaccination	26	260.2 (157.1, 430.9)	84	91.9 (71.5, 118.1)	110	88.9 (69.8, 113.4)
		1 month	26	4666.1 (3096.1, 7032.2)	84	2067.7 (1530.2, 2793.9)	108	1916.2 (1489.5, 2465.1)
Reference strain - NT50 (titre) ^f	All	Pre-vaccination	105	6863.3 (5587.8, 8430.1)	296	4017.3 (3430.7, 4704.1)	284	3690.6 (3082.2, 4419.0)
		1 month	105	23641.3 (20473.1, 27299.8)	296	16323.3 (14686.5, 18142.6)	286	16250.1 (14499.2, 18212.4)
	Positive ^d	Pre-vaccination	79	8685.4 (7062.7, 10680.9)	213	7068.6 (6251.9, 7992.0)	174	8082.1 (6843.6, 9544.8)
		1 month	79	25991.8 (22377.5, 30189.8)	212	19076.6 (17056.5, 21336.0)	176	21273.3 (18604.2, 24325.3)
	Negative ^e	Pre-vaccination	26	3356.2 (2106.9, 5346.2)	83	942.3 (705.6, 1258.3)	110	1068.0 (835.9, 1364.6)
		1 month	26	17725.2 (12376.4, 25385.7)	84	11014.6 (8793.9, 13796.0)	110	10560.6 (8827.1, 12634.5)

Abbreviations: CI = confidence interval; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

- a. Protocol-specified timing for blood sample collection.
- b. n = Number of participants with valid and determinate assay results for the specified assay at the given sampling time point.
- c. GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to 0.5 × LLOQ.
- d. Positive N-binding antibody result at baseline, positive NAAT result at baseline, or medical history of COVID-19.
- e. Negative N-binding antibody result at baseline, negative NAAT result at baseline, and no medical history of COVID-19.
- f. SARS-CoV-2 NT50 were determined using a validated 384-well assay platform (original strain [USA-WA1/2020, isolated in January 2020] and Omicron B.1.1.529 subvariant BA.4/BA.5).

Comirnaty (tozinameran)

Study C4591001 is a multicentre, multinational, Phase 1/2/3 randomised, placebo-controlled, observer-blind dose-finding, vaccine candidate selection and efficacy study in participants 12

years of age and older. Randomisation was stratified by age: 12 to 15 years of age, 16 to 55 years of age, or 56 years of age and older, with a minimum of 40% of participants in the ≥ 56 -year stratum. The study excluded participants who were immunocompromised and those who had previous clinical or microbiological diagnosis of COVID-19. Participants with pre-existing stable disease, defined as disease not requiring significant change in therapy or hospitalisation for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with HIV, hepatitis C virus (HCV) or hepatitis B virus (HBV).

Efficacy and immunogenicity in individuals 6 months to 4 years of age – 3-dose primary course

Effectiveness in individuals 6 months to 4 years of age is based on a comparison of efficacy against symptomatic COVID-19 comparing to placebo and immune responses in this age group to individuals 16 to 25 years of age.

Efficacy in participants 6 months to 4 years of age – after 3 doses

The efficacy analysis of Study C4591007 was performed across the combined population of participants 6 months to 4 years of age based on cases confirmed among 873 participants in the Comirnaty group and 381 participants in the placebo group (2:1 randomisation ratio) who received all 3 doses of study intervention during the blinded follow up period when the Omicron variant of SARS-CoV-2 (BA.2) was the predominant variant in circulation (data cutoff date of 17 June 2022).

The vaccine efficacy results after Dose 3 in participants 6 months to 4 years of age are presented in Table 16.

Table 16: Vaccine Efficacy – First COVID-19 Occurrence From 7 Days After Dose 3 – Blinded Follow-Up Period – Participants Without Evidence of Infection and Participants With or Without Evidence of Infection Prior to 7 Days After Dose 3 – Phase 2/3 – 6 Months to 4 Years of Age – Evaluable Efficacy (3-Dose) Population

First COVID-19 occurrence from 7 days after Dose 3 in participants without evidence of prior SARS-CoV-2 infection*			
Subgroup	Comirnaty 3 micrograms/Dose N^a=873 Cases n^{1b} Surveillance Time^c (n^{2d})	Placebo N^a=381 Cases n^{1b} Surveillance Time^c (n^{2d})	Vaccine Efficacy % (95% CI^e)
6 months to 4 years ^c	13 0.124 (794)	21 0.054 (351)	73.2 (43.8, 87.6)
2 to 4 years	9 0.081 (498)	13 0.033 (204)	71.8 (28.6, 89.4)
6 months to 23 months	4 0.042 (296)	8 0.020 (147)	75.8 (9.7, 94.7)
First COVID-19 occurrence from 7 days after Dose 3 in participants with or without evidence of prior SARS-CoV-2 infection			
Subgroup	Comirnaty 3 micrograms/Dose N^a=1294 Cases n^{1b} Surveillance Time^c (n^{2d})	Placebo N^a=612 Cases n^{1b} Surveillance Time^c (n^{2d})	Vaccine Efficacy % (95% CI^e)
6 months to 4 years ^c	14 0.149 (981)	23 0.067 (459)	72.5 (44.3, 86.9)
2 to 4 years	10 0.100 (639)	15 0.044 (286)	70.7 (30.3, 88.2)

6 months to 23 months	4 0.048 (342)	8 0.023 (173)	76.2 (11.1, 94.8)
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Abbreviations: NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; VE = vaccine efficacy.

- * Participants who had no serological or virological evidence (prior to 7 days after receipt of Dose 3) of past SARS-CoV-2 infection (i.e., negative N-binding antibody [serum] result at Dose 1, 1 month post-Dose 2 (if available), Dose 3 (if available) visits, SARS-CoV-2 not detected by NAAT [nasal swab] at Dose 1, Dose 2, and Dose 3 study visits, and a negative NAAT [nasal swab] result at any unscheduled visit prior to 7 days after receipt of Dose 3) and had no medical history of COVID-19 were included in the analysis.
- N = number of participants in the specified group.
 - n1 = Number of participants meeting the endpoint definition.
 - Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 3 to the end of the surveillance period.
 - n2 = Number of participants at risk for the endpoint.
 - Two-sided 95% confidence interval (CI) for VE is derived based on the Clopper and Pearson method adjusted for surveillance time.

Analysis of COVID-19 cases that excluded those involving coinfection with other respiratory pathogens did not meaningfully impact the estimated vaccine efficacy in this population.

Among participants 2 to 4 years of age, severe COVID-19 criteria (as described in the protocol, based on FDA definition and modified for children) were fulfilled for 9 cases (6 Comirnaty and 3 placebo) of which 5 of the 6 cases in the Comirnaty group fulfilled a single criterion of increased heart rate or respiratory rate and all 3 cases in the placebo group fulfilled a single criterion of increased heart rate or decreased peripheral oxygen saturation. None of the cases accrued met criteria for multisystem inflammatory syndrome in children (MIS-C).

Among participants 6 months to 23 months of age, severe COVID-19 criteria were fulfilled for 3 cases (2 Comirnaty and 1 placebo) of which 1 of the 2 cases in the Comirnaty group fulfilled a single criterion of increased heart rate (152 bpm) and 1 case in the placebo group fulfilled a single criterion of increased heart rate (172 bpm). None of the cases accrued met criteria for MIS-C.

Immunogenicity in participants 6 to 23 months of age – after 3 doses

Immunogenicity analyses have been performed in the immunobridging subset of 82 C4591007 participants 6 months to 23 months of age without evidence of infection up to 1 month after Dose 3 based on a data cutoff date of 29 April 2022.

SARS-CoV-2 50% neutralising antibody titres (NT50) 1 month after the vaccination course were compared between an immunogenicity subset of Phase 2/3 participants 6 months to 23 months of age from C4591007 and a randomly selected subset from C4591001 Phase 2/3 participants 16 to 25 years of age, using a microneutralisation assay against the reference strain (USA_WA1/2020). The primary immunobridging analyses compared the geometric mean titres (using a GMR) and the seroresponse (defined as achieving at least 4-fold rise in SARS-CoV-2 NT50 from before Dose 1) rates in the evaluable immunogenicity population of participants without evidence of prior SARS-CoV-2 infection up to 1 month after Dose 3 in participants 6 months to 23 months of age and up to 1 month after Dose 2 in participants 16 to 25 years of age. The prespecified immunobridging criteria were met for both the GMR and the seroresponse difference (Table 17 and Table 18, respectively).

Table 17: SARS-CoV-2 GMTs (NT50) at 1 month after vaccination course – immunobridging subset - participants 6 months to 23 months of age (C4591007) 1 month after Dose 3 and participants 16 to 25 years of age (C4591001) 1 month after Dose 2 – without evidence of SARS-CoV-2– evaluable immunogenicity population

	Comirnaty		GMR (95%CI) (6 months to 23 months of age/16 to 25 years of age) ^{c,d}
	3 micrograms/dose 6 to 23 months of age (1 month after Dose 3) n ^a =82	30 micrograms/dose 16 to 25 years of age (1 month after Dose 2) n ^a =170	
Assay	GMT ^b (95% CI ^b)	GMT ^b (95% CI ^b)	
SARS-CoV-2 neutralisation assay - NT50 (titre) ^e	1406.5 (1211.3, 1633.1)	1180.0 (1066.6, 1305.4)	1.19 (1.00, 1.42)

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NAAT = nucleic-acid amplification test; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Participants who had no serological or virological evidence [(up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood sample collection)] of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Dose 1, Dose 3 (C4591007) and 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007), SARS-CoV-2 not detected by NAAT [nasal swab] at Dose 1, Dose 2, and Dose 3 (C4591007) study visits, and negative NAAT (nasal swab) at any unscheduled visit up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood collection)] and had no medical history of COVID-19 were included in the analysis.

- n = Number of participants with valid and determinate assay results for the specified assay at the given dose/sampling time point.
- GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titre titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to 0.5 × LLOQ.
- GMRs and 2-sided 95% CIs were calculated by exponentiating the mean difference of the logarithms of the titres (6 months to 23 months of age minus 16 to 25 years of age) and the corresponding CI (based on the Student t distribution).
- Immunobridging is declared if the lower bound of the 2-sided 95% CI for the GMR ratio is greater than 0.67 and the point estimate of the GMR is ≥0.8.
- SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

Table 18: Difference in percentages of participants with seroresponse at 1 month after vaccination course – immunobridging subset – participants 6 months to 23 months of age (C4591007) 1 month after Dose 3 and participants 16 to 25 years of age (C4591001) to 1 month after Dose 2 without evidence of infection – evaluable immunogenicity population

	Comirnaty		Difference in seroresponse rates % ^d (95% CI ^e) (6 months to 23 months of age minus 16 to 25 years of age) ^f
	3 micrograms/dose 6 to 23 months of age (1 month after Dose 3) N ^a =80	30 micrograms/dose 16 to 25 years of age (1 month after Dose 2) N ^a =170	
Assay	n ^b (%) (95% CI ^e)	n ^b (%) (95% CI ^e)	
SARS-CoV-2 neutralisation assay - NT50 (titre) ^g	80 (100.0) (95.5, 100.0)	168 (98.8) (95.8, 99.9)	1.2 (-3.4, 4.2,)

Abbreviations: LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; NT50 = 50% neutralising titre 50; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Seroresponse is defined as achieving a ≥4-fold rise from baseline (before Dose 1). If the baseline measurement is below the LLOQ, a postvaccination assay result ≥4 × LLOQ is considered a seroresponse.

Note: Participants who had no serological or virological evidence [(up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood sample collection) of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at pre-Dose 1, Dose 3 (C4591007) and 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007), SARS-CoV-2 not detected by NAAT [nasal swab] at pre-Dose 1, pre-Dose 2, and pre-Dose 3 (C4591007) study visits, and negative NAAT (nasal swab) at any unscheduled visit up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood collection)] and had no medical history of COVID-19 were included in the analysis.

- N = number of participants with valid and determinate assay results both before vaccination and at 1 month after Dose 2. These values are the denominators for the percentage calculations.

- b. n = Number of participants with seroresponse for the given assay at the given dose/sampling time point.
- c. Exact 2-sided CI based on the Clopper and Pearson method.
- d. Difference in proportions, expressed as a percentage (6 months to 23 months of age minus 16 to 25 years of age).
- e. 2-sided CI, based on the Miettinen and Nurminen method for the difference in proportions, expressed as a percentage.
- f. Immunobridging is declared if the lower bound of the 2-sided 95% CI for the difference in proportions is greater than -10.0% provided that the immunobridging criteria based on GMR were met.
- g. SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

Using a non-validated fluorescence focus reduction neutralisation test assay against the Omicron variant of SARS-CoV-2 (BA.1), the NT50 GMT at 1 month after Dose 3 among a subset of 32 study participants without evidence of prior SARS-CoV-2 infection (127.5 [2-sided 95% CI: 90.2, 180.1]) was increased compared to the NT50 GMT before Dose 3 (16.3 [2-sided 95% CI: 12.8, 20.8]).

An additional descriptive immunogenicity analysis was performed for participants 6 months to 23 months of age who received a 3-dose course of Comirnaty in Phase 2/3 C4591007, compared with a subset of participants 18 to 50 years of age in Phase 3 Study C4591017 who had received a 2-dose primary course followed by a booster dose of Comirnaty 30 micrograms. The comparator group (participants 18 to 50 years of age) in this analysis had a similar interval between Comirnaty Dose 2 and Dose 3 (median 13.0 weeks) as the participants 6 months to 23 months of age (median 12.9 weeks). Among 32 participants 6 months to 23 months of age without evidence of prior SARS-CoV-2 infection who received 3 doses of Comirnaty 3 micrograms, Omicron neutralising GMTs were 128.8 at 1-month post-Dose 3. Among 27 participants 18 to 50 years of age without evidence of prior SARS-CoV-2 infection who received 3 doses of Comirnaty 30 micrograms, Omicron neutralising GMTs were 164.2 at 1-month post Dose 3.

Immunogenicity in participants 2 to 4 years of age – after 3 doses

Immunogenicity analyses have been performed in the immunobridging subset of 143 C4591007 participants 2 to 4 years of age without evidence of infection up to 1 month after Dose 3 based on a data cutoff date of 29 April 2022.

SARS-CoV-2 50% neutralising antibody titres (NT50) were compared between an immunogenicity subset of Phase 2/3 participants 2 to 4 years of age from C4591007 at 1 month after the 3-dose primary course and a randomly selected subset from C4591001 Phase 2/3 participants 16 to 25 years of age at 1 month after the 2-dose primary course, using a microneutralisation assay against the reference strain (USA_WA1/2020). The primary immunobridging analyses compared the geometric mean titres (using a geometric mean ratio [GMR]) and the seroresponse (defined as achieving at least 4-fold rise in SARS-CoV-2 NT50 from before Dose 1) rates in the evaluable immunogenicity population of participants without evidence of prior SARS-CoV-2 infection up to 1 month after Dose 3 in participants 2 to 4 years of age and up to 1 month after Dose 2 in participants 16 to 25 years of age. The prespecified immunobridging criteria were met for both the GMR and the seroresponse difference (Table 19 and Table 20, respectively).

Table 19: SARS-CoV-2 GMTs (NT50) at 1 month after vaccination course – immunobridging subset - participants 2 to 4 years of age (C4591007) 1 month after Dose 3 and participants 16 to 25 years of age (C4591001) 1 month after Dose 2 – without evidence of SARS-CoV-2 infection – evaluable immunogenicity population

	Comirnaty		GMR (95%CI)
	3 micrograms/dose 2 to 4 years of age	30 micrograms/dose 16 to 25 years of age	

	(1 month after Dose 3) n ^a =143	(1 month after Dose 2) n ^a =170	(2 to 4 years of age/16 to 25 years of age) ^{c,d}
Assay	GMT ^b (95% CI ^b)	GMT ^b (95% CI ^b)	
SARS-CoV-2 neutralisation assay - NT50 (titre) ^e	1535.2 (1388.2, 1697.8)	1180.0 (1066.6, 1305.4)	1.30 (1.13, 1.50)

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NAAT = nucleic-acid amplification test; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Participants who had no serological or virological evidence [(up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood sample collection)] of past SARS-CoV-2 infection [(i.e., N-binding antibody [serum] negative at Dose 1, Dose 3 (C4591007) and 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007), SARS-CoV-2 not detected by NAAT [nasal swab] at Dose 1, Dose 2, and Dose 3 (C4591007) study visits, and negative NAAT (nasal swab) at any unscheduled visit up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood collection)] and had no medical history of COVID-19 were included in the analysis.

- n = Number of participants with valid and determinate assay results for the specified assay at the given dose/sampling time point.
- GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times \text{LLOQ}$.
- GMRs and 2-sided 95% CIs were calculated by exponentiating the mean difference of the logarithms of the titres (2 to 4 years of age minus 16 to 25 years of age) and the corresponding CI (based on the Student t distribution).
- Immunobridging is declared if the lower bound of the 2-sided 95% CI for the GMR ratio is greater than 0.67 and the point estimate of the GMR is ≥ 0.8 .
- SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

Table 20: Difference in percentages of participants with seroresponse at 1 month after vaccination course – immunobridging subset – participants 2 to 4 years of age (C4591007) 1 month after Dose 3 and participants 16 to 25 years of age (C4591001) 1 month after Dose 2 without evidence of infection – evaluable immunogenicity population

	Comirnaty		Difference in seroresponse rates % ^d (95% CI ^e) (2 to 4 years of age minus 16 to 25 years of age) ^f
	3 micrograms/dose 2 to 4 years of age (1 month after Dose 3) N ^a =141	30 micrograms/dose 16 to 25 Years of age (1 month after Dose 2) N ^a =170	
Assay	n ^b (%) (95% CI ^c)	n ^b (%) (95% CI ^c)	
SARS-CoV-2 neutralisation assay - NT50 (titre) ^g	141 (100.0) (97.4, 100.0)	168 (98.8) (95.8, 99.9)	1.2 (-1.5, 4.2)

Abbreviations: LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; NT50 = 50% neutralising titre 50; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Seroresponse is defined as achieving a ≥ 4 -fold rise from baseline (before Dose 1). If the baseline measurement is below the LLOQ, a postvaccination assay result $\geq 4 \times \text{LLOQ}$ is considered a seroresponse.

Note: Participants who had no serological or virological evidence (up to 1 month after Dose 2 [(C4591001) or 1 month after Dose 3 (C4591007) blood sample collection]) of past SARS-CoV-2 infection [(i.e., N-binding antibody [serum] negative at pre-Dose 1, pre-Dose 3 (C4591007) and 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007), SARS-CoV-2 not detected by NAAT [nasal swab] at pre-Dose 1, pre-Dose 2, and pre-Dose 3 (C4591007) study visits, and negative NAAT (nasal swab) at any unscheduled visit up to 1 month after Dose 2 (C4591001) or 1 month after Dose 3 (C4591007) blood collection)] and had no medical history of COVID-19 were included in the analysis.

- N = number of participants with valid and determinate assay results both before vaccination and at 1 month after Dose 2. These values are the denominators for the percentage calculations.
- n = Number of participants with seroresponse for the given assay at the given dose/sampling time point.
- Exact 2-sided CI based on the Clopper and Pearson method.
- Difference in proportions, expressed as a percentage (2 to 4 years of age minus 16 to 25 years of age).
- 2-sided CI, based on the Miettinen and Nurminen method for the difference in proportions, expressed as a percentage.
- Immunobridging is declared if the lower bound of the 2-sided 95% CI for the difference in proportions is greater than -10.0% provided that the immunobridging criteria based on GMR were met.

- g. SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

Using a non-validated fluorescence focus reduction neutralisation test assay against the Omicron variant of SARS-CoV-2 (BA.1), the NT50 GMT at 1 month after Dose 3 among a subset of 34 study participants without evidence of prior SARS-CoV-2 infection (82.5 [2-sided 95% CI: 55.4, 122.9]) was increased compared to the NT50 GMT before Dose 3 (14.0 [2-sided 95% CI: 10.6, 18.5]).

An additional descriptive immunogenicity analysis was performed for participants 2 to 4 years of age who received a 3-dose course of Comirnaty in Phase 2/3 C4591007, compared with a subset of participants 18 to 50 years of age in Phase 3 Study C4591017 who had received a 2-dose primary course followed by a booster dose of Comirnaty 30 micrograms. The comparator group (participants 18 to 50 years of age) in this analysis had a similar interval between Comirnaty Dose 2 and Dose 3 (median 13.0 weeks) as the participants 2 to 4 years of age (median 10.6 weeks). Among 34 participants 2 to 4 years of age without evidence of prior SARS-CoV-2 infection who received 3 doses of Comirnaty 3 micrograms, neutralising GMTs were 114.3 at 1-month post-Dose 3. Among 27 participants 18 to 50 years of age without evidence of prior SARS-CoV-2 infection who received 3 doses of Comirnaty 30 micrograms, Omicron neutralising GMTs were 164.2 at 1-month post Dose 3.

Efficacy in children 5 to 11 years of age – after 2 doses

An initial descriptive efficacy analysis of Study C4591007 has been performed in 1,968 children 5 to 11 years of age without evidence of infection prior to 7 days after Dose 2. This analysis evaluated confirmed symptomatic COVID-19 cases accrued up to a data cut-off date of 8 October 2021.

The initial descriptive vaccine efficacy results in children 5 to 11 years of age without evidence of prior SARS-CoV-2 infection are presented in Table 21. None of the cases accrued met criteria for severe COVID-19 or multisystem inflammatory syndrome in children (MIS-C). No cases of COVID-19 were observed in either the vaccine group or the placebo group in participants with evidence of prior SARS-CoV-2 infection.

Table 21: Vaccine Efficacy – First COVID-19 Occurrence From 7 Days After Dose 2: Without Evidence of Infection Prior to 7 Days After Dose 2 – Phase 2/3 – Children 5 To 11 Years of Age Evaluable Efficacy Population

First COVID-19 occurrence from 7 days after Dose 2 in children 5 to 11 years of age without evidence of prior SARS-CoV-2 infection*			
	Comirnaty[±] 10 micrograms/dose N^a=1305 Cases n1^b Surveillance Time^c (n2^d)	Placebo N^a=663 Cases n1^b Surveillance Time^c (n2^d)	Vaccine Efficacy % (95% CI)
Children 5 to 11 years of age	3 0.322 (1273)	16 0.159 (637)	90.7 (67.7, 98.3)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 (symptoms included: fever; new or increased cough; new or increased shortness of breath; chills; new or increased muscle pain; new loss of taste or smell; sore throat; diarrhoea; vomiting).

* Participants who had no evidence of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by NAAT [nasal swab] at Visits 1 and 2), and had negative NAAT (nasal swab) at any unscheduled visit prior to 7 days after Dose 2 were included in the analysis.

± Pfizer-BioNTech COVID-19 Vaccine (10 micrograms modRNA).

a. N = Number of participants in the specified group.

b. n1 = Number of participants meeting the endpoint definition.

- c. Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 2 to the end of the surveillance period.
- d. n2 = Number of participants at risk for the endpoint.

Prespecified hypothesis-driven efficacy analysis was performed with additional confirmed COVID-19 cases accrued during blinded placebo-controlled follow-up, representing up to 6 months after Dose 2 in the efficacy population.

In the efficacy analysis of Study C4591007 in children 5 to 11 years of age without evidence of prior infection, there were 10 cases out of 2,703 participants who received the vaccine and 42 cases out of 1,348 participants who received placebo. The point estimate for efficacy is 88.2% (95% CI: 76.2, 94.7). In participants with or without evidence of prior infection there were 12 cases in the 3,018 who received vaccine and 42 cases in 1,511 participants who received placebo. The point estimate for efficacy is 85.7% (95% CI: 72.4, 93.2).

Immunogenicity in children 5 to 11 years of age – after 2 doses

Study C4591007 is a Phase 1/2/3 study comprised of an open-label vaccine dose-finding portion (Phase 1) and a multicentre, multinational, randomised, saline placebo-controlled, observer-blind efficacy portion (Phase 2/3) that has enrolled participants 5 to 11 years of age.

In C4591007, an analysis of SARS-CoV-2 50% neutralising titres (NT50) 1 month after Dose 2 in a randomly selected subset of participants demonstrated effectiveness by immunobridging of immune responses comparing children 5 to 11 years of age in the Phase 2/3 part of Study C4591007 to participants 16 to 25 years of age in the Phase 2/3 part of Study C4591001 who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, meeting the prespecified immunobridging criteria for both the geometric mean ratio (GMR) and the seroresponse difference with seroresponse defined as achieving at least 4-fold rise in SARS-CoV-2 NT50 from baseline (before Dose 1).

The ratio of the SARS-CoV-2 NT50 in children 5 to 11 years of age to that of young adults 16 to 25 years of age was 1.04 (2-sided 95% CI: 0.93, 1.18), as presented in Table 22.

Table 22: Summary of geometric mean ratio for 50% neutralising titre – Comparison of children 5 to 11 years of age (Study C4591007) to participants 16 to 25 years of age (Study C4591001) – participants without* evidence of infection up to 1 month after Dose 2 – evaluable immunogenicity population

		Comirnaty		5 to 11 years/ 16 to 25 years	
		10 microgram/dose 5 to 11 years n ^a =264	30 microgram/dose 16 to 25 years n ^a =253		
Assay	Time point ^b	GMT ^c (95% CI ^e)	GMT ^c (95% CI ^e)	GMR ^d (95% CI ^d)	Met immunobridging objective ^e (Y/N)
SARS-CoV-2 neutralisation assay - NT50 (titre) ^f	1 month after Dose 2	1197.6 (1106.1, 1296.6)	1146.5 (1045.5, 1257.2)	1.04 (0.93, 1.18)	Y

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

*Participants who had no serological or virological evidence (up to 1 month post-Dose 2 blood sample collection) of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and 1 month after Dose 2, SARS-CoV-2 not detected by NAAT [nasal swab] at Visits 1 and 2, and negative NAAT (nasal swab) at any unscheduled visit up to 1 month after Dose 2 blood collection) and had no medical history of COVID-19 were included in the analysis.

- a. n = Number of participants with valid and determinate assay results for the specified assay at the given dose/sampling time point.
- b. Protocol-specified timing for blood sample collection.
- c. GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times \text{LLOQ}$.
- d. GMRs and 2-sided 95% CIs were calculated by exponentiating the mean difference of the logarithms of the titres (Group 1 [5 to 11 years of age] - Group 2 [16 to 25 years of age]) and the corresponding CI (based on the Student t distribution).
- e. Immunobridging is declared if the lower bound of the 2-sided 95% CI for the GMR is greater than 0.67 and the point estimate of the GMR is ≥ 0.8 .
- f. SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

Among participants without prior evidence of SARS-CoV-2 infection up to 1 month after Dose 2, 99.2% of children 5 to 11 years of age and 99.2% of participants 16 to 25 years of age had a seroresponse from before vaccination to 1 month after Dose 2. The difference in proportions of participants who had seroresponse between the 2 age groups (children – young adult) was 0.0% (2-sided 95% CI: -2.0%, 2.2%) as presented in Table 23.

Table 23: Difference in percentages of participants with seroresponse – participants without evidence of infection up to 1 month after Dose 2 – immunobridging subset – Phase 2/3 – comparison of 5 to 11 years of age to Study C4591001 Phase 2/3 16 to 25 years of age – evaluable immunogenicity population

		Comirnaty		5 to 11 years/ 16 to 25 years	
		10 microgram/dose 5 to 11 years N ^a =264	30 microgram/dose 16 to 25 years N ^a =253		
Assay	Time point ^b	n ^c (%) (95% CI ^d)	n ^c (%) (95% CI ^d)	Difference % ^e (95% CI ^f)	Met immunobridging objective ^g (Y/N)
SARS-CoV-2 neutralisation assay – NT50 (titre) ^h	1 month after Dose 2	262 (99.2) (97.3, 99.9)	251 (99.2) (97.2, 99.9)	0.0 (-2.0, 2.2)	Y

Abbreviations: LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; NT50 = 50% neutralising titre 50; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Seroresponse is defined as achieving a ≥ 4 -fold rise from baseline (before Dose 1). If the baseline measurement is below the LLOQ, a postvaccination assay result $\geq 4 \times \text{LLOQ}$ is considered a seroresponse.

Note: Participants who had no serological or virological evidence (up to 1 month post-Dose 2 blood sample collection) of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and 1 month after Dose 2, SARS-CoV-2 not detected by NAAT [nasal swab] at Visits 1 and 2, and negative NAAT (nasal swab) at any unscheduled visit up to 1 month after Dose 2 blood collection) and had no medical history of COVID-19 were included in the analysis.

- a. N = number of participants with valid and determinate assay results both before vaccination and at 1 month after Dose 2. These values are the denominators for the percentage calculations.
- b. Protocol-specified timing for blood sample collection.
- c. n = Number of participants with seroresponse for the given assay at the given dose/sampling time point.
- d. Exact 2-sided CI based on the Clopper and Pearson method.
- e. Difference in proportions, expressed as a percentage (Group 1 [5 to 11 years of age] – Group 2 [16 to 25 years of age]).
- f. 2-Sided CI, based on the Miettinen and Nurminen method for the difference in proportions, expressed as a percentage.
- g. Immunobridging is declared if the lower bound of the 2-sided 95% CI for the difference in proportions is greater than -10.0%.
- h. SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

Efficacy and immunogenicity in adolescents 12 to 15 years of age – after 2 doses

An analysis of Study C4591001 has been performed in adolescents 12 to 15 years of age up to a data cutoff date of 13 March 2021.

The vaccine efficacy information in adolescents 12 to 15 years of age is presented in Table 24.

Table 24: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2 – participants without evidence of infection and with or without evidence of infection prior to 7 days after Dose 2 – adolescents 12 to 15 years of age evaluable efficacy (7 days) population

First COVID-19 occurrence from 7 days after Dose 2 in adolescents 12 to 15 years of age without evidence of prior SARS-CoV-2 infection*			
	Comirnaty N^a = 1005 Cases n¹^b Surveillance time^c (n²^d)	Placebo N^a = 978 Cases n¹^b Surveillance time^c (n²^d)	Vaccine efficacy % (95% CI^e)
Adolescents 12 to 15 years	0 0.154 (1001)	16 0.147 (972)	100.0 (75.3, 100.0)
First COVID-19 occurrence from 7 days after Dose 2 in adolescents 12 to 15 years of age with or without* evidence of prior SARS-CoV-2 infection			
	Comirnaty N^a = 1119 Cases n¹^b Surveillance time^c (n²^d)	Placebo N^a = 1110 Cases n¹^b Surveillance time^c (n²^d)	Vaccine efficacy % (95% CI^e)
Adolescents 12 to 15 years	0 0.170 (1109)	18 0.163 (1094)	100.0 (78.1, 100.0)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 [*Case definition: (at least 1 of) fever, new or increased cough, new or increased shortness of breath, chills, new or increased muscle pain, new loss of taste or smell, sore throat, diarrhoea or vomiting).

* Participants who had no serological or virological evidence (prior to 7 days after receipt of the last dose) of past SARS-CoV-2 infection (i.e, N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by nucleic acid amplification tests (NAAT) [nasal swab] at Visits 1 and 2), and had negative NAAT (nasal swab) at any unscheduled visit prior to 7 days after Dose 2 were included in the analysis.

- N = number of participants in the specified group.
- n1 = Number of participants meeting the endpoint definition.
- Total surveillance time in 1000 person-years for the given endpoint across all subjects within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 2 to the end of the surveillance period.
- n2 = Number of subjects at risk for the endpoint.
- Confidence interval (CI) for vaccine efficacy is derived based on the Clopper and Pearson method adjusted for surveillance time. CI not adjusted for multiplicity.

In Study C4591001 an analysis of SARS-CoV-2 neutralising titres in a randomly selected subset of participants was performed to demonstrate non-inferior immune responses (within 1.5-fold) comparing adolescents 12 to 15 years of age to participants 16 to 25 years of age who had no serological or virological evidence of past SARS-CoV-2 infection. The immune response to Comirnaty in adolescents 12 to 15 years of age (n = 190) was non-inferior to the immune response in participants 16 to 25 years of age (n = 170), based on results for SARS-CoV-2 neutralising titres at 1 month after Dose 2. The geometric mean titres (GMT) ratio of the adolescents 12 to 15 years of age group to the participants 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10, meeting the 1.5-fold non-inferiority criterion (the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] >0.67), which indicates a statistically greater response in the adolescents 12 to 15 years of age than that of participants 16 to 25 years of age.

An updated efficacy analysis of Study C4591001 has been performed in approximately 2,260 adolescents 12 to 15 years of age evaluating confirmed COVID-19 cases accrued up to a data cut-off date of 2 September 2021, representing up to 6 months of follow-up after Dose 2 for participants in the efficacy population.

The updated vaccine efficacy information in adolescents 12 to 15 years of age is presented in Table 25.

Table 25: Vaccine Efficacy – First COVID-19 Occurrence From 7 Days After Dose 2: Without Evidence of Infection and With or Without Evidence of Infection Prior to 7 Days After Dose 2 – Blinded Placebo-Controlled Follow-up Period, Adolescents 12 To 15 Years of Age Evaluable Efficacy (7 Days) Population

First COVID-19 occurrence from 7 days after Dose 2 in adolescents 12 to 15 years of age without evidence of prior SARS-CoV-2 infection*			
	Comirnaty N^a=1057 Cases n¹^b Surveillance Time^c (n²^d)	Placebo N^a=1030 Cases n¹^b Surveillance Time^c (n²^d)	Vaccine Efficacy % (95% CI^e)
Adolescents 12 to 15 years of age	0 0.343 (1043)	28 0.322 (1019)	100.0 (86.8, 100.0)
First COVID-19 occurrence from 7 days after Dose 2 in adolescents 12 to 15 years of age with or without evidence of prior SARS-CoV-2 infection			
	Comirnaty N^a=1119 Cases n¹^b Surveillance Time^c (n²^d)	Placebo N^a=1109 Cases n¹^b Surveillance Time^c (n²^d)	Vaccine Efficacy % (95% CI^e)
Adolescents 12 to 15 years of age	0 0.362 (1098)	30 0.345 (1088)	100.0 (87.5, 100.0)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 (symptoms included: fever; new or increased cough; new or increased shortness of breath; chills; new or increased muscle pain; new loss of taste or smell; sore throat; diarrhoea; vomiting).

* Participants who had no evidence of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by NAAT [nasal swab] at Visits 1 and 2), and had negative NAAT (nasal swab) at any unscheduled visit prior to 7 days after Dose 2 were included in the analysis.

- N = Number of participants in the specified group.
- n1 = Number of participants meeting the endpoint definition.
- Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 2 to the end of the surveillance period.
- n2 = Number of participants at risk for the endpoint.
- Two-sided confidence interval (CI) for vaccine efficacy is derived based on the Clopper and Pearson method adjusted for surveillance time.

Efficacy against severe COVID-19 in participants 12 years of age or older – after 2 doses

As of 13 March 2021, vaccine efficacy against severe COVID-19 is presented only for participants with or without prior SARS-CoV-2 infection (Table 26) as the COVID-19 case counts in participants without prior SARS-CoV-2 infection were the same as those in participants with or without prior SARS-CoV-2 infection in both the Comirnaty and placebo groups.

Table 26. Vaccine Efficacy – First Severe COVID-19 Occurrence in Participants With or Without* Prior SARS-CoV-2 Infection Based on Food and Drug Administration (FDA)[†] Definition After Dose 1 or From 7 Days After Dose 2 in the Placebo-Controlled Follow-up

	Comirnaty Cases n¹^a Surveillance Time (n²^b)	Placebo Cases n¹^a Surveillance Time (n²^b)	Vaccine Efficacy % (95% CI^c)
After Dose 1 ^d	1 8.439 ^c (22,505)	30 8.288 ^c (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 ^f	1 6.522 ^g (21,649)	21 6.404 ^g (21,730)	95.3 (70.9, 99.9)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 (symptoms included: fever; new or increased cough; new or increased shortness of breath; chills; new or increased muscle pain; new loss of taste or smell; sore throat; diarrhoea; vomiting).

* Participants who had no evidence of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by NAAT [nasal swab] at Visits 1 and 2), and had negative NAAT (nasal swab) at any unscheduled visit prior to 7 days after Dose 2 were included in the analysis.

† Severe illness from COVID-19 as defined by FDA is confirmed COVID-19 and presence of at least 1 of the following:

- Clinical signs at rest indicative of severe systemic illness (respiratory rate ≥ 30 breaths per minute, heart rate ≥ 125 beats per minute, saturation of oxygen $\leq 93\%$ on room air at sea level, or ratio of arterial oxygen partial pressure to fractional inspired oxygen < 300 mm Hg);
- Respiratory failure [defined as needing high-flow oxygen, noninvasive ventilation, mechanical ventilation or extracorporeal membrane oxygenation (ECMO)];
- Evidence of shock (systolic blood pressure < 90 mm Hg, diastolic blood pressure < 60 mm Hg, or requiring vasopressors);
- Significant acute renal, hepatic, or neurologic dysfunction;
- Admission to an Intensive Care Unit;
- Death.

a. n1 = Number of participants meeting the endpoint definition.

b. n2 = Number of participants at risk for the endpoint.

c. Two-side confidence interval (CI) for vaccine efficacy is derived based on the Clopper and Pearson method adjusted to the surveillance time.

d. Efficacy assessed based on the Dose 1 all available efficacy (modified intention-to-treat) population that included all randomised participants who received at least 1 dose of study intervention.

e. Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from Dose 1 to the end of the surveillance period.

f. Efficacy assessed based on the evaluable efficacy (7 Days) population that included all eligible randomised participants who receive all dose(s) of study intervention as randomised within the predefined window, have no other important protocol deviations as determined by the clinician

g. Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 2 to the end of the surveillance period.

Efficacy in participants 16 years of age and older – after 2 doses

In the Phase 2/3 portion of Study C4591001, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of Comirnaty or placebo. The efficacy analyses included participants that received their second vaccination within 19 to 42 days after their first vaccination. The majority (93.1%) of vaccine recipients received the second dose 19 days to 23 days after Dose 1. Participants are planned to be followed for up to 24 months after Dose 2, for assessments of safety and efficacy against COVID-19. In the clinical study, participants were required to observe a minimum interval of 14 days before and after administration of an influenza vaccine in order to receive either placebo or Comirnaty. In the clinical study, participants were required to observe a minimum interval of 60 days before or after receipt of blood/plasma products or immunoglobulins through to conclusion of the study in order to receive either placebo or Comirnaty.

The population for the analysis of the primary efficacy endpoint included 36,621 participants 12 years of age and older (18,242 in the Comirnaty group and 18,379 in the placebo group) who did not have evidence of prior infection with SARS-CoV-2 through 7 days after the second dose. In addition, 134 participants were between the ages of 16 to 17 years of age (66 in the Comirnaty group and 68 in the placebo group) and 1616 participants 75 years of age and older (804 in the Comirnaty group and 812 in the placebo group).

At the time of the primary efficacy analysis, participants had been followed for symptomatic COVID-19 for in total 2,214 person-years for the Comirnaty group and in total 2,222 person-years for the placebo group.

There were no meaningful clinical differences in overall vaccine efficacy in participants who were at risk of severe COVID-19 including those with 1 or more comorbidities that increase the risk of severe COVID-19 (e.g. asthma, body mass index (BMI) ≥ 30 kg/m², chronic pulmonary disease, diabetes mellitus, hypertension).

Comirnaty efficacy information is presented in Table 27.

Table 27: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of infection prior to 7 days after Dose 2 – evaluable efficacy (7 days) population

First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*			
Subgroup	Comirnaty N^a = 18,198 Cases n¹^b Surveillance time^c (n²^d)	Placebo N^a = 18,325 Cases n¹^b Surveillance time^c (n²^d)	Vaccine efficacy % (95% CI)^f
All participants ^c	8 2.214 (17,411)	162 2.222 (17,511)	95.0 (90.0, 97.9)
16 to 64 years	7 1.706 (13,549)	143 1.710 (13,618)	95.1 (89.6, 98.1)
65 years and older	1 0.508 (3848)	19 0.511 (3880)	94.7 (66.7, 99.9)
65 to 74 years	1 0.406 (3074)	14 0.406 (3095)	92.9 (53.1, 99.8)
75 years and older	0 0.102 (774)	5 0.106 (785)	100.0 (-13.1, 100.0)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 [*Case definition: (at least 1 of) fever, new or increased cough, new or increased shortness of breath, chills, new or increased muscle pain, new loss of taste or smell, sore throat, diarrhoea or vomiting.]

* Participants who had no serological or virological evidence (prior to 7 days after receipt of the last dose) of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by nucleic acid amplification tests (NAAT) [nasal swab] at Visits 1 and 2), and had negative NAAT (nasal swab) at any unscheduled visit prior to 7 days after Dose 2 were included in the analysis.

- N = number of participants in the specified group.
- n1 = Number of participants meeting the endpoint definition.
- Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 2 to the end of the surveillance period.
- n2 = Number of participants at risk for the endpoint.
- No confirmed cases were identified in adolescents 12 to 15 years of age.
- Two-sided confidence interval (CI) for vaccine efficacy (VE) is derived based on the Clopper and Pearson method adjusted to the surveillance time. CI not adjusted for multiplicity.

In the second primary analysis, efficacy of Comirnaty in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% credible interval of 89.9% to 97.3%) in participants 16 years of age and older with or without evidence of prior infection with SARS-CoV-2.

Additionally, subgroup analyses of the primary efficacy endpoint showed similar efficacy point estimates across genders, ethnic groups, and participants with medical comorbidities associated with high risk of severe COVID-19.

Updated efficacy analyses were performed with additional confirmed COVID-19 cases accrued during blinded placebo-controlled follow-up through 13 March 2021, representing up to 6 months of follow-up after Dose 2 for participants in the efficacy population.

The updated vaccine efficacy information is presented in Table 28.

Table 28: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of infection prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period

First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*			
Subgroup	Comirnaty N^a=20,998 Cases n1^b Surveillance Time^c (n2^d)	Placebo N^a=21,096 Cases n1^b Surveillance Time^c (n2^d)	Vaccine efficacy % (95% CI)^e
All participants ^f	77 6.247 (20,712)	850 6.003 (20,713)	91.3 (89.0, 93.2)
16 to 64 years	70 4.859 (15,519)	710 4.654 (15,515)	90.6 (87.9, 92.7)
65 years and older	7 1.233 (4192)	124 1.202 (4226)	94.5 (88.3, 97.8)
65 to 74 years	6 0.994 (3350)	98 0.966 (3379)	94.1 (86.6, 97.9)
75 years and older	1 0.239 (842)	26 0.237 (847)	96.2 (76.9, 99.9)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 (symptoms included: fever; new or increased cough; new or increased shortness of breath; chills; new or increased muscle pain; new loss of taste or smell; sore throat; diarrhoea; vomiting).

* Participants who had no evidence of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by NAAT [nasal swab] at Visits 1 and 2), and had negative NAAT (nasal swab) at any unscheduled visit prior to 7 days after Dose 2 were included in the analysis.

- N = Number of participants in the specified group.
- n1 = Number of participants meeting the endpoint definition.
- Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after Dose 2 to the end of the surveillance period.
- n2 = Number of participants at risk for the endpoint.
- Two-sided confidence interval (CI) for vaccine efficacy is derived based on the Clopper and Pearson method adjusted to the surveillance time.
- Included confirmed cases in participants 12 to 15 years of age: 0 in the Comirnaty group (both without and with or without evidence of prior SARS-CoV-2 infection); 16 and 18 in the placebo group (without and with or without evidence of prior SARS-CoV-2 infection, respectively).

Immunogenicity in participants 18 years of age and older – after booster dose

Effectiveness of a booster dose of Comirnaty was based on an assessment of 50% neutralising titres (NT50) against SARS-CoV-2 (USA_WA1/2020). In Study C4591001, analyses of NT50 1 month after the booster dose compared to 1 month after the primary series in individuals 18 to 55 years of age who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after the booster vaccination demonstrated noninferiority for both GMR and difference in seroresponse rates. Seroresponse for a participant was defined as achieving a ≥ 4 -fold rise in NT50 from baseline (before Dose 1), These analyses are summarised in Table 29.

Table 29. SARS-CoV-2 neutralisation assay - NT50 (titre)[†] (SARS-CoV-2 USA_WA1/2020) – GMT and seroresponse rate comparison of 1 month after booster dose to 1 month after primary series – participants 18 to 55 years of age without evidence of infection up to 1 month after booster dose* – booster dose evaluable immunogenicity population[‡]

	n	1 month after booster dose (95% CI)	1 month after primary series (95% CI)	1 month after booster dose/- 1 month after primary series (97.5% CI)	Met noninferiority objective (Y/N)
Geometric mean 50% neutralising titre (GMT)^b	212 ^a	2466.0 ^b (2202.6, 2760.8)	755.7 ^b (663.1, 861.2)	3.26 ^c (2.76, 3.86)	Y ^d
Seroresponse rate (%) for 50% neutralising titre[†]	200 ^e	199 ^f 99.5% (97.2%, 100.0%)	190 ^f 95.0% (91.0%, 97.6%)	4.5% ^g (1.0%, 7.9% ^h)	Y ⁱ

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; N-binding = SARS-CoV-2 nucleoprotein-binding; NAAT = nucleic acid amplification test; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; Y/N = yes/no.

[†] SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralisation Assay. The assay uses a fluorescent reporter virus derived from the USA_WA1/2020 strain and virus neutralisation is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.

* Participants who had no serological or virological evidence (up to 1 month after receipt of a booster dose of Comirnaty) of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative and SARS-CoV-2 not detected by NAAT [nasal swab]) and had a negative NAAT (nasal swab) at any unscheduled visit up to 1 month after the booster dose were included in the analysis.

[‡] All eligible participants who had received 2 doses of Comirnaty as initially randomised, with Dose 2 received within the predefined window (within 19 to 42 days after Dose 1), received a booster dose of Comirnaty, had at least 1 valid and determinate immunogenicity result after booster dose from a blood collection within an appropriate window (within 28 to 42 days after the booster dose), and had no other important protocol deviations as determined by the clinician.

- a. n = Number of participants with valid and determinate assay results at both sampling time points within specified window.
- b. GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times \text{LLOQ}$.
- c. GMRs and 2-sided 97.5% CIs were calculated by exponentiating the mean differences in the logarithms of the assay and the corresponding CIs (based on the Student t distribution).
- d. Noninferiority is declared if the lower bound of the 2-sided 97.5% CI for the GMR is > 0.67 and the point estimate of the GMR is ≥ 0.80 .
- e. n = Number of participants with valid and determinate assay results for the specified assay at baseline, 1 month after Dose 2 and 1 month after the booster dose within specified window. These values are the denominators for the percentage calculations.
- f. Number of participants with seroresponse for the given assay at the given dose/sampling time point. Exact 2-sided CI based on the Clopper and Pearson method.
- g. Difference in proportions, expressed as a percentage (1 month after booster dose – 1 month after Dose 2).
- h. Adjusted Wald 2-sided CI for the difference in proportions, expressed as a percentage.
- i. Noninferiority is declared if the lower bound of the 2-sided 97.5% CI for the percentage difference is $> -10\%$.

Relative vaccine efficacy in participants 16 years of age and older – after booster dose

An interim efficacy analysis of Study C4591031, a placebo-controlled booster study, was performed in approximately 10,000 participants 16 years of age and older who were recruited from Study C4591001, evaluated confirmed COVID-19 cases accrued from at least 7 days after booster vaccination up to a data cut-off date of 8 February 2022 (a period when Delta and then Omicron was the predominant variant), which represents a median of 2.8 months (range 0.3 to 7.5 months) post-booster follow-up. Vaccine efficacy of the Comirnaty booster dose after the primary series relative to the placebo booster group who only received the primary series dose was assessed. The relative vaccine efficacy information for participants 16 years of age and older is presented in Table 30.

Table 30: Vaccine Efficacy – First COVID-19 Occurrence From 7 Days After Booster Vaccination – Participants 16 Years of Age and Older Without Evidence of Infection and Participants With or Without Evidence of Infection Prior to 7 Days After Booster Vaccination – Evaluable Efficacy Population

First COVID-19 occurrence from 7 days after booster dose in participants without evidence of prior SARS-CoV-2 infection*			
	Comirnaty N^a=4689 Cases n^{1b} Surveillance Time^c (n^{2d})	Placebo N^a=4664 Cases n^{1b} Surveillance Time^c (n^{2d})	Relative Vaccine Efficacy^e % (95% CI^f)
First COVID-19 occurrence from 7 days after booster vaccination	63 1.098 (4639)	148 0.932 (4601)	63.9 (51.1, 73.5)
First COVID-19 occurrence from 7 days after booster dose in participants with or without evidence of prior SARS-CoV-2 infection			
	Comirnaty N^a=4977 Cases n^{1b} Surveillance Time^c (n^{2d})	Placebo N^a=4942 Cases n^{1b} Surveillance Time^c (n^{2d})	Relative Vaccine Efficacy^e % (95% CI^f)
First COVID-19 occurrence from 7 days after booster vaccination	67 1.173 (4903)	150 0.989 (4846)	62.4 (49.5, 72.2)

Note: Confirmed cases were determined by Reverse Transcription-Polymerase Chain Reaction (RT-PCR) and at least 1 symptom consistent with COVID-19 (symptoms included: fever; new or increased cough; new or increased shortness of breath; chills; new or increased muscle pain; new loss of taste or smell; sore throat; diarrhoea; vomiting).

- * Participants who had no serological or virological evidence (prior to 7 days after receipt of the booster vaccination) of past SARS-CoV-2 infection (i.e., N-binding antibody [serum] negative at Visit 1 and SARS-CoV-2 not detected by NAAT [nasal swab] at Visit 1, and had a negative NAAT [nasal swab] at any unscheduled visit prior to 7 days after booster vaccination) were included in the analysis.
- a. N = Number of participants in the specified group.
- b. n1 = Number of participants meeting the endpoint definition.
- c. Total surveillance time in 1000 person-years for the given endpoint across all participants within each group at risk for the endpoint. Time period for COVID-19 case accrual is from 7 days after the booster vaccination to the end of the surveillance period.
- d. n2 = Number of participants at risk for the endpoint.
- e. Relative vaccine efficacy of the Comirnaty booster group relative to the placebo group (non-booster).
- f. Two-sided confidence interval (CI) for relative vaccine efficacy is derived based on the Clopper and Pearson method adjusted for surveillance time.

Immunogenicity in children 5 to 11 years of age – after booster dose

Effectiveness of a booster dose of Comirnaty was based on an assessment of NT50 against the reference strain of SARS-CoV-2 (USA_WA1/2020). Analyses of NT50 1 month after the booster dose compared to before the booster dose demonstrated a substantial increase in GMTs in individuals 5 to 11 years of age who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after the booster dose. This analysis is summarised in Table 31.

Table 31: Summary of Geometric Mean Titres – NT50 – Participants Without Evidence of Infection – Phase 2/3 – Immunogenicity Set – 5 to 11 Years of Age – Evaluable Immunogenicity Population

		Comirnaty 10 micrograms /Dose					
		3-Dose Set		2-Dose Set		Total	
Assay	Dose/ Sampling Time Point ^a	n ^b	GMT ^c (95% CI ^c)	n ^b	GMT ^c (95% CI ^c)	n ^b	GMT ^c (95% CI ^c)
SARS-CoV-2 neutralisation assay - NT50 (titre)	1 month Prevacx	79	20.5 (20.5, 20.5)	67	20.5 (20.5, 20.5)	146	20.5 (20.5, 20.5)
	1 month after Dose 2	29	1659.4 (1385.1, 1988.0)	67	1110.7 (965.3, 1278.1)	96	1253.9 (1116.0, 1408.9)
	3 months Prevacx	67	271.0 (229.1, 320.6)	-	-	67	271.0 (229.1, 320.6)
	1 month after Dose 3	67	2720.9 (2280.1, 3247.0)	-	-	67	2720.9 (2280.1, 3247.0)

Abbreviations: CI = confidence interval; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; NT50 = 50% neutralising titre; Prevacx = before vaccination; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Note: Three-dose immunogenicity set included the first 130 participants who received Dose 3 and completed 1-month post-Dose 3 visit prior to March 15, 2022. Among those, 30 had blood sample collection at 1-month post-Dose 2. Two-dose immunogenicity set included an extra 67 participants randomly selected from previous Dose-2 evaluable immunogenicity population and without evidence of infection up to 1-month post-Dose 2 subset used for 2-dose immunobridging analysis.

Note: Participants included in this analysis had no serological or virological evidence of past SARS-CoV-2 infection up to the 1-month post-Dose 2 (for 1-month post-Dose 2 time point) or 1-month post-Dose 3 (for pre-Dose 3 and 1-month post-Dose 3 time point) study blood sample collection. Having no evidence of past SARS-CoV-2 infection up to 1-month post-Dose 2 was defined as having a negative N-binding antibody (serum) result at the Dose 1 and 1-month post-Dose 2 study visits; a negative NAAT (nasal swab) result at the Dose 1 and Dose 2 study visits and any unscheduled visit prior to the 1-month post-Dose 2 blood sample collection; and no medical history of COVID-19. Having no evidence of past SARS-CoV-2 infection up to 1-month post-Dose 3 was defined as having a negative N-binding antibody (serum) result at the Dose 1, 1-month post-Dose 2 (if available), Dose 3, and 1-month post-Dose 3 study visits; a negative NAAT (nasal swab) result at the Dose 1, Dose 2, and Dose 3 study visits and any unscheduled visit prior to the 1-month post-Dose 3 blood sample collection; and no medical history of COVID-19.

a. Protocol-specified timing for blood sample collection.

b. n = Number of participants with valid and determinate assay results for the specified assay at the given dose/sampling time point.

c. GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times \text{LLOQ}$.

Immunogenicity in children 5 to 11 years of age on the Omicron variant (B1.1.529) – after booster dose

The neutralising GMTs against both the Omicron variant (B1.1.529) and reference strain were substantially increased after booster vaccination compared with after the 2-dose primary series. At 1-month post-Dose 2, the observed neutralising GMTs for the Omicron variant (B1.1.529) and reference strain were 27.6 and 323.8, respectively. At 1-month post-Dose 3, the observed neutralising GMTs for the Omicron variant (B1.1.529) and reference strain were 614.4 and 1702.8, respectively (see Table 32).

For the Omicron variant (B1.1.529), neutralising titres after booster vaccination (1-month post-Dose 3) increased 22-fold over those after the 2-dose primary series (1-month post-Dose 2). For the reference strain, the increase after the booster relative to the primary series was 5.3-fold.

Table 32: Summary of Geometric Mean Titres – Omicron-Neutralisation Subset – Participants Without Evidence of Infection – Phase 2/3 – Immunogenicity Set – 5 to 11 Years of Age – Evaluable Immunogenicity Population

		Comirnaty 10 micrograms /Dose	
		Vaccine Group (as Randomised)	
Assay	Time Point ^b	n ^b	GMT ^c (95% CI ^a)
SARS-COV-2 FFRNT- B.1.1.529 strain (Omicron) - NT50 (titre)	1 month after Dose 2	29	27.6 (22.1, 34.5)
	1 month after Dose 3	17	614.4 (410.7, 919.2)
SARS-CoV-2 FFRNT- reference strain - NT50 (titre)	1 month after Dose 2	29	323.8 (267.5, 392.1)
	1 month after Dose 3	17	1702.8 (1282.6, 2260.7)

Abbreviations: CI = confidence interval; FFRNT = fluorescence focus reduction neutralisation test; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NAAT = nucleic acid amplification test; N-binding = SARS-CoV-2 nucleoprotein-binding; NT50 = 50% neutralising titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2. Note: Participants included in this analysis had no serological or virological evidence of past SARS-CoV-2 infection up to the 1-month post-Dose 2 (for 1-month post-Dose 2 time point) or 1-month post-Dose 3 (for 1-month post-Dose 3 time point) study blood sample collection. Having no evidence of past SARS-CoV-2 infection up to 1-month post-Dose 2 was defined as having a negative N-binding antibody (serum) result at the Dose 1 and 1-month post-Dose 2 study visits; a negative NAAT (nasal swab) result at the Dose 1 and Dose 2 study visits and any unscheduled visit prior to the 1-month post-Dose 2 blood sample collection; and no medical history of COVID-19. Having no evidence of past SARS-CoV-2 infection up to 1-month post-Dose 3 was defined as having a negative N-binding antibody (serum) result at the Dose 1, 1-month post-Dose 2 (if available), Dose 3, and 1-month post-Dose 3 study visits; a negative NAAT (nasal swab) result at the Dose 1, Dose 2, and Dose 3 study visits and any unscheduled visit prior to the 1-month post-Dose 3 blood sample collection; and no medical history of COVID-19.

- Protocol-specified timing for blood sample collection.
- n = Number of participants with valid and determinate assay results for the specified assays at the given dose/sampling time point.
- GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to $0.5 \times \text{LLOQ}$.

This medicine has been given a provisional consent under Section 23 of the Act. This means that further evidence on this medicine is awaited or that there are specific conditions of use. Refer to the consent notice published in the New Zealand Gazette for the specific conditions.

Immunogenicity in immunocompromised participants (adults and children)

Study C4591024 is a Phase 2b, open-label study (n=124) that enrolled immunocompromised participants 2 through <18 years of age receiving immunomodulator therapy or who have undergone solid organ transplant (within the previous 3 months) and are on immunosuppression or who have undergone bone marrow or stem cell transplant at least 6 months prior to enrollment. Study C4591024 also enrolled immunocompromised participants 18 years of age and older treated for NSCLC or CLL, receiving hemodialysis for secondary to end-stage renal disease, or receiving immunomodulator therapy for an autoimmune inflammatory disorder. Study participants did not have a past clinical or microbiological diagnosis of COVID-19. Participants received 4 age-appropriate doses of Comirnaty (tozinameran) (3 micrograms, 10 micrograms, or 30 micrograms); the first 2 doses separated by 21 days, with the third dose occurring 28 days after the second dose, followed by a fourth dose, 3 to 6 months after Dose 3.

Participants 2 through 4 years of age who received 3 micrograms Comirnaty (tozinameran) (n=37) comprised of 86.5% White and 83.8% non-Hispanic/non-Latino. The median age at vaccination was 3.0 years.

Participants 5 through <12 years of age who received 10 micrograms Comirnaty (tozinameran) (n=65) comprised of 87.7% White and 83.1% non-Hispanic/non-Latino. The median age at vaccination was 9.0 years.

Participants 12 through <18 years of age who received 30 micrograms Comirnaty (tozinameran) (n=15) comprised of 93.3% White and 73.3% non-Hispanic/non-Latino. The median age at vaccination was 12.0 years.

Participants 18 years of age and older who received 30 micrograms Comirnaty (tozinameran) (n=7) comprised of 28.6% Black or African American and 57.1% Hispanic. The median age at vaccination was 40.0 years.

The immunogenicity results pre-vaccination and after 3 and 4 doses of Comirnaty (tozinameran) in immunocompromised participants 2 years of age and older are presented in Table 33.

Table 33. Summary of Geometric Mean Titres – Participants With or Without Evidence of Infection by Age Group – All-Available Immunogenicity Population

		COMIRNATY (tozinameran)							
		3 micrograms Age Group: 2 to <5 Years		10 micrograms Age Group: 5 to <12 Years		30 micrograms Age Group: 12 to <18 Years		30 micrograms Age Group: ≥18 Years	
Assay	Dose/ Sampling Time Point ^b	n ^c	GMT ^c (95% CI ^d)	n ^c	GMT ^c (95% CI ^d)	n ^c	GMT ^c (95% CI ^d)	n ^c	GMT ^c (95% CI ^d)
SARS-CoV-2 neutralisation assay – reference strain – NT50 (titre) ^a	1/Prevax	32	44.8 (42.2, 47.7)	62	44.5 (42.5, 46.5)	14	54.2 (33.7, 87.0)	6	82.2 (16.0, 422.5)
	3/1 Month	32	942.3 (537.1, 1653.4)	60	1566.5 (1019.9, 2405.9)	14	2940.6 (1175.5, 7356.0)	6	787.1 (66.5, 9321.5)
	4/Pre-Dose 4	29	487.8 (269.0, 884.9)	57	922.2 (586.7, 1449.3)	11	3284.5 (1609.8, 6701.3)	3	606.2 (5.3, 68756.0)
	4/1 Month	26	3447.0 (1851.0, 6419.2)	50	6463.4 (4319.7, 9670.9)	9	13457.1 (5270.1, 34362.4)	4	1031.3 (56.9, 18681.7)
	4/6 Months	25	1296.7 (674.2, 2494.0)	49	2382.3 (1554.3, 3651.2)	8	5776.1 (2801.4, 11909.2)	3	1605.6 (28.5, 90614.9)

Abbreviations: CI = confidence interval; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NT50 = 50% neutralising titre; Prevax = before vaccination; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

- a. SARS-CoV-2 NT50 were determined using a validated 384-well assay platform (original strain [USA-WA1/2020, isolated in January 2020]).
- b. Protocol-specified timing for blood sample collection.
- c. n = Number of participants with valid and determinate assay results for the specified assay at the given dose/sampling time point.
- d. GMTs and 2-sided 95% CIs were calculated by exponentiating the mean logarithm of the titres and the corresponding CIs (based on the Student t distribution). Assay results below the LLOQ were set to 0.5 × LLOQ.

Analysis of immunogenicity data at 1 month after Dose 3 (32 participants 2 to < 5 years of age, 60 participants 5 to < 12 years of age, 14 participants 12 to < 18 years of age, and 6 participants ≥ 18 years of age) and 1 month after Dose 4 (26 participants 2 to < 5 years of age, 50 participants 5 to < 12 years of age, 9 participants 12 to < 18 years of age, and 4 participants ≥ 18 years of age) in the all available immunogenicity population with or without evidence of prior infection demonstrated a vaccine-elicited immune response.

GMTs were observed to be substantially higher at 1 month after Dose 3 and further increased at 1 month after Dose 4 and remained high at 6 months after Dose 4 compared to levels observed before study vaccination across age groups and disease subsets.

5.2 Pharmacokinetic properties

Not applicable.

5.3 Preclinical safety data

Genotoxicity/Carcinogenicity

Neither genotoxicity nor carcinogenicity studies were performed. The components of the vaccine (lipids and mRNA) are not expected to have genotoxic potential.

6. PHARMACEUTICAL PARTICULARS

6.1 List of excipients

((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate) (ALC-0315)

2-[(polyethylene glycol)-2000]-N,N-ditetradecylacetamide (ALC-0159)

1,2-Distearoyl-sn-glycero-3-phosphocholine (DSPC)

Cholesterol

Trometamol

Trometamol hydrochloride

Sucrose

Water for injections

6.2 Incompatibilities

This medicinal product must not be mixed with other medicinal products except those mentioned in Section 6.6 Special precautions for disposal and other handling.

6.3 Shelf life

Unopened vial

Frozen vial

24 months when stored at -90°C to -60°C.

The vaccine will be received frozen at -90°C to -60°C. Frozen vaccine can be stored either at -90°C to -60°C or 2°C to 8°C upon receipt.

When stored frozen at -90°C to -60°C, 10-vial packs of the vaccine can be thawed at 2°C to 8°C for 2 hours or individual vials can be thawed at room temperature (up to 30°C) for 30 minutes.

Thawed vial

If the vaccine is received at 2°C to 8°C it should be stored at 2°C to 8°C. Once removed from frozen storage, the unopened vial may be stored refrigerated at 2°C to 8°C for a single period of up to 10 weeks within the 24 month shelf life.

Upon moving the product to 2°C to 8°C storage, the updated expiry date must be written on the outer carton and the vaccine should be used or discarded by the updated expiry date. The original expiry date should be crossed out.

Check that the expiry date on the outer carton has been updated to reflect the refrigerated expiry date and that the original expiry date has been crossed out.

When stored frozen at -90°C to -60°C, the vaccine can be thawed at either 2°C to 8°C or at temperatures up to 30°C.

Prior to use, the unopened vials can be stored for up to 12 hours at temperatures between 8°C to 30°C.

Thawed vials can be handled in room light conditions.

Once thawed, the vaccine should not be re-frozen.

Diluted medicinal product

Chemical and physical in-use stability has been demonstrated for 12 hours at 2°C to 30°C, after dilution with sodium chloride 9 mg/mL (0.9%) solution for injection. From a microbiological point of view, unless the method of dilution precludes the risk of microbial contamination, the product should be used immediately. If not used immediately, in-use storage times and conditions are the responsibility of the user.

6.4 Special precautions for storage

Comirnaty Original/Omicron BA.4-5 can be stored in a refrigerator at 2°C to 8°C for a single period of up to 10 weeks, not exceeding the original expiry date (EXP). The expiry date for storage at -90°C to -60°C is printed on the vial and outer carton after “EXP”.

Check that the expiry date has been updated to reflect the refrigerated EXP date and that the original expiry date has been crossed out.

Store in the original package to protect from light. During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For detailed instructions see Section 6.6 Special precautions for disposal and other handling.

Once thawed, the vaccine cannot be re-frozen. Thawed vials can be handled in room light conditions.

For storage conditions after thawing and dilution of the medicinal product, see Section 6.3 Shelf life.

For additional advice on storing Comirnaty Original/Omicron BA.4-5, contact Pfizer New Zealand on 0800 736 363.

6.5 Nature and contents of container

Comirnaty Original/Omicron BA.4-5 (Maroon cap) 0.4 mL fill volume, 2 mL clear multidose vial (Type I glass) with a stopper (synthetic bromobutyl rubber) and a maroon flip-off plastic cap with aluminium seal. Each vial contains 10 doses, see Section 6.6 Special precautions for disposal and other handling.

Pack size: 10 vials

Not all pack sizes may be marketed.

6.6 Special precautions for disposal and other handling

Handling prior to use

Frozen vials must be completely thawed prior to use. Frozen vials should be transferred to 2 °C to 8 °C to thaw. Thaw times for 10-vial packs are noted in table below:

Vial Cap Color	Time That May Be Required For a 10-vial Pack to Thaw (at 2 °C to 8 °C)
Maroon	2 hours

- Upon moving frozen vaccine to 2 °C to 8 °C storage, update the expiry date on the carton. The updated expiry date should reflect 10 weeks from the date of transfer to refrigerated conditions (2 °C to 8 °C) and not exceeding the original printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C for immediate use.
- If the vaccine is received at 2 °C to 8 °C it should continue to be stored at 2 °C to 8 °C. Check that the carton has been previously updated to reflect the 10-week refrigerated expiry date.
- Unopened vials can be stored for up to 12 hours at temperatures up to 30 °C. Total storage time between 8 °C to 30 °C, inclusive of storage before and after puncture, should not exceed 24 hours.

Comirnaty Original/Omicron BA.4-5 Concentrated Suspension for Injection (Maroon cap)

Vials of Comirnaty Original/Omicron BA.4-5 Concentrated Suspension for Injection have an Maroon cap and **requires dilution**.

Preparation for administration

Comirnaty Original/Omicron BA.4-5 Concentrated Suspension for Injection should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared diluted suspension.

Vials of Comirnaty Original/Omicron BA.4-5 Concentrated Suspension for Injection contain:

- *Maroon cap*: 10 doses of 0.2 mL of vaccine after dilution

Vial verification

Prior to administration, check the name and strength of the vaccine on the vial label and the colour of the vial cap and vial label border to ensure it is the intended presentation. Check whether the vial is a single dose vial or a multidose vial and check if the vial requires dilution.

Prior to dilution

- After the thawed vial has reached room temperature, gently invert it 10 times prior to dilution. **Do not shake.**
- Check appearance of vaccine.
 - *Maroon cap vials:* Prior to dilution, the vaccine is a white to off-white dispersion and may contain white to off-white opaque amorphous particles.

Dilution instructions

- Thawed vaccine must be diluted in its original vial with sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques. Volume of sodium chloride 9 mg/mL (0.9%) required are noted below:
 - *Maroon cap vials:* 2.2 mL of sodium chloride 9 mg/mL
- Equalize vial pressure before removing the needle from the vial stopper by withdrawing air into the empty diluent syringe. Volume of air required are noted below:
 - *Maroon cap vials:* 2.2 mL of air
- Gently invert the diluted dispersion 10 times. **Do not shake.**
- Check appearance of vaccine after dilution.
 - *Maroon cap vials:* The diluted vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discoloration are present.
- After dilution, mark vial with appropriate date/time, store at 2 °C to 30 °C and use within 12 hours. **Do not re-freeze.**

Preparation of individual doses

- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw a single dose.
 - *Maroon cap multidose vials (10 doses per vial):*
 - Each dose must contain 0.2 mL of vaccine.
 - Low dead volume syringes and/or needles should be used in order to extract all doses from a single vial. The low dead volume syringe and needle combination should have a dead volume of no more than 35 microliters.
- If the amount of vaccine remaining in the vial cannot provide a full dose, discard the vial and any excess volume.

Any unused medicine or waste material should be disposed of in accordance with local requirements.

7. MEDICINE SCHEDULE

Prescription Medicine.

8. SPONSOR

Pfizer New Zealand Limited
P O Box 3998
Auckland, New Zealand
Toll Free Number: 0800 736 363
www.pfizermedinfo.co.nz

9. DATE OF FIRST APPROVAL

Date of publication in the New Zealand Gazette of consent to distribute this medicine:

15 August 2024

10. DATE OF REVISION OF THE TEXT

29 January 2025

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Summary of Updates

Section	Update
4.4	Addition of Study C4591024 data (immunocompromised)
4.8	Addition of study C4591048 & C4591024 safety data
4.9	Inclusion of post-authorisation experience
5.1	Addition of study C4591048 & C4591024 clinical data