

**ANNEX I**  
**SUMMARY OF PRODUCT CHARACTERISTICS**

▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 for how to report adverse reactions.

## 1. NAME OF THE MEDICINAL PRODUCT

Comirnaty 30 micrograms/dose concentrate for dispersion for injection  
COVID-19 mRNA Vaccine (nucleoside modified)

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with a purple cap and must be diluted before use.

One vial (0.45 mL) contains 6 doses of 0.3 mL after dilution, see sections 4.2 and 6.6.

One dose (0.3 mL) contains 30 micrograms of tozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran is a 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 SARS-CoV-2.

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Concentrate for dispersion for injection (sterile concentrate).  
The vaccine is a white to off-white frozen dispersion (pH: 6.9 - 7.9).

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Comirnaty 30 micrograms/dose concentrate for dispersion for injection is indicated for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in individuals 12 years of age and older.

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

### 4.2 Posology and method of administration

#### Posology

#### Primary vaccination course

##### *Individuals 12 years of age and older*

Comirnaty is administered intramuscularly after dilution as a primary course of 2 doses (0.3 mL each). It is recommended to administer the second dose 3 weeks after the first dose (see sections 4.4 and 5.1).

##### *Severely immunocompromised aged 12 years and older*

A third primary course dose may be administered intramuscularly at least 28 days after the second dose to individuals who are severely immunocompromised (see section 4.4).

### *Interchangeability*

The interchangeability of Comirnaty with COVID-19 vaccines from other manufacturers to complete the primary course has not been established. Individuals who have received a dose of Comirnaty should continue to receive Comirnaty to complete the primary course.

Doses of Comirnaty 30 micrograms/dose concentrate for dispersion for injection after dilution (supplied in a vial with a purple cap) and Comirnaty 30 micrograms/dose dispersion for injection (supplied in a vial with a grey cap) are considered interchangeable.

### *Booster dose*

The booster dose of Comirnaty is 0.3 mL given intramuscularly.

A booster dose may be given in individuals 12 years of age and older. There should be an interval of at least 3 months between administration of Comirnaty and the last prior dose of a COVID-19 vaccine.

### *Paediatric population*

There is a paediatric formulation available for individuals 6 months to 4 years of age. For details, please refer to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

There is a paediatric formulation available for individuals 5 to 11 years of age (i.e. 5 to less than 12 years of age). For details, please refer to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

The safety and efficacy of Comirnaty in infants aged less than 6 months have not yet been established.

### *Elderly population*

No dosage adjustment is required in elderly individuals  $\geq 65$  years of age.

### Method of administration

Comirnaty 30 micrograms/dose concentrate for dispersion for injection should be administered intramuscularly after dilution (see section 6.6).

After dilution, vials of Comirnaty contain 6 doses of 0.3 mL of vaccine. In order to extract 6 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 a sixth dose from a single vial. Irrespective of the type of syringe and needle:

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Do not pool excess vaccine from multiple vials.

The preferred site is the deltoid muscle of the upper arm.

Do not inject the vaccine intravascularly, subcutaneously or intradermally.

The vaccine should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering the vaccine, see section 4.4.

For instructions regarding thawing, handling and disposal of the vaccine, see section 6.6.

### 4.3 Contraindications

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

### 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.

Close observation for at least 15 minutes is recommended following vaccination. No further dose of the vaccine should be given to those who have experienced anaphylaxis after a prior dose of Comirnaty.

##### *Myocarditis and pericarditis*

There is an increased risk of myocarditis and pericarditis following vaccination with Comirnaty. These conditions can develop within just a few days after vaccination, and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. Available data suggest that the course of myocarditis and pericarditis following vaccination is not different from myocarditis or pericarditis in general (see section 4.8).

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis. Vaccinees (including parents or caregivers) 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.

Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

##### *Anxiety-related reactions*

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation or stress-related reactions (e.g. dizziness, palpitations, increases in heart rate, alterations in blood pressure, paraesthesia, hypoaesthesia and sweating) may occur in association with the vaccination process itself. Stress-related reactions are temporary and resolve on their own. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation. It is important that precautions are 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

The efficacy and safety of the vaccine has not been assessed in immunocompromised individuals, including those receiving immunosuppressant therapy. The efficacy of Comirnaty may be lower in immunocompromised individuals.

The recommendation to consider a third dose in severely immunocompromised individuals is based on limited serological evidence from a case-series in the literature from the clinical management of patients with iatrogenic immunocompromisation after solid organ transplantation (see section 4.2).

### 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 may not protect all vaccine recipients. Individuals may not be fully protected until 7 days after their second dose of vaccine.

### Excipients

This vaccine contains less than 1 mmol potassium (39 mg) per dose, that is to say essentially 'potassium-free'.

This vaccine contains less than 1 mmol sodium (23 mg) per dose, that is to say essentially 'sodium-free'.

## **4.5 Interaction with other medicinal products and other forms of interaction**

No interaction studies have been performed.

Concomitant administration of Comirnaty with other vaccines has not been studied.

## **4.6 Fertility, pregnancy and lactation**

### Pregnancy

A large amount of observational data from pregnant women vaccinated with Comirnaty during the second and third trimester have not shown an increase in adverse pregnancy outcomes. While data on pregnancy outcomes following vaccination during the first trimester are presently limited, no increased risk for miscarriage has been seen. Animal studies do not indicate direct or indirect harmful effects with respect to pregnancy, embryo/foetal development, parturition or post-natal development (see section 5.3). Comirnaty can be used during pregnancy.

### Breast-feeding

No effects on the breast-fed newborn/infant are anticipated since the systemic exposure of breast-feeding woman to Comirnaty is negligible. Observational data from women who were

breast-feeding after vaccination have not shown a risk for adverse effects in breast-fed newborns/infants. Comirnaty can be used during breast-feeding.

### Fertility

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity (see section 5.3).

### **4.7 Effects on ability to drive and use machines**

Comirnaty has no or negligible influence on the ability to drive and use machines. However, some of the effects mentioned under section 4.8 may temporarily affect the ability to drive or use machines.

### **4.8 Undesirable effects**

#### Summary of safety profile

##### Participants 16 years of age and older – after 2 doses

In Study 2, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty 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 vaccine and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty.

At the time of the analysis of Study 2 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 and 12,620 placebo) 16 years of age and older were followed up for  $\geq 4$  months after the second dose. This included a total of 15,111 (7,704 Comirnaty and 7,407 placebo) participants 16 to 55 years of age and a total of 10,540 (5,327 Comirnaty and 5,213 placebo) participants 56 years of age 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 participants 16 years of age and older receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

##### Adolescents 12 to 15 years of age – after 2 doses

In an analysis of long-term safety follow-up in Study 2, 2,260 adolescents (1,131 Comirnaty and 1,129 placebo) were 12 to 15 years of age. Of these, 1,559 adolescents (786 Comirnaty and 773 placebo) have been followed for  $\geq 4$  months after the second dose of Comirnaty. The safety evaluation in Study 2 is ongoing.

The overall safety profile of Comirnaty in adolescents 12 to 15 years of age was similar to that seen in participants 16 years of age and older. 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 12 years of age and older – after booster dose

The safety of a booster dose of Comirnaty in participants 12 years of age and older is inferred from safety data from studies of a booster dose of Comirnaty in participants 16 years of age and older.

A subset from Study 2 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty 2-dose course, received a booster dose of Comirnaty approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2.

The overall safety profile for the booster dose was similar to that seen after 2 doses. 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 4, a placebo-controlled booster study, participants 16 years of age and older recruited from Study 2 received a booster dose of Comirnaty (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty. Overall, participants who received a booster dose, had a median follow-up time of 2.5 months after the booster dose to the cut-off date (5 October 2021). No new adverse reactions of Comirnaty were identified.

#### Participants 12 years of age and older – after subsequent booster doses

The safety of a booster dose of Comirnaty in participants 12 years of age and older is inferred from safety data from studies of a booster dose of Comirnaty in participants 18 years of age and older.

A subset of 325 adults 18 to ≤ 55 years of age who had completed 3 doses of Comirnaty, received a booster (fourth dose) of Comirnaty 90 to 180 days after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty had a median follow-up time of 1.4 months up to a data cut-off date of 11 March 2022. 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 4 (Phase 3), 305 adults > 55 years of age who had completed 3 doses of Comirnaty, received a booster (fourth dose) of Comirnaty 5 to 12 months after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty had a median follow-up time of at least 1.7 months up to a data cut-off date of 16 May 2022. The overall safety profile for the Comirnaty booster (fourth dose) was similar to that seen after the Comirnaty booster (third dose). The most frequent adverse reactions in participants > 55 years of age were injection site pain (> 60%), fatigue (> 40%), headache (> 20%), myalgia and chills (> 10%).

#### Booster dose following primary vaccination with another authorised COVID-19 vaccine

In 5 independent studies on the use of a Comirnaty booster dose in individuals who had completed primary vaccination with another authorized COVID-19 vaccine (heterologous booster dose), no new safety issues were identified (see section 5.1).

#### Tabulated list of adverse reactions from clinical studies and post-authorisation experience in individuals 12 years of age and older

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

- 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),
- Very rare (< 1/10,000),
- Not known (cannot be estimated from the available data).

#### **Table 1: Adverse reactions from Comirnaty clinical trials and post-authorisation experience in individuals 12 years of age and older**

<b>System Organ Class</b>	<b>Very common (≥ 1/10)</b>	<b>Common (≥ 1/100 to &lt; 1/10)</b>	<b>Uncommon (≥ 1/1,000 to &lt; 1/100)</b>	<b>Rare (≥ 1/10,000 to &lt; 1/1,000)</b>	<b>Very rare (&lt; 1/10,000)</b>	<b>Not known (cannot be estimated from the available data)</b>
Blood and lymphatic system disorders			Lymphadenopathy <sup>a</sup>			
Immune system disorders			Hypersensitivity reactions (e.g. rash, pruritus, urticaria <sup>b</sup> , angioedema <sup>b</sup> )			Anaphylaxis
Metabolism and nutrition disorders			Decreased appetite			
Psychiatric disorders			Insomnia			
Nervous system disorders	Headache		Lethargy	Acute peripheral facial paralysis <sup>c</sup>		Paraesthesia <sup>d</sup> ; Hypoaesthesia <sup>d</sup>
Cardiac disorders					Myocarditis <sup>d</sup> ; Pericarditis <sup>d</sup>	
Gastrointestinal disorders	Diarrhoea <sup>d</sup>	Nausea; Vomiting <sup>d</sup>				
Skin and subcutaneous tissue disorder			Hyperhidrosis; Night sweats			Erythema multiforme <sup>d</sup>
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia		Pain in extremity <sup>e</sup>			
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Pyrexia <sup>f</sup> ; Injection site swelling	Injection site redness	Asthenia; Malaise; Injection site pruritus			Extensive swelling of vaccinated limb <sup>d</sup> ; Facial swelling <sup>g</sup>

a. A higher frequency of lymphadenopathy (2.8% vs. 0.4%) was observed in participants receiving a booster dose in Study 4 compared to participants receiving 2 doses.

b. The frequency category for urticaria and angioedema was rare.

c. 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 COVID-19 mRNA Vaccine 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.

d. Adverse reaction determined post-authorisation.

e. Refers to vaccinated arm.

f. A higher frequency of pyrexia was observed after the second dose compared to the first dose.

g. Facial swelling in vaccine recipients with a history of injection of dermatological fillers has been reported in the post-marketing phase.

#### Description of selected adverse reactions



### Myocarditis and pericarditis

The increased risk of myocarditis after vaccination with Comirnaty is highest in younger males (see section 4.4).

Two large European pharmacoepidemiological studies have estimated the excess risk in younger males following the second dose of Comirnaty. One study showed that in a period of 7 days after the second dose there were about 0.265 (95% CI 0.255 - 0.275) extra cases of myocarditis in 12-29 year old males per 10,000 compared to unexposed persons. In another study, in a period of 28 days after the second dose there were 0.56 [95% CI 0.37 – 0.74] extra cases of myocarditis in 16-24 year old males per 10,000 compared to unexposed persons.

Limited data indicate that the risk of myocarditis and pericarditis after vaccination with Comirnaty in children aged 5 to 11 years seems lower than in ages 12 to 17 years.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via [the national reporting system listed in Appendix V](#) and include batch/Lot number if available.

## **4.9 Overdose**

Overdose data is available from 52 study participants included in the clinical trial that due to an error in dilution received 58 micrograms of Comirnaty. The vaccine recipients did not report an increase in reactogenicity or adverse reactions.

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

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BX03

#### Mechanism of action

The nucleoside-modified messenger RNA in Comirnaty 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 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 neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.

#### Efficacy

Study 2 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  $\geq 56$ -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 hospitalization for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with human immunodeficiency virus (HIV), hepatitis C virus (HCV) or hepatitis B virus (HBV).

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

In the Phase 2/3 portion of Study 2, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine. 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 within through conclusion of the study in order to receive either placebo or COVID-19 mRNA Vaccine.

The population for the analysis of the primary efficacy endpoint included, 36,621 participants 12 years of age and older (18,242 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine group and 68 in the placebo group) and 1,616 participants 75 years of age and older (804 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine and in total 2,222 person-years in 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)  $\geq 30$  kg/m<sup>2</sup>, chronic pulmonary disease, diabetes mellitus, hypertension).

The vaccine efficacy information is presented in Table 2.

**Table 2: 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**

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants	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)
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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.

- a. N = Number of participants in the specified group.
- b. n1 = Number of participants meeting the endpoint definition.
- c. Total surveillance time in 1,000 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.
- e. Two-sided confidence interval (CI) for vaccine efficacy is derived based on the Clopper and Pearson method adjusted to the surveillance time. CI not adjusted for multiplicity.

Efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% confidence interval of 89.6% to 97.6%) 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, representing up to 6 months after Dose 2 in the efficacy population.

The updated vaccine efficacy information is presented in Table 3.

**Table 3: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

Subgroup	COVID-19 mRNA Vaccine N <sup>a</sup> =20,998 Cases n1 <sup>b</sup> Surveillance time <sup>c</sup> (n2 <sup>d</sup> )	Placebo N <sup>a</sup> =21,096 Cases n1 <sup>b</sup> Surveillance time <sup>c</sup> (n2 <sup>d</sup> )	Vaccine efficacy % (95% CI <sup>e</sup> )
All participants <sup>f</sup>	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 1,000 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 95% 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 COVID-19 mRNA Vaccine group; 16 in the placebo group.

In the updated efficacy analysis, efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 91.1% (95% CI of 88.8% to 93.0%) in participants in the evaluable efficacy population with or without evidence of prior infection with SARS-CoV-2.

Additionally, the updated efficacy analyses by subgroup showed similar efficacy point estimates across sexes, ethnic groups, geography and participants with medical comorbidities and obesity associated with high risk of severe COVID-19.

#### Efficacy against severe COVID-19

Updated efficacy analyses of secondary efficacy endpoints supported benefit of the COVID-19 mRNA Vaccine in preventing severe COVID-19.

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 4) 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 COVID-19 mRNA Vaccine and placebo groups.

**Table 4: Vaccine efficacy – First severe COVID-19 occurrence in participants with or without prior SARS-CoV-2 infection based on the Food and Drug Administration (FDA)\* after Dose 1 or from 7 days after Dose 2 in the placebo-controlled follow-up**

	COVID-19 mRNA Vaccine Cases n1 <sup>a</sup> Surveillance time (n2 <sup>b</sup> )	Placebo Cases n1 <sup>a</sup> Surveillance time (n2 <sup>b</sup> )	Vaccine efficacy % (95% CI <sup>c</sup> )
After Dose 1 <sup>d</sup>	1 8.439 <sup>e</sup> (22,505)	30 8.288 <sup>e</sup> (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 <sup>f</sup>	1 6.522 <sup>g</sup> (21,649)	21 6.404 <sup>g</sup> (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).

\* 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  $\geq$  30 breaths per minute, heart rate  $\geq$  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 1,000 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 1,000 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 and immunogenicity in adolescents 12 to 15 years of age – after 2 doses*

In an initial analysis of Study 2 in adolescents 12 to 15 years of age (representing a median follow-up duration of > 2 months after Dose 2) without evidence of prior infection, there were no cases in 1,005 participants who received the vaccine and 16 cases out of 978 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 75.3, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 18 cases in 1,110 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 78.1, 100.0).

Updated efficacy analyses were 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 updated efficacy analysis of Study 2 in adolescents 12 to 15 years of age without evidence of prior infection, there were no cases in 1,057 participants who received the vaccine and 28 cases out of 1,030 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 86.8, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 30 cases in 1,109 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 87.5, 100.0).

In Study 2, an analysis of SARS-CoV-2 neutralising titres 1 month after Dose 2 was conducted in a randomly selected subset of participants who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, comparing the response in adolescents 12 to 15 years of age (n = 190) to participants 16 to 25 years of age (n = 170).

The ratio of the geometric mean titres (GMT) in the 12 to 15 years of age group to the 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10. Therefore, the 1.5-fold noninferiority criterion was met as the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] was > 0.67.

#### *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% neutralizing antibody titres (NT50) against SARS-CoV-2 (USA\_WA1/2020) in Study 2. In this study, the booster dose was administered 5 to 8 months (median 7 months) after the second dose. In Study 2, analyses of NT50 1 month after the booster dose compared to 1 month after the primary series in individuals 18 through 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 geometric mean ratio (GMR) and difference in seroresponse rates. Seroresponse for a participant was defined as achieving a

≥ 4-fold rise in NT50 from baseline (before primary series). These analyses are summarized in Table 5.

**Table 5: SARS-CoV-2 neutralization assay - NT50 (titre)<sup>†</sup> (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 through 55 years of age without evidence of infection up to 1 month after booster dose\* – booster dose evaluable immunogenicity population<sup>‡</sup>**

	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)
<b>Geometric mean 50% neutralizing titre (GMT<sup>b</sup>)</b>	212 <sup>a</sup>	2466.0 <sup>b</sup> (2202.6, 2760.8)	750.6 <sup>b</sup> (656.2, 858.6)	3.29 <sup>c</sup> (2.77, 3.90)	Y <sup>d</sup>
<b>Seroresponse rate (%) for 50% neutralizing titre<sup>†</sup></b>	200 <sup>e</sup>	199 <sup>f</sup> 99.5% (97.2%, 100.0%)	196 <sup>f</sup> 98.0% (95.0%, 99.5%)	1.5% <sup>g</sup> (-0.7%, 3.7% <sup>h</sup> )	Y <sup>i</sup>

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% neutralizing titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; Y/N = yes/no.

<sup>†</sup> SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralization Assay. The assay uses a fluorescent reporter virus derived from the USA\_WA1/2020 strain and virus neutralization is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralized.

\* 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.

<sup>‡</sup> All eligible participants who had received 2 doses of Comirnaty as initially randomized, 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  $\geq 0.80$ .
- 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 4, a placebo-controlled booster study performed in approximately 10,000 participants 16 years of age and older who were recruited from Study 2,

evaluated confirmed COVID-19 cases accrued from at least 7 days after booster vaccination up to a data cut-off date of 5 October 2021, which represents a median of 2.5 months post-booster follow-up. The booster dose was administered 5 to 13 months (median 11 months) after the second dose. 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 without prior evidence of SARS-CoV-2 infection is presented in Table 6. Relative vaccine efficacy in participants with or without evidence of prior SARS-CoV-2 infection was 94.6% (95% confidence interval of 88.5% to 97.9%), similar to that seen in those participants without evidence of prior infection. Primary COVID-19 cases observed from 7 days after booster vaccination were 7 primary cases in the Comirnaty group, and 124 primary cases in the placebo group.

**Table 6: Vaccine efficacy – First COVID-19 occurrence from 7 days after booster vaccination – participants 16 years of age and older without evidence of infection – evaluable efficacy population**

<b>First COVID-19 occurrence from 7 days after booster dose in participants without evidence of prior SARS-CoV-2 infection*</b>			
	<b>Comirnaty N<sup>a</sup>=4695 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=4671 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Relative Vaccine Efficacy<sup>e</sup> % (95% CI<sup>f</sup>)</b>
First COVID-19 occurrence from 7 days after booster vaccination	6 0.823 (4659)	123 0.792 (4614)	95.3 (89.5, 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 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 1,000 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 of a booster dose following primary vaccination with another authorised COVID-19 vaccine*

Effectiveness of a Comirnaty booster dose (30 mcg) in individuals who completed primary vaccination with another authorised COVID-19 vaccine (heterologous booster dose) is inferred from immunogenicity data from an independent National Institutes of Health (NIH) study phase 1/2 open-label clinical trial (NCT04889209) conducted in the United States. In this study, adults (range 19 to 80 years of age) who had completed primary vaccination with Moderna 100 mcg 2-dose series (N = 51, mean age 54±17), Janssen single dose (N = 53, mean age 48±14), or Comirnaty 30 mcg 2-dose series (N = 50, mean age 50±18) at least 12 weeks prior to enrolment and who reported no history of SARS-CoV-2 infection received a booster dose of Comirnaty (30 mcg). The boost with Comirnaty induced a 36, 12, and 20 GMR-fold rise in neutralising titres following the Janssen, Moderna, and Comirnaty primary doses, respectively.

Heterologous boosting with Comirnaty was also evaluated in the CoV-BOOST study (EudraCT 2021-002175-19), a multicentre, randomised, controlled, phase 2 trial of third dose booster vaccination against COVID-19, in which 107 adult participants (median age 71 years of age, interquartile range 54 to 77 years of age) were randomised at least 70 days post 2 doses of AstraZeneca COVID-19 Vaccine. After the AstraZeneca COVID-19 Vaccine primary series, pseudovirus (wild-type), neutralising antibody NT50 GMR-fold change increased 21.6-fold with heterologous Comirnaty booster (n = 95).

Immunogenicity in participants > 55 years of age – after a booster dose (fourth dose) of Comirnaty (30 mcg)

In an interim analysis of a subset from Study 4 (Substudy E), 305 participants > 55 years of age who had completed a series of 3 doses of Comirnaty received Comirnaty (30 mcg) as a booster dose (fourth dose) 5 to 12 months after receiving Dose 3. For the immunogenicity subset data see Table 7.

Immunogenicity in participants 18 to < 55 years of age – after a booster dose (fourth dose) of Comirnaty (30 mcg)

In Substudy D [a subset from Study 2 (Phase 3) and Study 4 (Phase 3)], 325 participants 18 to ≤ 55 years of age who had completed 3 doses of Comirnaty received Comirnaty (30 mcg) as a booster dose (fourth dose) 90 to 180 days after receiving Dose 3. For the immunogenicity subset data see Table 7.

**Table 7. Summary of immunogenicity data from participants in C4591031 Substudy D (cohort 2 full expanded set) and Substudy E (expanded cohort immunogenicity subset) who received Comirnaty 30 mcg as booster (fourth dose) – participants without evidence of infection up to 1 month after booster dose – evaluable immunogenicity population**

	Dose/ sampling time point <sup>a</sup>	Substudy D (18 to < 55 years of age) Comirnaty 30 mcg		Substudy E (> 55 years of age) Comirnaty 30 mcg	
		N <sup>b</sup>	GMT (95% CI <sup>d</sup> )	N <sup>b</sup>	GMT (95% CI <sup>d</sup> )
SARS-CoV-2 neutralization assay – Omicron BA.1 – NT50 (titre)	1/Prevax	226	315.0 (269.0, 368.9)	167	67.5 (52.9, 86.3)
	1/1 Month	228	1063.2 (935.8, 1207.9)	163	455.8 (365.9, 567.6)
SARS-CoV-2 neutralization assay – reference strain – NT50 (titre)	1/Prevax	226	3999.0 (3529.5, 4531.0)	179	1389.1 (1142.1, 1689.5)
	1/1 Month	227	12009.9 (10744.3, 13424.6)	182	5998.1 (5223.6, 6887.4)
<b>Seroresponse rate at 1 month post-Dose 4</b>		N <sup>c</sup>	<b>n<sup>e</sup> (%) (95% CI<sup>f</sup>)</b>	N <sup>c</sup>	<b>n<sup>e</sup> (%) (95% CI<sup>f</sup>)</b>
SARS-CoV-2 neutralization assay – Omicron BA.1 – NT50 (titre)	1/1 Month	226	91 (40.3%) (33.8, 47.0)	149	85 (57.0%) (48.7, 65.1)
SARS-CoV-2 neutralization assay – reference strain – NT50 (titre)	1/1 Month	225	76 (33.8%) (27.6, 40.4)	179	88 (49.2%) (41.6, 56.7)



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Abbreviations: CI = confidence interval; GMFR = geometric mean fold rise; 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.

Note: Median time from Dose 3 to Dose 4 of Comirnaty 30 mcg is 4.0 months for Substudy D Cohort 2 and 6.3 months for Substudy E expanded cohort.

Note: Substudy D Full Expanded Set = Cohort 2 excluding the sentinel group; Substudy E Immunogenicity Subset = a random sample of 230 participants in each vaccine group selected from the expanded cohort.

Note: Participants who had no serological or virological evidence (prior to the 1-month post-study vaccination blood sample collection) of past SARS-CoV-2 infection (i.e. N-binding antibody [serum] result negative at the study vaccination and the 1-month post-study vaccination visits, negative NAAT [nasal swab] result at the study vaccination visit, and any unscheduled visit prior to the 1-month post-study vaccination blood sample collection) and had no medical history of COVID-19 were included in the analysis.

Note: Seroresponse is defined as achieving  $\geq 4$ -fold rise from baseline (before the study vaccination). If the baseline measurement is below the LLOQ, the post-vaccination measure of  $\geq 4 \times$  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 the given sampling time point.
- c. 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.
- 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  $0.5 \times$  LLOQ.
- e. n = Number of participants with seroresponse for the given assay at the given sampling time point.
- f. Exact 2-sided CI, based on the Clopper and Pearson method.

## Paediatric population

The European Medicines Agency has deferred the obligation to submit the results of studies with Comirnaty in the paediatric population in prevention of COVID-19 (see section 4.2 for information on paediatric use).

### **5.2 Pharmacokinetic properties**

Not applicable.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of repeat dose toxicity and reproductive and developmental toxicity.

#### General toxicity

Rats intramuscularly administered Comirnaty (receiving 3 full human doses once weekly, generating relatively higher levels in rats due to body weight differences) demonstrated some injection site oedema and erythema and increases in white blood cells (including basophils and eosinophils) consistent with an inflammatory response as well as vacuolation of portal hepatocytes without evidence of liver injury. All effects were reversible.

#### Genotoxicity/Carcinogenicity

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

#### Reproductive toxicity

Reproductive and developmental toxicity were investigated in rats in a combined fertility and developmental toxicity study where female rats were intramuscularly administered Comirnaty prior to mating and during gestation (receiving 4 full human doses that generate relatively higher levels in rat due to body weight differences, spanning between pre-mating day 21 and gestational day 20). SARS-CoV-2 neutralizing antibody responses were present in maternal animals from prior to mating to the end of the study on postnatal day 21 as well as in foetuses and offspring. There were no

vaccine-related effects on female fertility, pregnancy, or embryo-foetal or offspring development. No Comirnaty data are available on vaccine placental transfer or excretion in milk.

## 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

Potassium chloride

Potassium dihydrogen phosphate

Sodium chloride

Disodium phosphate dihydrate

Sucrose

Water for injections

Sodium hydroxide (for pH adjustment)

Hydrochloric acid (for pH adjustment)

### 6.2 Incompatibilities

This medicinal product must not be mixed with other medicinal products except those mentioned in section 6.6.

### 6.3 Shelf life

#### Unopened vial

#### Frozen vial

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

Within the 15-month shelf life unopened vials may be stored and transported at -25 °C to -15 °C for a single period of up to 2 weeks and can be returned to -90 °C to -60 °C.

When stored frozen at -90 °C to -60 °C, 195-vial packs of the vaccine can be thawed at 2 °C to 8 °C for 3 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

#### Thawed vial

1 month at 2 °C to 8 °C within the 15-month shelf life.

Within the 1-month shelf life at 2 °C to 8 °C, up to 48 hours may be used for transportation.

Prior to use, the unopened vial can be stored for up to 2 hours at temperatures up to 30 °C.

Thawed vials can be handled in room light conditions.

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

#### Handling of temperature excursions once removed from the freezer

Stability data indicate that the unopened vial is stable for up to:

- 24 hours when stored at temperatures from -3 °C to 2 °C
- a total of 4 hours when stored at temperatures from 8 °C to 30 °C; this includes the 2 hours at up to 30 °C detailed above

This information is intended to guide healthcare professionals only in case of temporary temperature excursion.

### Transfers of frozen vials stored at ultra-low temperature (< -60 °C)

- Closed-lid vial trays containing 195 vials removed from ultra-low temperature frozen storage (< -60 °C) may be at temperatures up to 25 °C for up to 5 minutes.
- Open-lid vial trays, or vial trays containing less than 195 vials, removed from ultra-low temperature frozen storage (< -60 °C) may be at temperatures up to 25 °C for up to 3 minutes.
- After vial trays are returned to frozen storage following temperature exposure up to 25 °C, they must remain in frozen storage for at least 2 hours before they can be removed again.

### Transfers of frozen vials stored at -25 °C to -15 °C

- Closed-lid vial trays containing 195 vials removed from frozen storage (-25 °C to -15 °C) may be at temperatures up to 25 °C for up to 3 minutes.
- Open-lid vial trays, or vial trays containing less than 195 vials, removed from frozen storage (-25 °C to -15 °C) may be at temperatures up to 25 °C for up to 1 minute.

Once a vial is removed from the vial tray, it should be thawed for use.

### Diluted medicinal product

Chemical and physical in-use stability, including during transportation, has been demonstrated for 6 hours at 2 °C to 30 °C after dilution in 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**

Store in a freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For storage conditions after thawing and dilution of the medicinal product, see section 6.3.

## **6.5 Nature and contents of container**

0.45 mL concentrate in a 2 mL clear multidose vial (type I glass) with a stopper (synthetic bromobutyl rubber) and a purple flip-off plastic cap with aluminium seal. Each vial contains 6 doses, see section 6.6.

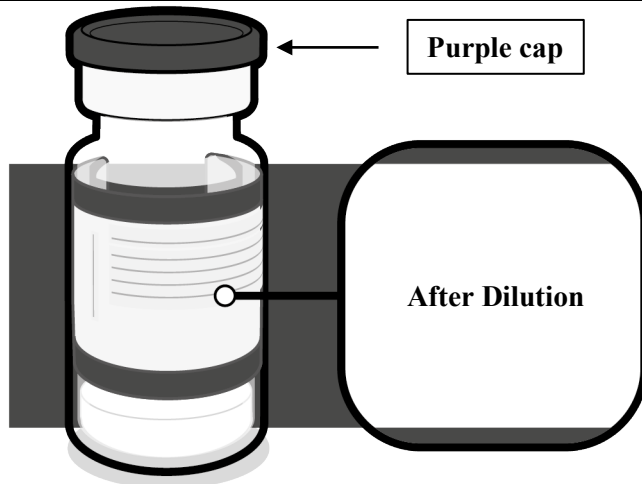
Pack size: 195 vials

## **6.6 Special precautions for disposal and other handling**

### Handling instructions

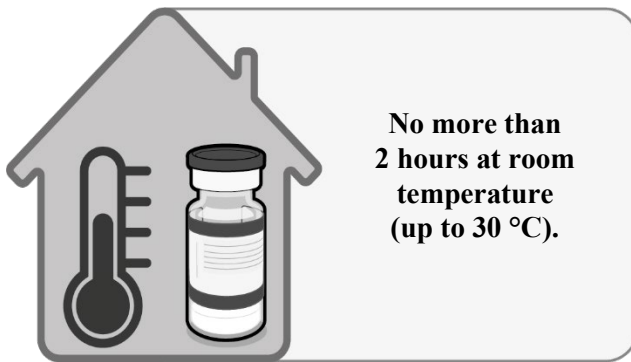
Comirnaty should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY 30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



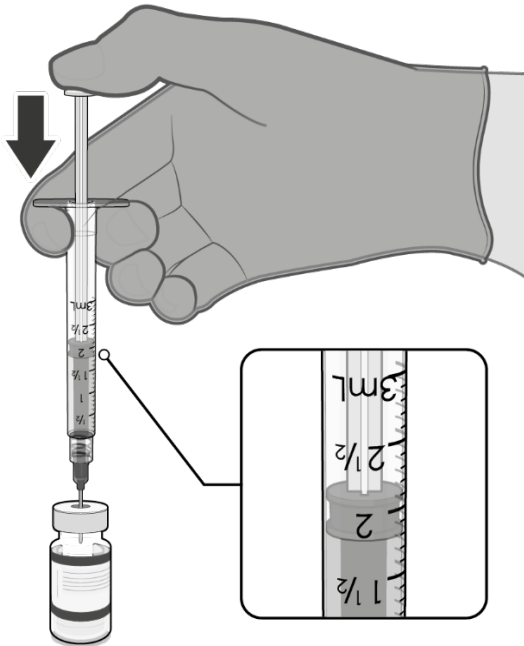
- Verify that the vial has a purple plastic cap.
- If the vial has a grey plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose dispersion for injection, Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

**THAWING PRIOR TO DILUTION OF COMIRNATY 30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



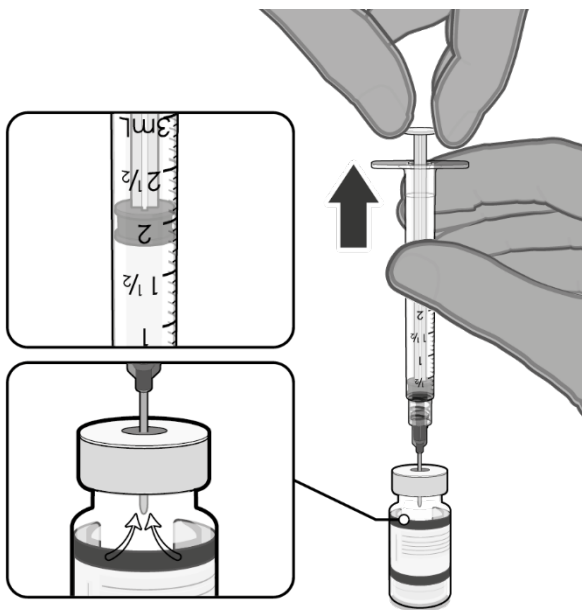
- The multidose vial is stored frozen and must be thawed prior to dilution. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 195 vial pack may take 3 hours to thaw. Alternatively, frozen vials may also be thawed for 30 minutes at temperatures up to 30 °C for immediate use.
- The unopened vial can be stored for up to 1 month at 2 °C to 8 °C; not exceeding the printed expiry date (EXP). Within the 1-month shelf life at 2 °C to 8 °C, up to 48 hours may be used for transportation.
- Allow the thawed vial to come to room temperature. Prior to use, the unopened vial can be stored for up to 2 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.
- Gently invert the vial 10 times prior to dilution. Do not shake.
- Prior to dilution, the thawed dispersion may contain white to off-white opaque amorphous particles.

**DILUTION OF COMIRNATY 30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



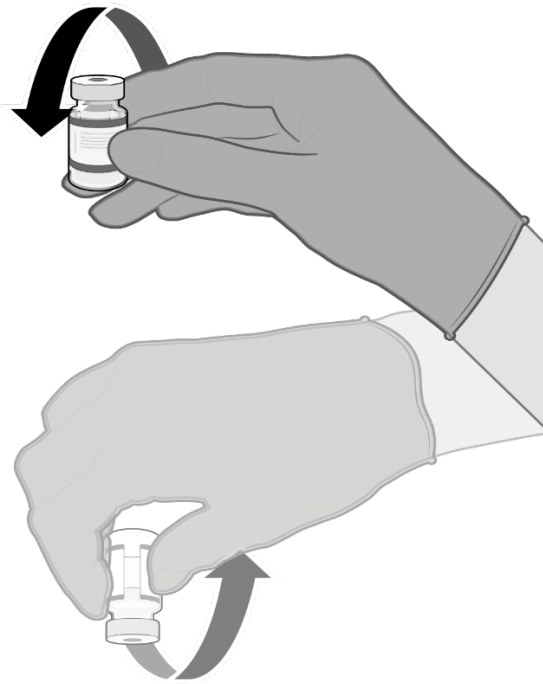
**1.8 mL of sodium chloride 9 mg/mL (0.9%) solution for injection.**

- The thawed vaccine must be diluted in its original vial with 1.8 mL of sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques.



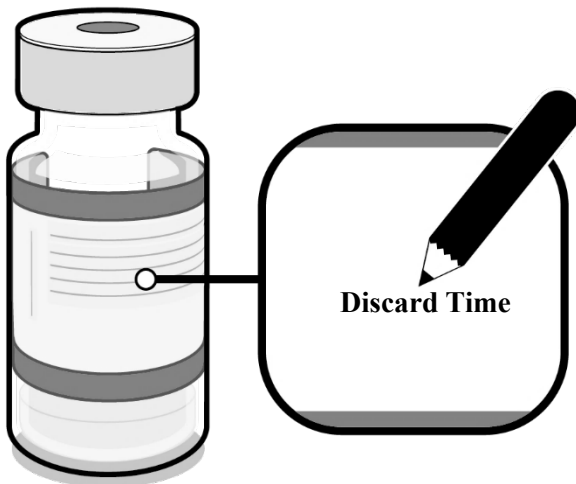
**Pull back plunger to 1.8 mL to remove air from vial.**

- Equalise vial pressure before removing the needle from the vial stopper by withdrawing 1.8 mL air into the empty diluent syringe.



**Gently × 10**

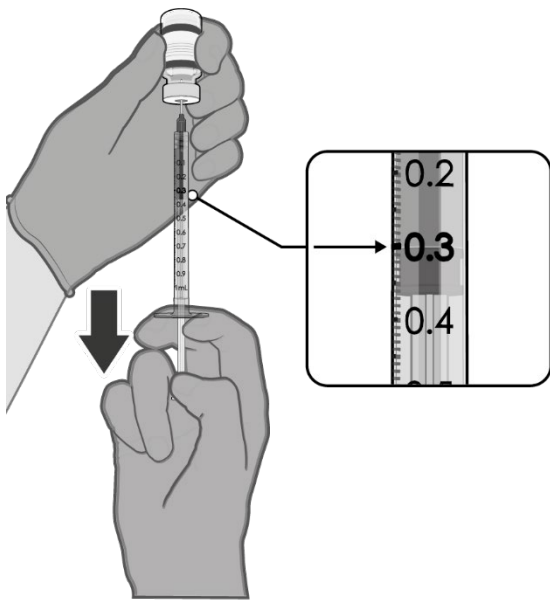
- Gently invert the diluted dispersion 10 times. Do not shake.
- The diluted vaccine should present as an off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discoloration are present.



**Record appropriate date and time.  
Use within 6 hours after dilution.**

- The diluted vials should be marked with the appropriate date and time.
- After dilution, store at 2 °C to 30 °C and use within 6 hours, including any transportation time.
- Do not freeze or shake the diluted dispersion. If refrigerated, allow the diluted dispersion to come to room temperature prior to use.

**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY  
30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION  
(12 YEARS AND OLDER)**



**0.3 mL diluted vaccine**

- After dilution, the vial contains 2.25 mL from which 6 doses of 0.3 mL can be extracted.
- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.3 mL of Comirnaty.

Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. 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 a sixth dose from a single vial.

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Discard any unused vaccine within 6 hours after dilution.

Disposal

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

**7. MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz  
Germany  
Phone: +49 6131 9084-0  
Fax: +49 6131 9084-2121  
service@biontech.de

**8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/001

**9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 21 December 2020

Date of latest renewal: 10 October 2022

**10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>.



▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 for how to report adverse reactions.

## 1. NAME OF THE MEDICINAL PRODUCT

Comirnaty 30 micrograms/dose dispersion for injection  
COVID-19 mRNA Vaccine (nucleoside modified)

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with a grey cap. Do not dilute prior to use.

One vial (2.25 mL) contains 6 doses of 0.3 mL, see sections 4.2 and 6.6.

One dose (0.3 mL) contains 30 micrograms of tozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran is a 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 SARS-CoV-2.

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Dispersion for injection.

The vaccine is a white to off-white frozen dispersion (pH: 6.9 - 7.9).

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Comirnaty 30 micrograms/dose dispersion for injection is indicated for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in individuals 12 years of age and older.

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

### 4.2 Posology and method of administration

#### Posology

#### Primary vaccination course

##### *Individuals 12 years of age and older*

Comirnaty is administered intramuscularly as a primary course of 2 doses (0.3 mL each). It is recommended to administer the second dose 3 weeks after the first dose (see sections 4.4 and 5.1).

##### *Severely immunocompromised aged 12 years and older*

A third primary course dose may be administered intramuscularly at least 28 days after the second dose to individuals who are severely immunocompromised (see section 4.4).

### Interchangeability

The interchangeability of Comirnaty with COVID-19 vaccines from other manufacturers to complete the primary course has not been established. Individuals who have received a dose of Comirnaty should continue to receive Comirnaty to complete the primary course.

Doses of Comirnaty 30 micrograms/dose concentrate for dispersion for injection after dilution (supplied in a vial with a purple cap) and Comirnaty 30 micrograms/dose dispersion for injection (supplied in a vial with a grey cap) are considered interchangeable.

### Booster dose

The booster dose of Comirnaty is 0.3 mL given intramuscularly.

A booster dose may be given in individuals 12 years of age and older. There should be an interval of at least 3 months between administration of Comirnaty and the last prior dose of a COVID-19 vaccine.

### Paediatric population

There is a paediatric formulation available for individuals 6 months to 4 years of age. For details, please refer to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

There is a paediatric formulation available for individuals 5 to 11 years of age (i.e. 5 to less than 12 years of age). For details, please refer to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

The safety and efficacy of Comirnaty in infants aged less than 6 months of age have not yet been established.

### Elderly population

No dosage adjustment is required in elderly individuals  $\geq 65$  years of age.

### Method of administration

Comirnaty 30 micrograms/dose dispersion for injection should be administered intramuscularly (see section 6.6). Do not dilute prior to use.

Vials of Comirnaty contain 6 doses of 0.3 mL of vaccine. In order to extract 6 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 a sixth dose from a single vial. Irrespective of the type of syringe and needle:

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Do not pool excess vaccine from multiple vials.

The preferred site is the deltoid muscle of the upper arm.

Do not inject the vaccine intravascularly, subcutaneously or intradermally.

The vaccine should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering the vaccine, see section 4.4.

For instructions regarding thawing, handling and disposal of the vaccine, see section 6.6.

### **4.3 Contraindications**

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

### **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.

Close observation for at least 15 minutes is recommended following vaccination. No further dose of the vaccine should be given to those who have experienced anaphylaxis after a prior dose of Comirnaty.

##### *Myocarditis and pericarditis*

There is an increased risk of myocarditis and pericarditis following vaccination with Comirnaty. These conditions can develop within just a few days after vaccination, and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. Available data suggest that the course of myocarditis and pericarditis following vaccination is not different from myocarditis or pericarditis in general (see section 4.8).

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis. Vaccinees (including parents or caregivers) 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.

Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

##### *Anxiety-related reactions*

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation or stress-related reactions (e.g. dizziness, palpitations, increases in heart rate, alterations in blood pressure, paraesthesia, hypoaesthesia and sweating) may occur in association with the vaccination process itself. Stress-related reactions are temporary and resolve on their own. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation. It is important that precautions are 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

The efficacy and safety of the vaccine has not been assessed in immunocompromised individuals, including those receiving immunosuppressant therapy. The efficacy of Comirnaty may be lower in immunocompromised individuals.

The recommendation to consider a third dose in severely immunocompromised individuals is based on limited serological evidence from a case-series in the literature from the clinical management of patients with iatrogenic immunocompromisation after solid organ transplantation (see section 4.2).

### 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 may not protect all vaccine recipients. Individuals may not be fully protected until 7 days after their second dose of vaccine.

## **4.5 Interaction with other medicinal products and other forms of interaction**

No interaction studies have been performed.

Concomitant administration of Comirnaty with other vaccines has not been studied.

## **4.6 Fertility, pregnancy and lactation**

### Pregnancy

A large amount of observational data from pregnant women vaccinated with Comirnaty during the second and third trimester have not shown an increase in adverse pregnancy outcomes. While data on pregnancy outcomes following vaccination during the first trimester are presently limited, no increased risk for miscarriage has been seen. Animal studies do not indicate direct or indirect harmful effects with respect to pregnancy, embryo/foetal development, parturition or post-natal development (see section 5.3). Comirnaty can be used during pregnancy.

### Breast-feeding

No effects on the breast-fed newborn/infant are anticipated since the systemic exposure of breast-feeding woman to Comirnaty is negligible. Observational data from women who were breast-feeding after vaccination have not shown a risk for adverse effects in breast-fed newborns/infants. Comirnaty can be used during breast-feeding.

### Fertility

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity (see section 5.3).

#### **4.7 Effects on ability to drive and use machines**

Comirnaty has no or negligible influence on the ability to drive and use machines. However, some of the effects mentioned under section 4.8 may temporarily affect the ability to drive or use machines.

#### **4.8 Undesirable effects**

##### Summary of safety profile

##### Participants 16 years of age and older – after 2 doses

In Study 2, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty 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 vaccine and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty.

At the time of the analysis of Study 2 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 and 12,620 placebo) 16 years of age and older were followed up for  $\geq 4$  months after the second dose. This included a total of 15,111 (7,704 Comirnaty and 7,407 placebo) participants 16 to 55 years of age and a total of 10,540 (5,327 Comirnaty and 5,213 placebo) participants 56 years of age 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 participants 16 years of age and older receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

##### Adolescents 12 to 15 years of age – after 2 doses

In an analysis of long-term safety follow-up in Study 2, 2,260 adolescents (1,131 Comirnaty and 1,129 placebo) were 12 to 15 years of age. Of these, 1,559 adolescents (786 Comirnaty and 773 placebo) have been followed for  $\geq 4$  months after the second dose of Comirnaty. The safety evaluation in Study 2 is ongoing.

The overall safety profile of Comirnaty in adolescents 12 to 15 years of age was similar to that seen in participants 16 years of age and older. 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 12 years of age and older – after booster dose

The safety of a booster dose of Comirnaty in participants 12 years of age and older is inferred from safety data from studies of a booster dose of Comirnaty in participants 16 years of age and older.

A subset from Study 2 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty 2-dose course, received a booster dose of Comirnaty approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2.

The overall safety profile for the booster dose was similar to that seen after 2 doses. 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 4, a placebo-controlled booster study, participants 16 years of age and older recruited from Study 2 received a booster dose of Comirnaty (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty. Overall, participants who received a booster dose, had a median follow-up time of 2.5 months after the booster dose to the cut-off date (5 October 2021). No new adverse reactions of Comirnaty were identified.

#### Participants 12 years of age and older – after subsequent booster doses

The safety of a booster dose of Comirnaty in participants 12 years of age and older is inferred from safety data from studies of a booster dose of Comirnaty in participants 18 years of age and older.

A subset of 325 adults 18 to  $\leq 55$  years of age who had completed 3 doses of Comirnaty, received a booster (fourth dose) of Comirnaty 90 to 180 days after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty had a median follow-up time of 1.4 months up to a data cut-off date of 11 March 2022. 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 4 (Phase 3), 305 adults  $> 55$  years of age who had completed 3 doses of Comirnaty, received a booster (fourth dose) of Comirnaty 5 to 12 months after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty had a median follow-up time of at least 1.7 months up to a data cut-off date of 16 May 2022. The overall safety profile for the Comirnaty booster (fourth dose) was similar to that seen after the Comirnaty booster (third dose). The most frequent adverse reactions in participants  $> 55$  years of age were injection site pain ( $> 60\%$ ), fatigue ( $> 40\%$ ), headache ( $> 20\%$ ), myalgia and chills ( $> 10\%$ ).

#### Booster dose following primary vaccination with another authorised COVID-19 vaccine

In 5 independent studies on the use of a Comirnaty booster dose in individuals who had completed primary vaccination with another authorized COVID-19 vaccine (heterologous booster dose), no new safety issues were identified (see section 5.1).

#### Tabulated list of adverse reactions from clinical studies and post-authorisation experience in individuals 12 years of age and older

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 clinical trials and post-authorisation experience in individuals 12 years of age and older**

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)	Very rare (< 1/10,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy <sup>a</sup>			
Immune system disorders			Hypersensitivity reactions (e.g. rash, pruritus, urticaria <sup>b</sup> , angioedema <sup>b</sup> )			Anaphylaxis
Metabolism and nutrition disorders			Decreased appetite			
Psychiatric disorders			Insomnia			
Nervous system disorders	Headache		Lethargy	Acute peripheral facial paralysis <sup>c</sup>		Paraesthesia <sup>d</sup> ; Hypoaesthesia <sup>d</sup>
Cardiac disorders					Myocarditis <sup>d</sup> ; Pericarditis <sup>d</sup>	
Gastrointestinal disorders	Diarrhoea <sup>d</sup>	Nausea; Vomiting <sup>d</sup>				
Skin and subcutaneous tissue disorder			Hyperhidrosis; Night sweats			Erythema multiforme <sup>d</sup>
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia		Pain in extremity <sup>e</sup>			
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Pyrexia <sup>f</sup> ; Injection site swelling	Injection site redness	Asthenia; Malaise; Injection site pruritus			Extensive swelling of vaccinated limb <sup>d</sup> ; Facial swelling <sup>g</sup>

- a. A higher frequency of lymphadenopathy (2.8% vs. 0.4%) was observed in participants receiving a booster dose in Study 4 compared to participants receiving 2 doses.
- b. The frequency category for urticaria and angioedema was rare.
- c. 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 COVID-19 mRNA Vaccine 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.
- d. Adverse reaction determined post-authorisation.
- e. Refers to vaccinated arm.
- f. A higher frequency of pyrexia was observed after the second dose compared to the first dose.
- g. Facial swelling in vaccine recipients with a history of injection of dermatological fillers has been reported in the post-marketing phase.

## Description of selected adverse reactions

### Myocarditis and pericarditis

The increased risk of myocarditis after vaccination with Comirnaty is highest in younger males (see section 4.4).

Two large European pharmacoepidemiological studies have estimated the excess risk in younger males following the second dose of Comirnaty. One study showed that in a period of 7 days after the second dose there were about 0.265 (95% CI 0.255 - 0.275) extra cases of myocarditis in 12-29 year old males per 10,000 compared to unexposed persons. In another study, in a period of 28 days after the second dose there were 0.56 [95% CI 0.37 – 0.74] extra cases of myocarditis in 16-24 year old males per 10,000 compared to unexposed persons.

Limited data indicate that the risk of myocarditis and pericarditis after vaccination with Comirnaty in children aged 5 to 11 years seems lower than in ages 12 to 17 years.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available.

## **4.9 Overdose**

Overdose data is available from 52 study participants included in the clinical trial that due to an error in dilution received 58 micrograms of Comirnaty. The vaccine recipients did not report an increase in reactogenicity or adverse reactions.

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

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BX03

#### Mechanism of action

The nucleoside-modified messenger RNA in Comirnaty 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 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 neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.

#### Efficacy

Study 2 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  $\geq 56$ -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 hospitalization for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with human immunodeficiency virus (HIV), hepatitis C virus (HCV) or hepatitis B virus (HBV).

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

In the Phase 2/3 portion of Study 2, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine. 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 within through conclusion of the study in order to receive either placebo or COVID-19 mRNA Vaccine.

The population for the analysis of the primary efficacy endpoint included, 36,621 participants 12 years of age and older (18,242 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine group and 68 in the placebo group) and 1,616 participants 75 years of age and older (804 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine and in total 2,222 person-years in 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)  $\geq 30$  kg/m<sup>2</sup>, chronic pulmonary disease, diabetes mellitus, hypertension).

The vaccine efficacy information is presented in Table 2.

**Table 2: 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**

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants	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)

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
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 1,000 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. CI not adjusted for multiplicity.

Efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% confidence interval of 89.6% to 97.6%) 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, representing up to 6 months after Dose 2 in the efficacy population.

The updated vaccine efficacy information is presented in Table 3.

**Table 3: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup>=20,998 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=21,096 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants <sup>f</sup>	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)

**Table 3: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup>=20,998 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=21,096 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>e</sup>)</b>
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 1,000 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 95% 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 COVID-19 mRNA Vaccine group; 16 in the placebo group.

In the updated efficacy analysis, efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 91.1% (95% CI of 88.8% to 93.0%) in participants in the evaluable efficacy population with or without evidence of prior infection with SARS-CoV-2.

Additionally, the updated efficacy analyses by subgroup showed similar efficacy point estimates across sexes, ethnic groups, geography and participants with medical comorbidities and obesity associated with high risk of severe COVID-19.

#### Efficacy against severe COVID-19

Updated efficacy analyses of secondary efficacy endpoints supported benefit of the COVID-19 mRNA Vaccine in preventing severe COVID-19.

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 4) 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 COVID-19 mRNA Vaccine and placebo groups.

**Table 4: Vaccine efficacy – First severe COVID-19 occurrence in participants with or without prior SARS-CoV-2 infection based on the Food and Drug Administration (FDA)\* after Dose 1 or from 7 days after Dose 2 in the placebo-controlled follow-up**

	<b>COVID-19 mRNA Vaccine Cases n1<sup>a</sup></b> <b>Surveillance time (n2<sup>b</sup>)</b>	<b>Placebo Cases n1<sup>a</sup></b> <b>Surveillance time (n2<sup>b</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>c</sup>)</b>
After Dose 1 <sup>d</sup>	1 8.439 <sup>e</sup> (22,505)	30 8.288 <sup>e</sup> (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 <sup>f</sup>	1 6.522 <sup>g</sup> (21,649)	21 6.404 <sup>g</sup> (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).

\* 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  $\geq 30$  breaths per minute, heart rate  $\geq 125$  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 1,000 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 1,000 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 and immunogenicity in adolescents 12 to 15 years of age – after 2 doses

In an initial analysis of Study 2 in adolescents 12 to 15 years of age (representing a median follow-up duration of  $>2$  months after Dose 2) without evidence of prior infection, there were no cases in 1,005 participants who received the vaccine and 16 cases out of 978 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 75.3, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 18 cases in 1,110 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 78.1, 100.0).

Updated efficacy analyses were 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 updated efficacy analysis of Study 2 in adolescents 12 to 15 years of age without evidence of prior infection, there were no cases in 1,057 participants who received the vaccine and 28 cases out of 1,030 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 86.8, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 30 cases in 1,109 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 87.5, 100.0).

In Study 2, an analysis of SARS-CoV-2 neutralising titres 1 month after Dose 2 was conducted in a randomly selected subset of participants who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, comparing the response in adolescents 12 to 15 years of age (n = 190) to participants 16 to 25 years of age (n = 170).

The ratio of the geometric mean titres (GMT) in the 12 to 15 years of age group to the 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10. Therefore, the 1.5-fold noninferiority criterion was met as the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] was > 0.67.

*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% neutralizing antibody titres (NT50) against SARS-CoV-2 (USA\_WA1/2020) in Study 2. In this study, the booster dose was administered 5 to 8 months (median 7 months) after the second dose. In Study 2, analyses of NT50 1 month after the booster dose compared to 1 month after the primary series in individuals 18 through 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 geometric mean ratio (GMR) and difference in seroresponse rates. Seroresponse for a participant was defined as achieving a  $\geq$  4-fold rise in NT50 from baseline (before primary series). These analyses are summarized in Table 5.

**Table 5: SARS-CoV-2 neutralization assay - NT50 (titre)<sup>†</sup> (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 through 55 years of age without evidence of infection up to 1 month after booster dose\* – booster dose evaluable immunogenicity population<sup>‡</sup>**

	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)
<b>Geometric mean 50% neutralizing titre (GMT)<sup>b</sup></b>	212 <sup>a</sup>	2466.0 <sup>b</sup> (2202.6, 2760.8)	750.6 <sup>b</sup> (656.2, 858.6)	3.29 <sup>c</sup> (2.77, 3.90)	Y <sup>d</sup>
<b>Seroresponse rate (%) for 50% neutralizing titre<sup>†</sup></b>	200 <sup>e</sup>	199 <sup>f</sup> 99.5% (97.2%, 100.0%)	196 <sup>f</sup> 98.0% (95.0%, 99.5%)	1.5% <sup>g</sup> (-0.7%, 3.7% <sup>h</sup> )	Y <sup>i</sup>

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% neutralizing titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; Y/N = yes/no.

<sup>†</sup> SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralization Assay. The assay uses a fluorescent reporter virus derived from the USA\_WA1/2020 strain and virus neutralization is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralized.

\* 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 randomized, 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.
- n = Number of participants with valid and determinate assay results at both sampling time points within specified window.
  - 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 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).
  - 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  $\geq 0.80$ .
  - 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.
  - 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 (1 month after booster dose – 1 month after Dose 2).
  - Adjusted Wald 2-sided CI for the difference in proportions, expressed as a percentage.
  - 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 4, a placebo-controlled booster study performed in approximately 10,000 participants 16 years of age and older who were recruited from Study 2, evaluated confirmed COVID-19 cases accrued from at least 7 days after booster vaccination up to a data cut-off date of 5 October 2021, which represents a median of 2.5 months post-booster follow-up. The booster dose was administered 5 to 13 months (median 11 months) after the second dose. 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 without prior evidence of SARS-CoV-2 infection is presented in Table 6. Relative vaccine efficacy in participants with or without evidence of prior SARS-CoV-2 infection was 94.6% (95% confidence interval of 88.5% to 97.9%), similar to that seen in those participants without evidence of prior infection. Primary COVID-19 cases observed from 7 days after booster vaccination were 7 primary cases in the Comirnaty group, and 124 primary cases in the placebo group.

**Table 6: Vaccine efficacy – First COVID-19 occurrence from 7 days after booster vaccination – participants 16 years of age and older without evidence of infection – evaluable efficacy population**

<b>First COVID-19 occurrence from 7 days after booster dose in participants without evidence of prior SARS-CoV-2 infection*</b>			
	<b>Comirnaty N<sup>a</sup>=4695 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=4671 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Relative Vaccine Efficacy<sup>e</sup> % (95% CI<sup>f</sup>)</b>
First COVID-19 occurrence from 7 days after booster vaccination	6 0.823 (4659)	123 0.792 (4614)	95.3 (89.5, 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 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.
- N = Number of participants in the specified group.
  - n1 = Number of participants meeting the endpoint definition.
  - Total surveillance time in 1,000 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.
  - n2 = Number of participants at risk for the endpoint.
  - Relative vaccine efficacy of the Comirnaty booster group relative to the placebo group (non-booster).
  - Two-sided confidence interval (CI) for relative vaccine efficacy is derived based on the Clopper and Pearson method adjusted for surveillance time.

#### Immunogenicity of a booster dose following primary vaccination with another authorised COVID-19 vaccine

Effectiveness of a Comirnaty booster dose (30 mcg) in individuals who completed primary vaccination with another authorised COVID-19 vaccine (heterologous booster dose) is inferred from immunogenicity data from an independent National Institutes of Health (NIH) study phase 1/2 open-label clinical trial (NCT04889209) conducted in the United States. In this study, adults (range 19 to 80 years of age) who had completed primary vaccination with Moderna 100 mcg 2-dose series (N = 51, mean age 54±17), Janssen single dose (N = 53, mean age 48±14), or Comirnaty 30 mcg 2-dose series (N = 50, mean age 50±18) at least 12 weeks prior to enrolment and who reported no history of SARS-CoV-2 infection received a booster dose of Comirnaty (30 mcg). The boost with Comirnaty induced a 36, 12, and 20 GMR-fold rise in neutralising titres following the Janssen, Moderna, and Comirnaty primary doses, respectively.

Heterologous boosting with Comirnaty was also evaluated in the CoV-BOOST study (EudraCT 2021-002175-19), a multicentre, randomised, controlled, phase 2 trial of third dose booster vaccination against COVID-19, in which 107 adult participants (median age 71 years of age, interquartile range 54 to 77 years of age) were randomised at least 70 days post 2 doses of AstraZeneca COVID-19 Vaccine. After the AstraZeneca COVID-19 Vaccine primary series, pseudovirus (wild-type), neutralising antibody NT50 GMR-fold change increased 21.6-fold with heterologous Comirnaty booster (n = 95).

#### Immunogenicity in participants > 55 years of age – after a booster dose (fourth dose) of Comirnaty (30 mcg)

In an interim analysis of a subset from Study 4 (Substudy E), 305 participants > 55 years of age who had completed a series of 3 doses of Comirnaty received Comirnaty (30 mcg) as a booster dose (fourth dose) 5 to 12 months after receiving Dose 3. For the Immunogenicity subset data see Table 7.

#### Immunogenicity in participants 18 to ≤ 55 years of age – after a booster dose (fourth dose) of Comirnaty (30 mcg)

In Substudy D [a subset from Study 2 (Phase 3) and Study 4 (Phase 3)], 325 participants 18 to ≤ 55 years of age who had completed 3 doses of Comirnaty received Comirnaty (30 mcg) as a booster dose (fourth dose) 90 to 180 days after receiving Dose 3. For the Immunogenicity subset data see Table 7.

**Table 7. Summary of immunogenicity data from participants in C4591031 Substudy D (cohort 2 full expanded set) and Substudy E (expanded cohort immunogenicity subset) who received Comirnaty 30 mcg as booster (fourth dose) – participants without evidence of infection up to 1 month after booster dose – evaluable immunogenicity population**

	Dose/ sampling time point <sup>a</sup>	Substudy D (18 to < 55 years of age) Comirnaty 30 mcg		Substudy E (> 55 years of age) Comirnaty 30 mcg	
		N <sup>b</sup>	GMT (95% CI <sup>d</sup> )	N <sup>b</sup>	GMT (95% CI <sup>d</sup> )
SARS-CoV-2 neutralization assay – Omicron BA.1 – NT50 (titre)	1/Prevax	226	315.0 (269.0, 368.9)	167	67.5 (52.9, 86.3)
	1/1 Month	228	1063.2 (935.8, 1207.9)	163	455.8 (365.9, 567.6)
SARS-CoV-2 neutralization assay – reference strain – NT50 (titre)	1/Prevax	226	3999.0 (3529.5, 4531.0)	179	1389.1 (1142.1, 1689.5)
	1/1 Month	227	12009.9 (10744.3, 13424.6)	182	5998.1 (5223.6, 6887.4)
<b>Seroresponse rate at 1 month post-Dose 4</b>		N <sup>c</sup>	<b>n<sup>e</sup> (%) (95% CI<sup>f</sup>)</b>	N <sup>c</sup>	<b>n<sup>e</sup> (%) (95% CI<sup>f</sup>)</b>
SARS-CoV-2 neutralization assay – Omicron BA.1 – NT50 (titre)	1/1 Month	226	91 (40.3%) (33.8, 47.0)	149	85 (57.0%) (48.7, 65.1)
SARS-CoV-2 neutralization assay – reference strain – NT50 (titre)	1/1 Month	225	76 (33.8%) (27.6, 40.4)	179	88 (49.2%) (41.6, 56.7)

Abbreviations: CI = confidence interval; GMFR = geometric mean fold rise; 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.

Note: Median time from Dose 3 to Dose 4 of Comirnaty 30 mcg is 4.0 months for Substudy D Cohort 2 and 6.3 months for Substudy E expanded cohort.

Note: Substudy D Full Expanded Set = Cohort 2 excluding the sentinel group; Substudy E Immunogenicity Subset = a random sample of 230 participants in each vaccine group selected from the expanded cohort.

Note: Participants who had no serological or virological evidence (prior to the 1-month post-study vaccination blood sample collection) of past SARS-CoV-2 infection (i.e. N-binding antibody [serum] result negative at the study vaccination and the 1-month post-study vaccination visits, negative NAAT [nasal swab] result at the study vaccination visit, and any unscheduled visit prior to the 1-month post-study vaccination blood sample collection) and had no medical history of COVID-19 were included in the analysis.

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

- 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.
- 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.
- 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.
- n = Number of participants with seroresponse for the given assay at the given sampling time point.
- Exact 2-sided CI, based on the Clopper and Pearson method.

### Paediatric population

The European Medicines Agency has deferred the obligation to submit the results of studies with Comirnaty in the paediatric population in prevention of COVID-19 (see section 4.2 for information on paediatric use).

### **5.2 Pharmacokinetic properties**

Not applicable.



### 5.3 Preclinical safety data

Non-clinical data reveal no special hazard for humans based on conventional studies of repeat dose toxicity and reproductive and developmental toxicity.

#### General toxicity

Rats intramuscularly administered Comirnaty (receiving 3 full human doses once weekly, generating relatively higher levels in rats due to body weight differences) demonstrated some injection site oedema and erythema and increases in white blood cells (including basophils and eosinophils) consistent with an inflammatory response as well as vacuolation of portal hepatocytes without evidence of liver injury. All effects were reversible.

#### Genotoxicity/Carcinogenicity

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

#### Reproductive toxicity

Reproductive and developmental toxicity were investigated in rats in a combined fertility and developmental toxicity study where female rats were intramuscularly administered Comirnaty prior to mating and during gestation (receiving 4 full human doses that generate relatively higher levels in rat due to body weight differences, spanning between pre-mating day 21 and gestational day 20). SARS-CoV-2 neutralizing antibody responses were present in maternal animals from prior to mating to the end of the study on postnatal day 21 as well as in foetuses and offspring. There were no vaccine-related effects on female fertility, pregnancy, or embryo-foetal or offspring development. No Comirnaty data are available on vaccine placental transfer or excretion in milk.

## 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.

### 6.3 Shelf life

#### Unopened vial

#### Frozen vial

12 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 6 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

#### Thawed vial

10 weeks storage and transportation at 2 °C to 8 °C within the 12-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.
- If the vaccine is received at 2 °C to 8 °C it should be stored at 2 °C to 8 °C. The expiry date on the outer carton should have been updated to reflect the refrigerated expiry date and the original expiry date should have been crossed out.

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

Thawed vials can be handled in room light conditions.

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

#### Handling of temperature excursions during refrigerated storage

- Stability data indicate that the unopened vial is stable for up to 10 weeks when stored at temperatures from -2 °C to 2 °C, within the 10-week storage period between 2 °C and 8 °C.
- Stability data indicate the vial can be stored for up to 24 hours at temperatures of 8 °C to 30 °C, including up to 12 hours following first puncture.

This information is intended to guide healthcare professionals only in case of temporary temperature excursion.

#### Opened vial

Chemical and physical in-use stability has been demonstrated for 12 hours at 2 °C to 30 °C, which includes up to 6 hours transportation time. From a microbiological point of view, unless the method of opening precludes the risks 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**

Store in a freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For storage conditions after thawing and first opening, see section 6.3.

### **6.5 Nature and contents of container**

2.25 mL dispersion in a 2 mL clear multidose vial (type I glass) with a stopper (synthetic bromobutyl rubber) and a grey flip-off plastic cap with aluminium seal. Each vial contains 6 doses, see section 6.6.

Pack sizes: 10 vials or 195 vials

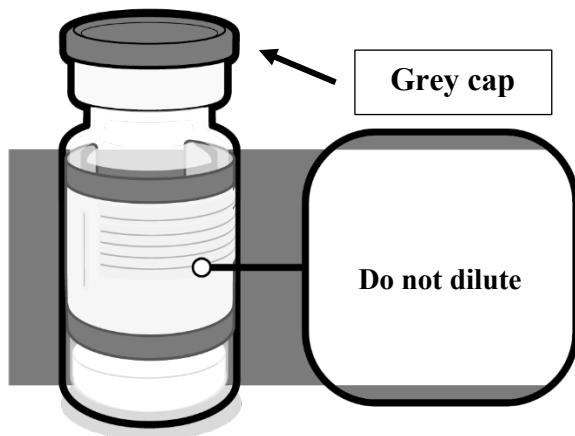
Not all pack sizes may be marketed.

## **6.6 Special precautions for disposal and other handling**

### Handling instructions

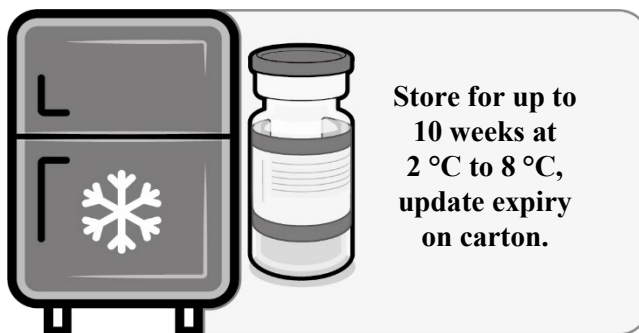
Comirnaty should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

### VIAL VERIFICATION OF COMIRNATY 30 MICROGRAMS/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)

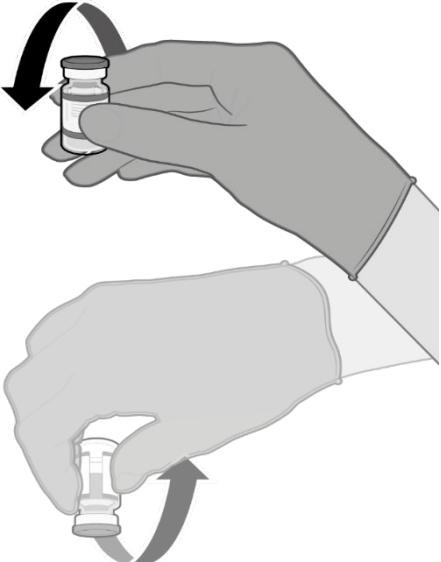


- Verify that the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty 30 micrograms/dose dispersion for injection.
- If the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection, please make reference to the Summary of Product Characteristics for that formulation.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

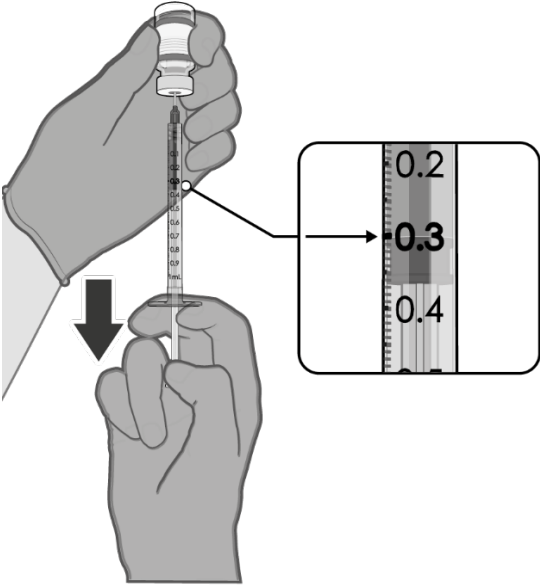
### HANDLING PRIOR TO USE OF COMIRNATY 30 MICROGRAMS/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 6 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

 <p style="text-align: center;"><b>Gently × 10</b></p>	<ul style="list-style-type: none"> <li>• Gently mix by inverting vials 10 times prior to use. Do not shake.</li> <li>• Prior to mixing, the thawed dispersion may contain white to off-white opaque amorphous particles.</li> <li>• After mixing, the vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the vaccine if particulates or discoloration are present.</li> </ul>
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**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY  
30 MICROGRAMS/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**

 <p style="text-align: center;"><b>0.3 mL vaccine</b></p>	<ul style="list-style-type: none"> <li>• Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.</li> <li>• Withdraw 0.3 mL of Comirnaty.</li> </ul> <p>Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. The low dead-volume syringe and needle combination should have a dead volume of no more than 35 microlitres.</p> <p>If standard syringes and needles are used, there may not be sufficient volume to extract a sixth dose from a single vial.</p> <ul style="list-style-type: none"> <li>• Each dose must contain 0.3 mL of vaccine.</li> <li>• If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.</li> <li>• Record the appropriate date/time on the vial. Discard any unused vaccine 12 hours after first puncture.</li> </ul>
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Disposal

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

**7. MARKETING AUTHORISATION HOLDER**

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55131 Mainz  
Germany  
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**8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/002  
EU/1/20/1528/003

**9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 21 December 2020  
Date of latest renewal: 10 October 2022

**10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>.

▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 for how to report adverse reactions.

## 1. NAME OF THE MEDICINAL PRODUCT

Comirnaty 10 micrograms/dose concentrate for dispersion for injection  
COVID-19 mRNA Vaccine (nucleoside modified)

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with an orange cap and must be diluted before use.

One vial (1.3 mL) contains 10 doses of 0.2 mL after dilution, see sections 4.2 and 6.6.

One dose (0.2 mL) contains 10 micrograms of tozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran is a 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 SARS-CoV-2.

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Concentrate for dispersion for injection (sterile concentrate).  
The vaccine is a white to off-white frozen dispersion (pH: 6.9 - 7.9).

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Comirnaty 10 micrograms/dose concentrate for dispersion for injection is indicated for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in children aged 5 to 11 years.

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

### 4.2 Posology and method of administration

#### Posology

#### Primary vaccination course

*Children 5 to 11 years of age (i.e. 5 to less than 12 years of age)*

Comirnaty 10 micrograms/dose is administered intramuscularly after dilution as a primary course of 2 doses (0.2 mL each). It is recommended to administer the second dose 3 weeks after the first dose (see sections 4.4 and 5.1).

*Severely immunocompromised aged 5 years and older*

A third primary course dose may be administered intramuscularly at least 28 days after the second dose to individuals who are severely immunocompromised (see section 4.4).

If a child turns 12 years old between their doses in the primary vaccination course, he/she should complete the series at the same 10 micrograms dose level.

### Booster dose

#### *Booster dose in children 5 to 11 years of age*

A booster dose of Comirnaty 10 micrograms may be administered intramuscularly at least 6 months after the primary course in children 5 to 11 years of age.

### Interchangeability

The interchangeability of Comirnaty with COVID-19 vaccines from other manufacturers to complete the primary course has not been established. Individuals who have received a dose of Comirnaty should continue to receive Comirnaty to complete the primary course.

### Paediatric population

There is a paediatric formulation available for infants and children 6 months to 4 years of age. For details, please refer to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

The safety and efficacy of Comirnaty in infants aged less than 6 months of age have not yet been established.

### Method of administration

Comirnaty 10 micrograms/dose concentrate for dispersion for injection should be administered intramuscularly after dilution (see section 6.6).

After dilution, vials of Comirnaty 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.

The preferred site is the deltoid muscle of the upper arm.

Do not inject the vaccine intravascularly, subcutaneously or intradermally.

The vaccine should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering the vaccine, see section 4.4.

For instructions regarding thawing, handling and disposal of the vaccine, see section 6.6.

## **4.3 Contraindications**

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



## 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.

Close observation for at least 15 minutes is recommended following vaccination. No further dose of the vaccine should be given to those who have experienced anaphylaxis after a prior dose of Comirnaty.

#### *Myocarditis and pericarditis*

There is an increased risk of myocarditis and pericarditis following vaccination with Comirnaty. These conditions can develop within just a few days after vaccination, and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. Available data suggest that the course of myocarditis and pericarditis following vaccination is not different from myocarditis or pericarditis in general (see section 4.8).

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis. Vaccinees (including parents or caregivers) 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.

Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

#### *Anxiety-related reactions*

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation or stress-related reactions (e.g. dizziness, palpitations, increases in heart rate, alterations in blood pressure, paraesthesia, hypoesthesia and sweating) may occur in association with the vaccination process itself. Stress-related reactions are temporary and resolve on their own. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation. It is important that precautions are 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

The efficacy and safety of the vaccine has not been assessed in immunocompromised individuals, including those receiving immunosuppressant therapy. The efficacy of Comirnaty may be lower in immunocompromised individuals.

The recommendation to consider a third dose in severely immunocompromised individuals is based on limited serological evidence from a case-series in the literature from the clinical management of adult patients with iatrogenic immunocompromisation after solid organ transplantation (see section 4.2).

### 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 may not protect all vaccine recipients. Individuals may not be fully protected until 7 days after their second dose of vaccine.

## **4.5 Interaction with other medicinal products and other forms of interaction**

No interaction studies have been performed.

Concomitant administration of Comirnaty with other vaccines has not been studied.

## **4.6 Fertility, pregnancy and lactation**

### Pregnancy

A large amount of observational data from pregnant women vaccinated with Comirnaty during the second and third trimester have not shown an increase in adverse pregnancy outcomes. While data on pregnancy outcomes following vaccination during the first trimester are presently limited, no increased risk for miscarriage has been seen. Animal studies do not indicate direct or indirect harmful effects with respect to pregnancy, embryo/foetal development, parturition or post-natal development (see section 5.3). Comirnaty can be used during pregnancy.

### Breast-feeding

No effects on the breast-fed newborn/infant are anticipated since the systemic exposure of breast-feeding woman to Comirnaty is negligible. Observational data from women who were breast-feeding after vaccination have not shown a risk for adverse effects in breast-fed newborns/infants. Comirnaty can be used during breast-feeding.

### Fertility

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity (see section 5.3).

## **4.7 Effects on ability to drive and use machines**

Comirnaty has no or negligible influence on the ability to drive and use machines. However, some of the effects mentioned under section 4.8 may temporarily affect the ability to drive or use machines.

## 4.8 Undesirable effects

### Summary of safety profile

#### Children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after 2 doses

In Study 3, a total of 1,518 children 5 to 11 years of age received at least 1 dose of Comirnaty 10 mcg and a total of 750 children 5 to 11 years of age received placebo. At the time of the analysis of Study 3 Phase 2/3 with data up to the cut-off date of 6 September 2021, 2,158 (95.1%) (1,444 Comirnaty 10 mcg and 714 placebo) children have been followed for at least 2 months after the second dose of Comirnaty 10 mcg. An analysis of Study 3 Phase 2/3 adverse event data also included another 2,379 participants [1,591 Comirnaty 10 mcg and 788 placebo], of whom 71.2% had a follow-up period for at least 2 weeks after Dose 2 up to the cut-off date of 8 October 2021. The safety evaluation in Study 3 is ongoing.

The overall safety profile of Comirnaty in participants 5 to 15 years of age was similar to that seen in participants 16 years of age and older. The most frequent adverse reactions in children 5 to 11 years of age that received 2 doses were injection site pain (>80%), fatigue (>50%), headache (>30%), injection site redness and swelling (>20%), myalgia and chills (>10%).

#### Children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after booster dose

In a subset from Study 3, a total of 401 children 5 to 11 years of age received a booster dose of Comirnaty 10 mcg at least 5 months (range of 5 to 9 months) after completing the primary series. The analysis of the Study 3 Phase 2/3 subset is based on data up to the cut-off date of March 22, 2022 (median follow-up time of 1.3 months).

The overall safety profile for the booster dose was similar to that seen after the primary course. The most frequent adverse reactions in children 5 to 11 years of age were injection site pain (>70%), fatigue (>40%), headache (>30%), myalgia, chills, injection site redness and swelling (>10%).

#### Adolescents 12 to 15 years of age – after 2 doses

In an analysis of long-term safety follow-up in Study 2, 2,260 adolescents (1,131 Comirnaty and 1,129 placebo) were 12 to 15 years of age. Of these, 1,559 adolescents (786 Comirnaty and 773 placebo) have been followed for  $\geq 4$  months after the second dose of Comirnaty. The safety evaluation in Study 2 is ongoing.

The overall safety profile of Comirnaty in adolescents 12 to 15 years of age was similar to that seen in participants 16 years of age and older. 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 2, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty 30 mcg 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 vaccine and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty.

At the time of the analysis of Study 2 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 and 12,620 placebo) 16 years of age and older were followed up for  $\geq 4$  months after the second dose. This included a total of 15,111 (7,704 Comirnaty and 7,407 placebo) participants 16 to 55 years of age and a total of 10,540 (5,327 Comirnaty and 5,213 placebo) participants 56 years of age 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 participants 16 years of age and older receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

#### Participants 16 years of age and older – after booster dose

A subset from Study 2 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty 2-dose course, received a booster dose of Comirnaty approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2.

The overall safety profile for the booster dose was similar to that seen after 2 doses. 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 4, a placebo-controlled booster study, participants 16 years of age and older recruited from Study 2 received a booster dose of Comirnaty (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty. Overall, participants who received a booster dose, had a median follow-up time of 2.5 months after the booster dose to the cut-off date (5 October 2021). No new adverse reactions of Comirnaty were identified.

#### Booster dose following primary vaccination with another authorised COVID-19 vaccine

In 5 independent studies on the use of a Comirnaty booster dose in individuals who had completed primary vaccination with another authorized COVID-19 vaccine (heterologous booster dose), no new safety issues were identified.

#### Tabulated list of adverse reactions from clinical studies and post-authorisation experience in individuals 5 years of age and older

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 clinical trials and post-authorisation experience in individuals 5 years of age and older**

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)	Very rare (< 1/10,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy <sup>a</sup>			
Immune system disorders			Hypersensitivity reactions (e.g. rash, pruritus, urticaria <sup>b</sup> , angioedema <sup>b</sup> )			Anaphylaxis
Metabolism and nutrition disorders			Decreased appetite			
Psychiatric disorders			Insomnia			
Nervous system disorders	Headache		Lethargy	Acute peripheral facial paralysis <sup>c</sup>		Paraesthesia <sup>d</sup> ; Hypoaesthesia <sup>d</sup>
Cardiac disorders					Myocarditis <sup>d</sup> ; Pericarditis <sup>d</sup>	
Gastrointestinal disorders	Diarrhoea <sup>d</sup>	Nausea; Vomiting <sup>d</sup>				
Skin and subcutaneous tissue disorder			Hyperhidrosis; Night sweats			Erythema multiforme <sup>d</sup>
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia		Pain in extremity <sup>e</sup>			
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Pyrexia <sup>f</sup> ; Injection site swelling	Injection site redness <sup>h</sup>	Asthenia; Malaise; Injection site pruritus			Extensive swelling of vaccinated limb <sup>d</sup> ; Facial swelling <sup>g</sup>

- a. A higher frequency of lymphadenopathy was observed in participants 5 to 11 years of age in Study 3 (2.5% vs. 0.9%) and in participants 16 years of age and older in Study 4 (2.8% vs. 0.4%) receiving a booster dose compared to participants receiving 2 doses.
- b. The frequency category for urticaria and angioedema was rare.
- c. 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 COVID-19 mRNA Vaccine 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.
- d. Adverse reaction determined post-authorisation.
- e. Refers to vaccinated arm.
- f. A higher frequency of pyrexia was observed after the second dose compared to the first dose.
- g. Facial swelling in vaccine recipients with a history of injection of dermatological fillers has been reported in the post-marketing phase.
- h. Injection site redness occurred at a higher frequency (very common) in children 5 to 11 years of age.

## Description of selected adverse reactions

### Myocarditis and pericarditis

The increased risk of myocarditis after vaccination with Comirnaty is highest in younger males (see section 4.4).

Two large European pharmacoepidemiological studies have estimated the excess risk in younger males following the second dose of Comirnaty. One study showed that in a period of 7 days after the second dose there were about 0.265 (95% CI 0.255 - 0.275) extra cases of myocarditis in 12-29 year old males per 10,000 compared to unexposed persons. In another study, in a period of 28 days after the second dose there were 0.56 [95% CI 0.37 – 0.74] extra cases of myocarditis in 16-24 year old males per 10,000 compared to unexposed persons.

Limited data indicate that the risk of myocarditis and pericarditis after vaccination with Comirnaty in children aged 5 to 11 years seems lower than in ages 12 to 17 years.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available.

## **4.9 Overdose**

Overdose data is available from 52 study participants included in the clinical trial that due to an error in dilution received 58 micrograms of Comirnaty. The vaccine recipients did not report an increase in reactogenicity or adverse reactions.

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

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BX03

#### Mechanism of action

The nucleoside-modified messenger RNA in Comirnaty 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 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 neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.

#### Efficacy

Study 2 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  $\geq 56$ -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 hospitalization for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with human immunodeficiency virus (HIV), hepatitis C virus (HCV) or hepatitis B virus (HBV).

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

In the Phase 2/3 portion of Study 2, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine. 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 within through conclusion of the study in order to receive either placebo or COVID-19 mRNA Vaccine.

The population for the analysis of the primary efficacy endpoint included 36,621 participants 12 years of age and older (18,242 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine group and 68 in the placebo group) and 1,616 participants 75 years of age and older (804 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine and in total 2,222 person-years in 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)  $\geq 30$  kg/m<sup>2</sup>, chronic pulmonary disease, diabetes mellitus, hypertension).

The vaccine efficacy information is presented in Table 2.

**Table 2: 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**

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants	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)

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
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 1,000 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. CI not adjusted for multiplicity.

Efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% confidence interval of 89.6% to 97.6%) 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, representing up to 6 months after Dose 2 in the efficacy population.

The updated vaccine efficacy information is presented in Table 3.

**Table 3: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup>=20,998 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=21,096 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants <sup>f</sup>	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)



**Table 3: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

Subgroup	COVID-19 mRNA Vaccine N <sup>a</sup> =20,998 Cases n1 <sup>b</sup> Surveillance time <sup>c</sup> (n2 <sup>d</sup> )	Placebo N <sup>a</sup> =21,096 Cases n1 <sup>b</sup> Surveillance time <sup>c</sup> (n2 <sup>d</sup> )	Vaccine efficacy % (95% CI <sup>e</sup> )
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 1,000 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 95% 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 COVID-19 mRNA Vaccine group; 16 in the placebo group.

In the updated efficacy analysis, efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 91.1% (95% CI of 88.8% to 93.0%) in participants in the evaluable efficacy population with or without evidence of prior infection with SARS-CoV-2.

Additionally, the updated efficacy analyses by subgroup showed similar efficacy point estimates across sexes, ethnic groups, geography and participants with medical comorbidities and obesity associated with high risk of severe COVID-19.

#### Efficacy against severe COVID-19

Updated efficacy analyses of secondary efficacy endpoints supported benefit of the COVID-19 mRNA Vaccine in preventing severe COVID-19.

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 4) 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 COVID-19 mRNA Vaccine and placebo groups.

**Table 4: Vaccine efficacy – First severe COVID-19 occurrence in participants with or without prior SARS-CoV-2 infection based on the Food and Drug Administration (FDA)\* after Dose 1 or from 7 days after Dose 2 in the placebo-controlled follow-up**

	COVID-19 mRNA Vaccine Cases n1 <sup>a</sup> Surveillance time (n2 <sup>b</sup> )	Placebo Cases n1 <sup>a</sup> Surveillance time (n2 <sup>b</sup> )	Vaccine efficacy % (95% CI <sup>c</sup> )
After Dose 1 <sup>d</sup>	1 8.439 <sup>e</sup> (22,505)	30 8.288 <sup>e</sup> (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 <sup>f</sup>	1 6.522 <sup>g</sup> (21,649)	21 6.404 <sup>g</sup> (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).

\* 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  $\geq 30$  breaths per minute, heart rate  $\geq 125$  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 highflow 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 1,000 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 1,000 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 and immunogenicity in adolescents 12 to 15 years of age – after 2 doses

In an initial analysis of Study 2 in adolescents 12 to 15 years of age (representing a median follow-up duration of  $>2$  months after Dose 2) without evidence of prior infection, there were no cases in 1,005 participants who received the vaccine and 16 cases out of 978 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 75.3, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 18 cases in 1,110 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 78.1, 100.0).

Updated efficacy analyses were 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 updated efficacy analysis of Study 2 in adolescents 12 to 15 years of age without evidence of prior infection, there were no cases in 1,057 participants who received the vaccine and 28 cases out of 1,030 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 86.8, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 30 cases in 1,109 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 87.5, 100.0).

In Study 2, an analysis of SARS-CoV-2 neutralising titres 1 month after Dose 2 was conducted in a randomly selected subset of participants who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, comparing the response in adolescents 12 to 15 years of age (n = 190) to participants 16 to 25 years of age (n = 170).

The ratio of the geometric mean titres (GMT) in the 12 to 15 years of age group to the 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10. Therefore, the 1.5-fold noninferiority criterion was met as the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] was > 0.67.

Efficacy and immunogenicity in children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after 2 doses

Study 3 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. The majority (94.4%) of randomised vaccine recipients received the second dose 19 days to 23 days after Dose 1.

The descriptive vaccine efficacy results in children 5 to 11 years of age without evidence of prior SARS-CoV-2 infection are presented in Table 5. 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 5: 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**

<b>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*</b>			
	<b>COVID-19 mRNA Vaccine 10 mcg/dose N<sup>a</sup>=1305 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=663 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)</b>
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.

- 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.

In Study 3, 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 (i.e. 5 to less than 12 years of age) in the Phase 2/3 part of Study 3 to participants 16 to 25 years of age in the Phase 2/3 part of Study 2 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 GMR of the SARS-CoV-2 NT50 1 month after Dose 2 in children 5 to 11 years of age (i.e. 5 to less than 12 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). 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 at 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%). This information is presented in Table 6.

**Table 6: Summary of geometric mean ratio for 50% neutralising titre and difference in percentages of participants with seroresponse – comparison of children 5 to 11 years of age (Study 3) to participants 16 to 25 years of age (Study 2) – participants without evidence of infection up to 1 month after Dose 2 – immunobridging subset – Phase 2/3 – evaluable immunogenicity population**

		COVID-19 mRNA Vaccine		5 to 11 years/ 16 to 25 years	
		10 mcg/dose 5 to 11 years N <sup>a</sup> =264	30 mcg/dose 16 to 25 years N <sup>a</sup> =253		
	Time point <sup>b</sup>	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMR <sup>d</sup> (95% CI <sup>d</sup> )	Met immunobridging objective <sup>e</sup> (Y/N)
<b>Geometric mean 50% neutralizing titre<sup>f</sup> (GMT<sup>c</sup>)</b>	1 month after Dose 2	1197.6 (1106.1, 1296.6)	1146.5 (1045.5, 1257.2)	1.04 (0.93, 1.18)	Y
	Time point <sup>b</sup>	n <sup>g</sup> (%) (95% CI <sup>h</sup> )	n <sup>g</sup> (%) (95% CI <sup>h</sup> )	Difference % <sup>i</sup> (95% CI <sup>j</sup> )	Met immunobridging objective <sup>k</sup> (Y/N)
<b>Seroresponse rate (%) for 50% neutralizing titre<sup>f</sup></b>	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: 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 post-Dose 2 blood sample collection) of past SARS-CoV-2 infection (i.e. N-binding antibody [serum] negative at Dose 1 visit and 1 month after Dose 2, SARS-CoV-2 not detected by NAAT [nasal swab] at Dose 1 and Dose 2 visits, 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.

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

- N = Number of participants with valid and determinate assay results before vaccination and at 1 month after Dose 2. These values are also the denominators used in the percentage calculations for seroresponse rates.
- 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 (5 to 11 years of age minus 16 to 25 years of age) and the corresponding CI (based on the Student t distribution).
- e. Immunobridging based on GMT 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  $\geq 0.8$ .
- f. SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralization 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.
- g. n = Number of participants with seroresponse based on NT50 1 month after Dose 2.
- h. Exact 2-sided CI based on the Clopper and Pearson method.
- i. Difference in proportions, expressed as a percentage (5 to 11 years of age minus 16 to 25 years of age).
- j. 2-Sided CI, based on the Miettinen and Nurminen method for the difference in proportions, expressed as a percentage.
- k. Immunobridging based on seroresponse rate is declared if the lower bound of the 2-sided 95% CI for the seroresponse difference is greater than -10.0%.

Immunogenicity in children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after booster dose

A booster dose of Comirnaty was given to 401 randomly selected participants in Study 3. Effectiveness of a booster dose in ages 5 to 11 is inferred by immunogenicity. The immunogenicity of this was assessed through 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 through 11 years of age who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after the dose 2 and the booster dose. This analysis is summarized in Table 7.

**Table 7: Summary of geometric mean titres – NT50 – participants without evidence of infection – phase 2/3 – immunogenicity set – 5 through 11 years of age – evaluable immunogenicity population**

Assay	Sampling time point <sup>a</sup>		1 month after booster dose/ 1 month after dose 2
	1 month after booster dose (n <sup>b</sup> =67)	1 month after dose 2 (n <sup>b</sup> =96)	
	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMR <sup>d</sup> (95% CI <sup>d</sup> )
SARS-CoV-2 neutralization assay - NT50 (titre)	2720.9 (2280.1, 3247.0)	1253.9 (1116.0, 1408.9)	2.17 (1.76, 2.68)

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NT50 = 50% neutralizing 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 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's 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 (1-Month Post-Booster Dose minus 1-Month Post-Dose 2) and the corresponding CI (based on the Student's t distribution).

### Paediatric population

The European Medicines Agency has deferred the obligation to submit the results of studies with Comirnaty in the paediatric population in prevention of COVID-19 (see section 4.2 for information on paediatric use).

### **5.2 Pharmacokinetic properties**

Not applicable.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of repeat dose toxicity and reproductive and developmental toxicity.

### General toxicity

Rats intramuscularly administered Comirnaty (receiving 3 full human doses once weekly, generating relatively higher levels in rats due to body weight differences) demonstrated some injection site oedema and erythema and increases in white blood cells (including basophils and eosinophils) consistent with an inflammatory response as well as vacuolation of portal hepatocytes without evidence of liver injury. All effects were reversible.

### Genotoxicity/Carcinogenicity

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

### Reproductive toxicity

Reproductive and developmental toxicity were investigated in rats in a combined fertility and developmental toxicity study where female rats were intramuscularly administered Comirnaty prior to mating and during gestation (receiving 4 full human doses that generate relatively higher levels in rat due to body weight differences, spanning between pre-mating day 21 and gestational day 20). SARS-CoV-2 neutralizing antibody responses were present in maternal animals from prior to mating to the end of the study on postnatal day 21 as well as in foetuses and offspring. There were no vaccine-related effects on female fertility, pregnancy, or embryo-foetal or offspring development. No Comirnaty data are available on vaccine placental transfer or excretion in milk.

## **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.

## 6.3 Shelf life

### Unopened vial

#### *Frozen vial*

12 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 4 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

#### *Thawed vial*

10 weeks storage and transportation at 2 °C to 8 °C within the 12-month shelf life.

- Upon moving the vaccine 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.
- If the vaccine is received at 2 °C to 8 °C it should be stored at 2 °C to 8 °C. The expiry date on the outer carton should have been updated to reflect the refrigerated expiry date and the original expiry date should have been crossed out.

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

Thawed vials can be handled in room light conditions.

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

#### *Handling of temperature excursions during refrigerated storage*

- Stability data indicate that the unopened vial is stable for up to 10 weeks when stored at temperatures from -2 °C to 2 °C, and within the 10 weeks storage period between 2 °C and 8 °C.
- Stability data indicate the vial can be stored for up to 24 hours at temperatures of 8 °C to 30 °C, including up to 12 hours following first puncture.

This information is intended to guide healthcare professionals only in case of temporary temperature excursion.

### 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, which includes up to 6 hours transportation time. 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

Store in a freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For storage conditions after thawing and dilution of the medicinal product, see section 6.3.

#### 6.5 Nature and contents of container

1.3 mL concentrate for dispersion in a 2 mL clear multidose vial (type I glass) with a stopper (synthetic bromobutyl rubber) and an orange flip-off plastic cap with aluminium seal. Each vial contains 10 doses, see section 6.6.

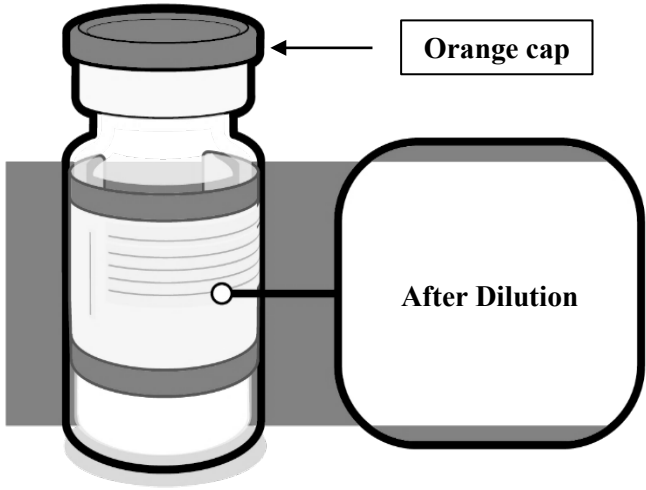
Pack sizes: 10 vials or 195 vials

Not all pack sizes may be marketed.

#### 6.6 Special precautions for disposal and other handling

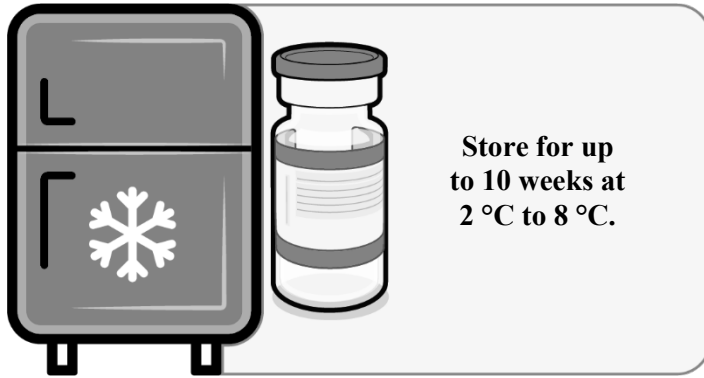
##### Handling instructions

Comirnaty 10 micrograms/dose should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

<b>VIAL VERIFICATION OF COMIRNATY 10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)</b>	
 <p>10 mcg</p>	<ul style="list-style-type: none"><li>• Verify that the vial has an orange plastic cap.</li><li>• If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.</li><li>• If the vial has a grey plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose dispersion for injection, Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.</li><li>• If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.</li></ul>

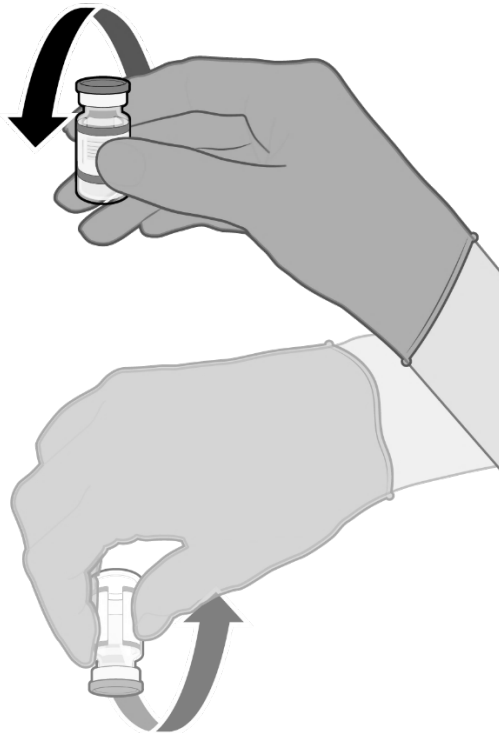


**HANDLING PRIOR TO USE OF COMIRNATY 10 MICROGRAMS/DOSE  
CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 4 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

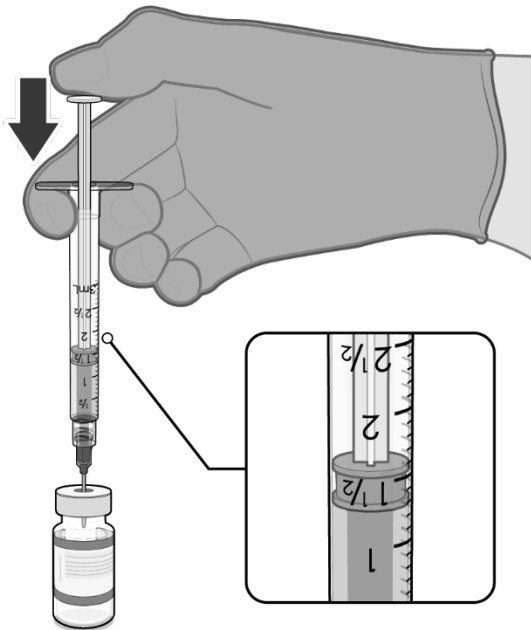
**MIXING PRIOR TO DILUTION OF COMIRNATY 10 MICROGRAMS/DOSE  
CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



**Gently × 10**

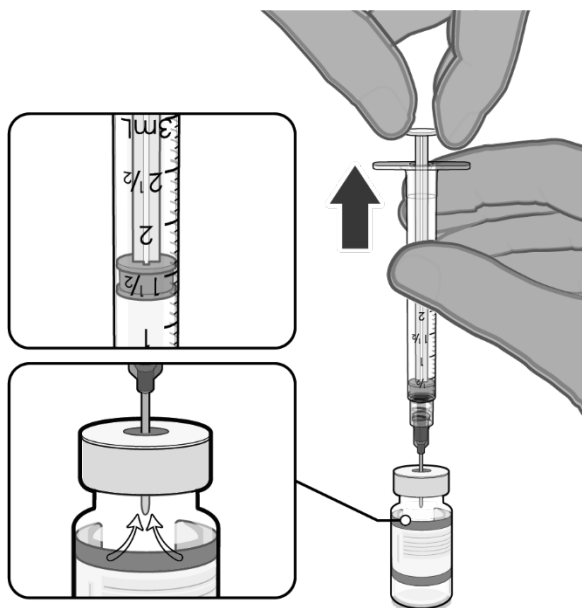
- Allow the thawed vial to come to room temperature and gently invert it 10 times prior to dilution. Do not shake.
- Prior to dilution, the thawed dispersion may contain white to off-white opaque amorphous particles.

**DILUTION OF COMIRNATY 10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



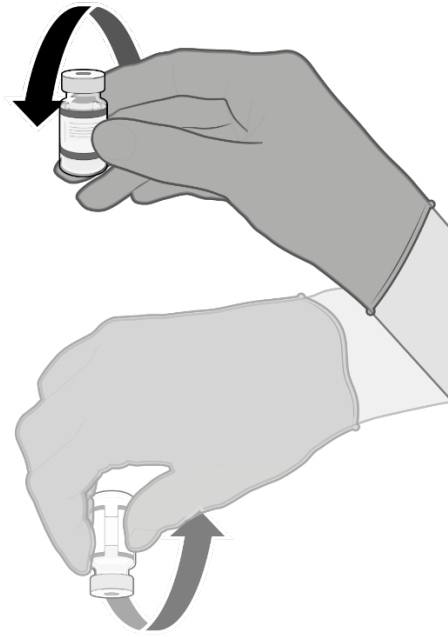
**1.3 mL of sodium chloride 9 mg/mL (0.9%)  
solution for injection**

- The thawed vaccine must be diluted in its original vial with 1.3 mL sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques.



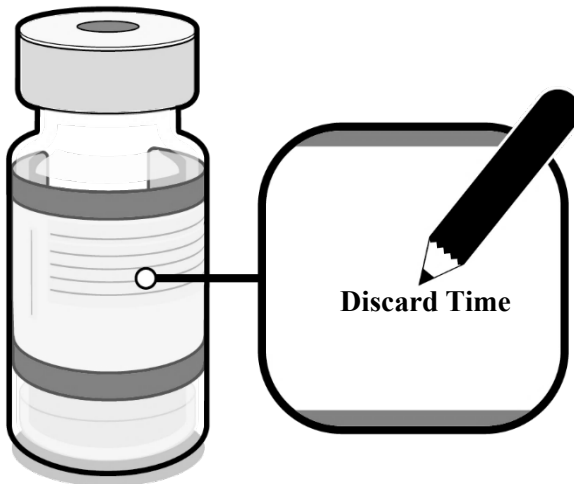
**Pull back plunger to 1.3 mL to remove air  
from vial.**

- Equalise vial pressure before removing the needle from the vial stopper by withdrawing 1.3 mL air into the empty diluent syringe.



**Gently × 10**

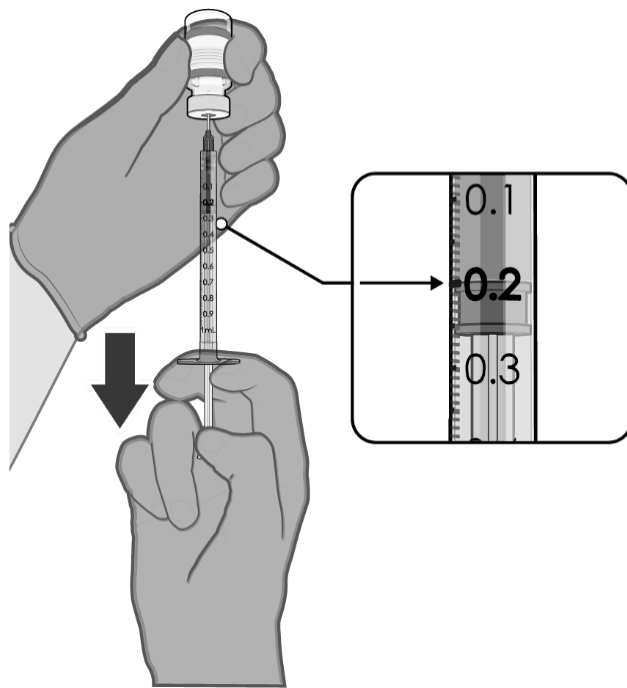
- Gently invert the diluted dispersion 10 times. Do not shake.
- The diluted vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discoloration are present.



**Record appropriate date and time.  
Use within 12 hours after dilution.**

- The diluted vials should be marked with the appropriate date and time.
- After dilution, store at 2 °C to 30 °C and use within 12 hours.
- Do not freeze or shake the diluted dispersion. If refrigerated, allow the diluted dispersion to come to room temperature prior to use.

**PREPARATION OF INDIVIDUAL 0.2 mL DOSES OF COMIRNATY  
10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION  
(CHILDREN 5 TO 11 YEARS)**



**0.2 mL diluted vaccine**

- After dilution, the vial contains 2.6 mL from which 10 doses of 0.2 mL can be extracted.
- Using aseptic technique, cleanse the vial stopper with a single use antiseptic swab.
- Withdraw 0.2 mL of Comirnaty for children age 5 to 11 years.

Low dead-volume syringes and/or needles should be used in order to extract 10 doses from a single vial. 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 ten doses from a single vial.

- 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.
- Discard any unused vaccine within 12 hours after dilution.

Disposal

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

**7. MARKETING AUTHORISATION HOLDER**

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55131 Mainz  
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Phone: +49 6131 9084-0  
Fax: +49 6131 9084-2121  
service@biontech.de

**8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/004  
EU/1/20/1528/005

**9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 21 December 2020  
Date of latest renewal: 10 October 2022

**10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>.

▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 for how to report adverse reactions.

## 1. NAME OF THE MEDICINAL PRODUCT

Comirnaty 3 micrograms/dose concentrate for dispersion for injection  
COVID-19 mRNA Vaccine (nucleoside modified)

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with a maroon cap and must be diluted before use.

One vial (0.4 mL) contains 10 doses of 0.2 mL after dilution, see sections 4.2 and 6.6.

One dose (0.2 mL) contains 3 micrograms of tozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran is a 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 SARS-CoV-2.

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Concentrate for dispersion for injection (sterile concentrate).  
The vaccine is a white to off-white frozen dispersion (pH: 6.9 - 7.9).

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Comirnaty 3 micrograms/dose concentrate for dispersion for injection is indicated for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in infants and children aged 6 months to 4 years.

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

### 4.2 Posology and method of administration

#### Posology

#### Infants and children 6 months to 4 years of age

Comirnaty 3 micrograms/dose is administered intramuscularly after dilution as a primary course of 3 doses (0.2 mL each). It is recommended to administer the second dose 3 weeks after the first dose followed by a third dose administered at least 8 weeks after the second dose (see sections 4.4 and 5.1).

If a child turns 5 years old between their doses in the vaccination course, he/she should complete the series at the same 3 micrograms dose level.

### Interchangeability

The interchangeability of Comirnaty with COVID-19 vaccines from other manufacturers to complete the primary course has not been established. Individuals who have received a dose of Comirnaty should continue to receive Comirnaty to complete the primary course.

### Paediatric population

There is a paediatric formulation available for individuals 5 to 11 years of age (i.e. 5 to less than 12 years of age). For details, please refer to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

The safety and efficacy of Comirnaty in infants aged less than 6 months have not yet been established.

### Method of administration

Comirnaty 3 micrograms/dose concentrate for dispersion for injection should be administered intramuscularly after dilution (see section 6.6).

After dilution, vials of Comirnaty 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.

In infants 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.

The vaccine should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering the vaccine, see section 4.4.

For instructions regarding thawing, handling and disposal of the vaccine, see section 6.6.

## **4.3 Contraindications**

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

## **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.

Close observation for at least 15 minutes is recommended following vaccination. No further dose of the vaccine should be given to those who have experienced anaphylaxis after a prior dose of Comirnaty.

### Myocarditis and pericarditis

There is an increased risk of myocarditis and pericarditis following vaccination with Comirnaty. These conditions can develop within just a few days after vaccination, and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. Available data suggest that the course of myocarditis and pericarditis following vaccination is not different from myocarditis or pericarditis in general (see section 4.8).

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis. Vaccinees (including parents or caregivers) 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.

Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

### Anxiety-related reactions

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation or stress-related reactions (e.g. dizziness, palpitations, increases in heart rate, alterations in blood pressure, paraesthesia, hypoesthesia and sweating) may occur in association with the vaccination process itself. Stress-related reactions are temporary and resolve on their own. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation. It is important that precautions are 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

The efficacy and safety of the vaccine has not been assessed in immunocompromised individuals, including those receiving immunosuppressant therapy. The efficacy of Comirnaty may be lower in immunocompromised individuals.



### 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 may not protect all vaccine recipients. Individuals may not be fully protected until 7 days after their primary course of 3 doses of vaccine.

## **4.5 Interaction with other medicinal products and other forms of interaction**

No interaction studies have been performed.

Concomitant administration of Comirnaty with other vaccines has not been studied.

## **4.6 Fertility, pregnancy and lactation**

Comirnaty 3 micrograms/dose concentrate for dispersion 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 Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection, Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

## **4.7 Effects on ability to drive and use machines**

Comirnaty has no or negligible influence on the ability to drive, cycle, and use machines. However, some of the effects mentioned under section 4.8 may temporarily affect the ability to drive, cycle, or use machines.

## **4.8 Undesirable effects**

### Summary of safety profile

#### Infants 6 to 23 months of age – after 3 doses

In an analysis of Study 3 (Phase 2/3), 1,776 infants (1,178 Comirnaty 3 mcg and 598 placebo) were 6 to 23 months of age. Based on data in the blinded placebo-controlled follow-up period up to the cut-off date of April 29, 2022, 570 infants 6 to 23 months of age who received a 3-dose primary course (386 Comirnaty 3 mcg and 184 placebo) have been followed for a median of 1.3 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%), drowsiness (> 40%), decreased 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 3 (Phase 2/3), 2,750 children (1,835 Comirnaty 3 mcg and 915 placebo) were 2 to 4 years age. Based on data in the blinded placebo-controlled follow-up period up to the cut-off date of April 29, 2022, 886 children 2 to 4 years of age who received a 3-dose primary course (606 Comirnaty 3 mcg and 280 placebo) have been followed a median of 1.4 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 (i.e. 5 to less than 12 years of age) – after 2 doses

In Study 3, a total of 1,518 children 5 to 11 years of age received at least 1 dose of Comirnaty 10 mcg and a total of 750 children 5 to 11 years of age received placebo. At the time of the analysis of Study 3 Phase 2/3 with data up to the cut-off date of 6 September 2021, 2,158 (95.1%) (1,444 Comirnaty 10 mcg and 714 placebo) children have been followed for at least 2 months after the second dose of Comirnaty 10 mcg. An analysis of Study 3 Phase 2/3 adverse event data also included another 2,379 participants [1,591 Comirnaty 10 mcg and 788 placebo], of whom 71.2% had a follow-up period for at least 2 weeks after Dose 2 up to the cut-off date of 8 October 2021. The safety evaluation in Study 3 is ongoing.

The overall safety profile of Comirnaty in participants 5 to 15 years of age was similar to that seen in participants 16 years of age and older. The most frequent adverse reactions in children 5 to 11 years of age that received 2 doses were injection site pain (> 80%), fatigue (> 50%), headache (> 30%), injection site redness and swelling (> 20%), myalgia and chills (> 10%).

Children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after booster dose

In a subset from Study 3, a total of 401 children 5 to 11 years of age received a booster dose of Comirnaty 10 mcg at least 5 months (range of 5 to 9 months) after completing the primary series. The analysis of the Study 3 Phase 2/3 subset is based on data up to the cut-off date of March 22, 2022 (median follow-up time of 1.3 months).

The overall safety profile for the booster dose was similar to that seen after the primary course. The most frequent adverse reactions in children 5 to 11 years of age were injection site pain (>70%), fatigue (>40%), headache (>30%), myalgia, chills, injection site redness and swelling (>10%).

Adolescents 12 to 15 years of age – after 2 doses

In an analysis of long-term safety follow-up in Study 2, 2,260 adolescents (1,131 Comirnaty and 1,129 placebo) were 12 to 15 years of age. Of these, 1,559 adolescents (786 Comirnaty and 773 placebo) have been followed for  $\geq$  4 months after the second dose of Comirnaty. The safety evaluation in Study 2 is ongoing.

The overall safety profile of Comirnaty in adolescents 12 to 15 years of age was similar to that seen in participants 16 years of age and older. 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 2, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty 30 mcg 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 vaccine and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty.

At the time of the analysis of Study 2 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 and 12,620 placebo) 16 years of age and older were followed up for  $\geq$  4 months after the second dose. This included a total of 15,111 (7,704 Comirnaty and 7,407 placebo) participants 16 to 55 years of age and a total of 10,540 (5,327 Comirnaty and 5,213 placebo) participants 56 years of age 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 participants 16 years of age and older receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

#### Participants 16 years of age and older – after booster dose

A subset from Study 2 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty 2-dose course, received a booster dose of Comirnaty approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2.

The overall safety profile for the booster dose was similar to that seen after 2 doses. 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 4, a placebo-controlled booster study, participants 16 years of age and older recruited from Study 2 received a booster dose of Comirnaty (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty. Overall, participants who received a booster dose, had a median follow-up time of 2.5 months after the booster dose to the cut-off date (5 October 2021). No new adverse reactions of Comirnaty were identified.

#### Booster dose following primary vaccination with another authorised COVID-19 vaccine

In 5 independent studies on the use of a Comirnaty booster dose in individuals who had completed primary vaccination with another authorized COVID-19 vaccine (heterologous booster dose), no new safety issues were identified.

#### Tabulated list of adverse reactions from clinical studies and post-authorisation experience in individuals 6 months of age and older

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 clinical trials and post-authorisation experience in individuals 6 months of age and older**

<b>System Organ Class</b>	<b>Very common (≥ 1/10)</b>	<b>Common (≥ 1/100 to &lt; 1/10)</b>	<b>Uncommon (≥ 1/1,000 to &lt; 1/100)</b>	<b>Rare (≥ 1/10,000 to &lt; 1/1,000)</b>	<b>Very rare (&lt; 1/10,000)</b>	<b>Not known (cannot be estimated from the available data)</b>
Blood and lymphatic system disorders			Lymphadenopathy <sup>a</sup>			
Immune system disorders			Hypersensitivity reactions (e.g. rash <sup>i</sup> , pruritus, urticaria, angioedema <sup>b</sup> )			Anaphylaxis
Metabolism and nutrition disorders			Decreased appetite <sup>j</sup>			
Psychiatric disorders	Irritability <sup>k</sup>		Insomnia			
Nervous system disorders	Headache; Drowsiness <sup>k</sup>		Lethargy	Acute peripheral facial paralysis <sup>c</sup>		Paraesthesia <sup>d</sup> ; Hypoesthesia <sup>d</sup>
Cardiac disorders					Myocarditis <sup>d</sup> ; Pericarditis <sup>d</sup>	
Gastrointestinal disorders	Diarrhoea <sup>d</sup>	Nausea; Vomiting <sup>d</sup>				
Skin and subcutaneous tissue disorder			Hyperhidrosis; Night sweats			Erythema multiforme <sup>d</sup>
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia		Pain in extremity <sup>e</sup>			

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)	Very rare (< 1/10,000)	Not known (cannot be estimated from the available data)
General disorders and administration site conditions	Injection site pain; Injection site tenderness <sup>k</sup> ; Fatigue; Chills; Pyrexia <sup>f</sup> ; Injection site swelling	Injection site redness <sup>h</sup>	Asthenia; Malaise; Injection site pruritus			Extensive swelling of vaccinated limb <sup>d</sup> ; Facial swelling <sup>g</sup>

- A higher frequency of lymphadenopathy was observed in participants 5 to 11 years of age in Study 3 (2.5% vs. 0.9%) and in participants 16 years of age and older in Study 4 (2.8% vs. 0.4%) receiving a booster dose compared to participants receiving 2 doses.
- The frequency category for angioedema was rare.
- 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 COVID-19 mRNA Vaccine 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.
- Adverse reaction determined post-authorisation.
- Refers to vaccinated arm.
- A higher frequency of pyrexia was observed after the second dose compared to the first dose.
- Facial swelling in vaccine recipients with a history of injection of dermatological fillers has been reported in the post-marketing phase.
- Injection site redness occurred at a higher frequency (very common) in participants 6 months to 11 years of age.
- The frequency category for rash was common in participants 6 to 23 months of age.
- The frequency category for decreased appetite was very common in participants 6 to 23 months of age.
- Irritability, injection site tenderness, and drowsiness pertain to participants 6 to 23 months of age.

#### Description of selected adverse reactions

##### *Myocarditis and pericarditis*

The increased risk of myocarditis after vaccination with Comirnaty is highest in younger males (see section 4.4).

Two large European pharmacoepidemiological studies have estimated the excess risk in younger males following the second dose of Comirnaty. One study showed that in a period of 7 days after the second dose there were about 0.265 (95% CI 0.255 - 0.275) extra cases of myocarditis in 12-29 year old males per 10,000 compared to unexposed persons. In another study, in a period of 28 days after the second dose there were 0.56 [95% CI 0.37 – 0.74] extra cases of myocarditis in 16-24 year old males per 10,000 compared to unexposed persons.

Limited data indicate that the risk of myocarditis and pericarditis after vaccination with Comirnaty in children aged 5 to 11 years seems lower than in ages 12 to 17 years.

#### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available.

## 4.9 Overdose

Overdose data is available from 52 study participants included in the clinical trial that due to an error in dilution received 58 micrograms of Comirnaty. The vaccine recipients did not report an increase in reactogenicity or adverse reactions.

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

## 5. PHARMACOLOGICAL PROPERTIES

### 5.1 Pharmacodynamic properties

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BX03

#### Mechanism of action

The nucleoside-modified messenger RNA in Comirnaty 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 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 neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.

#### Efficacy

Study 2 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  $\geq 56$ -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 hospitalization for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with human immunodeficiency virus (HIV), hepatitis C virus (HCV) or hepatitis B virus (HBV).

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

In the Phase 2/3 portion of Study 2, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine. 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 within through conclusion of the study in order to receive either placebo or COVID-19 mRNA Vaccine.

The population for the analysis of the primary efficacy endpoint included 36,621 participants 12 years of age and older (18,242 in the COVID-19 mRNA Vaccine 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 COVID-19

mRNA Vaccine group and 68 in the placebo group) and 1,616 participants 75 years of age and older (804 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine and in total 2,222 person-years in 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)  $\geq 30$  kg/m<sup>2</sup>, chronic pulmonary disease, diabetes mellitus, hypertension).

The vaccine efficacy information is presented in Table 2.

**Table 2: 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**

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants	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 1,000 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. CI not adjusted for multiplicity.

Efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% confidence interval of 89.6% to 97.6%) 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, representing up to 6 months after Dose 2 in the efficacy population.

The updated vaccine efficacy information is presented in Table 3.

**Table 3: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup>=20,998 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=21,096 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>e</sup>)</b>
All participants <sup>f</sup>	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 1,000 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 95% 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 COVID-19 mRNA Vaccine group; 16 in the placebo group.

In the updated efficacy analysis, efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 91.1% (95% CI of 88.8% to 93.0%) in participants in the evaluable efficacy population with or without evidence of prior infection with SARS-CoV-2.

Additionally, the updated efficacy analyses by subgroup showed similar efficacy point estimates across sexes, ethnic groups, geography and participants with medical comorbidities and obesity associated with high risk of severe COVID-19.



## Efficacy against severe COVID-19

Updated efficacy analyses of secondary efficacy endpoints supported benefit of the COVID-19 mRNA Vaccine in preventing severe COVID-19.

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 4) 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 COVID-19 mRNA Vaccine and placebo groups.

**Table 4: Vaccine efficacy – First severe COVID-19 occurrence in participants with or without prior SARS-CoV-2 infection based on the Food and Drug Administration (FDA)\* after Dose 1 or from 7 days after Dose 2 in the placebo-controlled follow-up**

	COVID-19 mRNA Vaccine Cases n1 <sup>a</sup> Surveillance time (n2 <sup>b</sup> )	Placebo Cases n1 <sup>a</sup> Surveillance time (n2 <sup>b</sup> )	Vaccine efficacy % (95% CI) <sup>c</sup>
After Dose 1 <sup>d</sup>	1 8.439 <sup>e</sup> (22,505)	30 8.288 <sup>e</sup> (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 <sup>f</sup>	1 6.522 <sup>g</sup> (21,649)	21 6.404 <sup>g</sup> (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).

\* 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  $\geq 30$  breaths per minute, heart rate  $\geq 125$  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 1,000 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 1,000 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 and immunogenicity in adolescents 12 to 15 years of age – after 2 doses

In an initial analysis of Study 2 in adolescents 12 to 15 years of age (representing a median follow-up duration of  $>2$  months after Dose 2) without evidence of prior infection, there were no cases in 1,005 participants who received the vaccine and 16 cases out of 978 who received placebo. The point

estimate for efficacy is 100% (95% confidence interval 75.3, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 18 cases in 1,110 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 78.1, 100.0).

Updated efficacy analyses were 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 updated efficacy analysis of Study 2 in adolescents 12 to 15 years of age without evidence of prior infection, there were no cases in 1,057 participants who received the vaccine and 28 cases out of 1,030 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 86.8, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 30 cases in 1,109 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 87.5, 100.0).

In Study 2, an analysis of SARS-CoV-2 neutralising titres 1 month after Dose 2 was conducted in a randomly selected subset of participants who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, comparing the response in adolescents 12 to 15 years of age (n = 190) to participants 16 to 25 years of age (n = 170).

The ratio of the geometric mean titres (GMT) in the 12 to 15 years of age group to the 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10. Therefore, the 1.5-fold noninferiority criterion was met as the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] was > 0.67.

Efficacy and immunogenicity in children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after 2 doses

Study 3 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. The majority (94.4%) of randomised vaccine recipients received the second dose 19 days to 23 days after Dose 1.

The descriptive vaccine efficacy results in children 5 to 11 years of age without evidence of prior SARS-CoV-2 infection are presented in Table 5. 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 5: 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*			
	COVID-19 mRNA Vaccine 10 mcg/dose N <sup>a</sup> =1305 Cases n1 <sup>b</sup> Surveillance time <sup>c</sup> (n2 <sup>d</sup> )	Placebo N <sup>a</sup> =663 Cases n1 <sup>b</sup> Surveillance time <sup>c</sup> (n2 <sup>d</sup> )	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.
- 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.

In Study 3, 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 (i.e. 5 to less than 12 years of age) in the Phase 2/3 part of Study 3 to participants 16 to 25 years of age in the Phase 2/3 part of Study 2 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 GMR of the SARS-CoV-2 NT50 1 month after Dose 2 in children 5 to 11 years of age (i.e. 5 to less than 12 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). 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 at 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%). This information is presented in Table 6.

**Table 6: Summary of geometric mean ratio for 50% neutralising titre and difference in percentages of participants with seroresponse – comparison of children 5 to 11 years of age (Study 3) to participants 16 to 25 years of age (Study 2) – participants without evidence of infection up to 1 month after Dose 2 – immunobridging subset – Phase 2/3 – evaluable immunogenicity population**

		COVID-19 mRNA Vaccine		5 to 11 years/ 16 to 25 years	
		10 mcg/dose 5 to 11 years N <sup>a</sup> =264	30 mcg/dose 16 to 25 years N <sup>a</sup> =253		
	Time point <sup>b</sup>	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMR <sup>d</sup> (95% CI <sup>d</sup> )	Met immunobridging objective <sup>e</sup> (Y/N)
Geometric mean 50% neutralizing titre <sup>f</sup> (GMT <sup>c</sup> )	1 month after Dose 2	1197.6 (1106.1, 1296.6)	1146.5 (1045.5, 1257.2)	1.04 (0.93, 1.18)	Y
	Time point <sup>b</sup>	n <sup>g</sup> (%) (95% CI <sup>h</sup> )	n <sup>g</sup> (%) (95% CI <sup>h</sup> )	Difference % <sup>i</sup> (95% CI <sup>j</sup> )	Met immunobridging objective <sup>k</sup> (Y/N)
Seroresponse rate (%) for 50% neutralizing titre <sup>f</sup>	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: 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 post-Dose 2 blood sample collection) of past SARS-CoV-2 infection (i.e. N-binding antibody [serum] negative at Dose 1 visit and 1 month

after Dose 2, SARS-CoV-2 not detected by NAAT [nasal swab] at Dose 1 and Dose 2 visits, 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.

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

- a. N = Number of participants with valid and determinate assay results before vaccination and at 1 month after Dose 2. These values are also the denominators used in the percentage calculations for seroresponse rates.
- 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  $0.5 \times$  LLOQ.
- d. GMRs and 2-sided 95% CIs were calculated by exponentiating the mean difference of the logarithms of the titres (5 to 11 years of age minus 16 to 25 years of age) and the corresponding CI (based on the Student t distribution).
- e. Immunobridging based on GMT 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  $\geq 0.8$ .
- f. SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralization 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.
- g. n = Number of participants with seroresponse based on NT50 1 month after Dose 2.
- h. Exact 2-sided CI based on the Clopper and Pearson method.
- i. Difference in proportions, expressed as a percentage (5 to 11 years of age minus 16 to 25 years of age).
- j. 2-Sided CI, based on the Miettinen and Nurminen method for the difference in proportions, expressed as a percentage.
- k. Immunobridging based on seroresponse rate is declared if the lower bound of the 2-sided 95% CI for the seroresponse difference is greater than -10.0%.

Immunogenicity in children 5 to 11 years of age (i.e. 5 to less than 12 years of age) – after booster dose

A booster dose of Comirnaty was given to 401 randomly selected participants in Study 3. Effectiveness of a booster dose in ages 5 to 11 is inferred by immunogenicity. The immunogenicity of this was assessed through 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 through 11 years of age who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after the dose 2 and the booster dose. This analysis is summarized in Table 7.

**Table 7: Summary of geometric mean titres – NT50 – participants without evidence of infection – phase 2/3 – immunogenicity set – 5 through 11 years of age – evaluable immunogenicity population**

	Sampling time point <sup>a</sup>		
	1 month after booster dose (n <sup>b</sup> =67)	1 month after dose 2 (n <sup>b</sup> =96)	1 month after booster dose/ 1 month after dose 2
Assay	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMT <sup>c</sup> (95% CI <sup>c</sup> )	GMR <sup>d</sup> (95% CI <sup>d</sup> )
SARS-CoV-2 neutralization assay - NT50 (titre)	2720.9 (2280.1, 3247.0)	1253.9 (1116.0, 1408.9)	2.17 (1.76, 2.68)

Abbreviations: CI = confidence interval; GMR = geometric mean ratio; GMT = geometric mean titre; LLOQ = lower limit of quantitation; NT50 = 50% neutralizing 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 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's 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 (1-Month Post-Booster Dose minus 1-Month Post-Dose 2) and the corresponding CI (based on the Student's t distribution).

*Efficacy and immunogenicity of a 3-dose primary course in infants and children 6 months to 4 years of age*

The efficacy analysis of Study 3 was performed across the combined population of participants 6 months through 4 years of age based on cases confirmed among 873 participants in the COVID-19 mRNA Vaccine group and 381 participants in the placebo group (2:1 randomization ratio) who received all 3 doses of study intervention during the blinded follow-up period when the Omicron variant of SARS-CoV-2 (BA.1) was the predominant variant in circulation (data cut-off date of 17 June 2022).

The vaccine efficacy results after Dose 3 in participants 6 months through 4 years of age are presented in Table 8.

**Table 8: Vaccine Efficacy – First COVID-19 Occurrence From 7 Days After Dose 3 – Blinded Follow-Up Period – Participants 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**

<b>First COVID-19 occurrence from 7 days after Dose 3 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine 3 mcg/Dose N<sup>a</sup>=873 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=381 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine Efficacy % (95% CI<sup>e</sup>)</b>
6 months through 4 years <sup>e</sup>	13 0.124 (794)	21 0.054 (351)	73.2 (43.8, 87.6)
2 through 4 years	9 0.081 (498)	13 0.033 (204)	71.8 (28.6, 89.4)
6 months through 23 months	4 0.042 (296)	8 0.020 (147)	75.8 (9.7, 94.7)

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.

- a. N = number of participants in the specified group.
- b. n1 = Number of participants meeting the endpoint definition.
- c. Total surveillance time in 1,000 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.
- d. n2 = Number of participants at risk for the endpoint.
- e. Two-sided 95% confidence interval (CI) for VE is derived based on the Clopper and Pearson method adjusted for surveillance time.

Vaccine efficacy in participants with or without prior SARS-CoV-2 infection was similar to those participants without prior SARS-CoV-2 infection.

Severe COVID-19 criteria (as described in the protocol, based on FDA definition and modified for children) were fulfilled for 12 cases (8 COVID-19 mRNA Vaccine and 4 placebo) among participants 6 months to 4 years of age. Among participants 6 months through 23 months of age, severe COVID-19 criteria were fulfilled for 3 cases (2 COVID-19 mRNA Vaccine and 1 placebo).

Immunogenicity analyses have been performed in the immunobridging subset of 82 Study 3 participants 6 to 23 months of age and 143 Study 3 participants 2 to 4 years of age without evidence of infection up to 1 month after Dose 3 based on a data cut-off date of 29 April 2022.

SARS-CoV-2 50% neutralising antibody titres (NT50) were compared between an immunogenicity subset of Phase 2/3 participants 6 to 23 months of age and 2 to 4 years of age from Study 3 at 1 month after the 3-dose primary course and a randomly selected subset from Study 2 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 6 to 23 months of age and 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 for both age groups (Table 9).

**Table 9: SARS-CoV-2 GMTs (NT50) and difference in percentages of participants with seroresponse at 1 month after vaccination course – immunobridging subset – participants 6 months to 4 years of age (Study 3) 1 month after Dose 3 and participants 16 to 25 years of age (Study 2) 1 month after Dose 2 – without evidence of SARS-CoV-2 infection – evaluable immunogenicity population**

SARS-CoV-2 GMTs (NT50) at 1 month after vaccination course							
SARS-CoV-2 neutralization assay - NT50 (titre) <sup>e</sup>							
Age	N <sup>a</sup>	GMT <sup>b</sup> (95% CI <sup>b</sup> ) (1 month after Dose 3)	Age	N <sup>a</sup>	GMT <sup>b</sup> (95% CI <sup>b</sup> ) (1 month after Dose 2)	Age	GMR <sup>c,d</sup> (95% CI)
2 to 4 years	143	1535.2 (1388.2, 1697.8)	16 to 25 years of age	170	1180.0 (1066.6, 1305.4)	2 to 4 years/16 to 25 years of age	1.30 (1.13, 1.50)
6 to 23 months	82	1406.5 (1211.3, 1633.1)	16 to 25 years of age	170	1180.0 (1066.6, 1305.4)	6 to 23 months years/16 to 25 years of age	1.19 (1.00, 1.42)
Difference in percentages of participants with seroresponse at 1 month after vaccination course							
SARS-CoV-2 neutralization assay - NT50 (titre) <sup>e</sup>							
Age	N <sup>a</sup>	n <sup>f</sup> (%) (95% CI <sup>g</sup> ) (1 month after Dose 3)	Age	N <sup>a</sup>	n <sup>f</sup> (%) (95% CI <sup>g</sup> ) (1 month after Dose 2)	Age	Difference in seroresponse rates % <sup>h</sup> (95% CI) <sup>j</sup>
2 to 4 years	141	141(100.0) (97.4, 100.0)	16 to 25 years of age	170	168 (98.8) (95.8, 99.9)	2 to 4 years/16 to 25 years of age	1.2 (1.5, 4.2)
6 to 23 months	80	80 (100.0) (95.5, 100.0)	16 to 25 years of age	170	168 (98.8) (95.8, 99.9)	6 to 23 months years/16 to 25 years of age	1.2 (3.4, 4.2)

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

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

- N = Number of participants with valid and determinate assay results for the specified assay at the given dose/sampling time point for GMTs and number of participants with valid and determinate assay results for the specified assay at both baseline and the given dose/sampling time point for seroresponse rates.
- 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 mean difference of the logarithms of the titres (younger age group minus 16 to 25 years of age) and the corresponding CI (based on the Student t distribution).

- 
- d. For each younger age group (2 to 4 years, 6 to 23 months), immunobridging based on GMR 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  $\geq 0.8$ .
  - e. 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 neutralization is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralised.
  - f. n = Number of participants with seroresponse for the given assay at the given dose/sampling time point.
  - g. Exact 2-sided CI based on the Clopper and Pearson method.
  - h. Difference in proportions, expressed as a percentage (younger age group minus 16 to 25 years of age).
  - i. 2-sided CI, based on the Miettinen and Nurminen method for the difference in proportions, expressed as a percentage.
  - j. For each younger age group (2 to 4 years, 6 to 23 months), immunobridging based on seroresponse rate 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.

### Paediatric population

The European Medicines Agency has deferred the obligation to submit the results of studies with Comirnaty in the paediatric population in prevention of COVID-19 (see section 4.2 for information on paediatric use).

### **5.2 Pharmacokinetic properties**

Not applicable.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of repeat dose toxicity and reproductive and developmental toxicity.

#### General toxicity

Rats intramuscularly administered Comirnaty (receiving 3 full human doses once weekly, generating relatively higher levels in rats due to body weight differences) demonstrated some injection site oedema and erythema and increases in white blood cells (including basophils and eosinophils) consistent with an inflammatory response as well as vacuolation of portal hepatocytes without evidence of liver injury. All effects were reversible.

#### Genotoxicity/Carcinogenicity

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

#### Reproductive toxicity

Reproductive and developmental toxicity were investigated in rats in a combined fertility and developmental toxicity study where female rats were intramuscularly administered Comirnaty prior to mating and during gestation (receiving 4 full human doses that generate relatively higher levels in rat due to body weight differences, spanning between pre-mating day 21 and gestational day 20). SARS-CoV-2 neutralizing antibody responses were present in maternal animals from prior to mating to the end of the study on postnatal day 21 as well as in foetuses and offspring. There were no vaccine-related effects on female fertility, pregnancy, or embryo-foetal or offspring development. No Comirnaty data are available on vaccine placental transfer or excretion in milk.



## 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.

### 6.3 Shelf life

#### Unopened vial

#### Frozen vial

12 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

10 weeks storage and transportation at 2 °C to 8 °C within the 12-month shelf life.

- Upon moving the vaccine 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.
- If the vaccine is received at 2 °C to 8 °C it should be stored at 2 °C to 8 °C. The expiry date on the outer carton should have been updated to reflect the refrigerated expiry date and the original expiry date should have been crossed out.

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

Thawed vials can be handled in room light conditions.

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

### Handling of temperature excursions during refrigerated storage

- Stability data indicate that the unopened vial is stable for up to 10 weeks when stored at temperatures from -2 °C to 2 °C, and within the 10 weeks storage period between 2 °C and 8 °C.
- Stability data indicate the vial can be stored for up to 24 hours at temperatures of 8 °C to 30 °C, including up to 12 hours following first puncture.

This information is intended to guide healthcare professionals only in case of temporary temperature excursion.

### 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, which includes up to 6 hours transportation time. 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**

Store in a freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For storage conditions after thawing and dilution of the medicinal product, see section 6.3.

### **6.5 Nature and contents of container**

0.4 mL concentrate for dispersion in a 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.

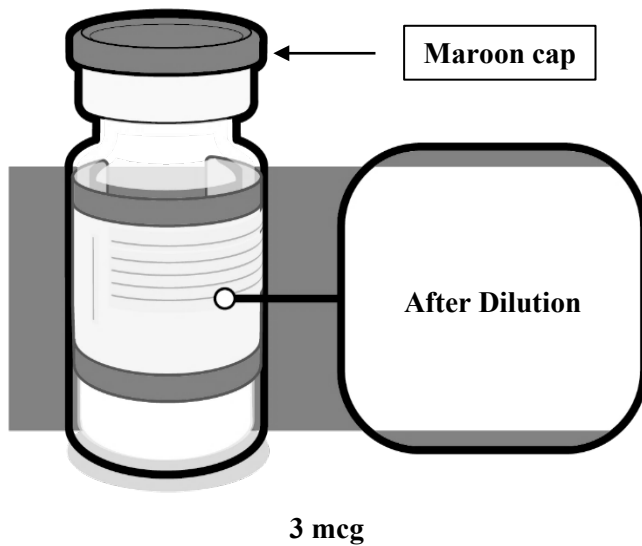
Pack sizes: 10 vials

### **6.6 Special precautions for disposal and other handling**

#### Handling instructions

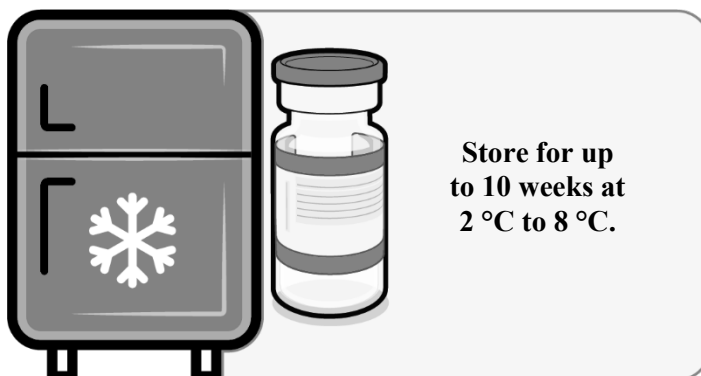
Comirnaty 3 micrograms/dose should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY 3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



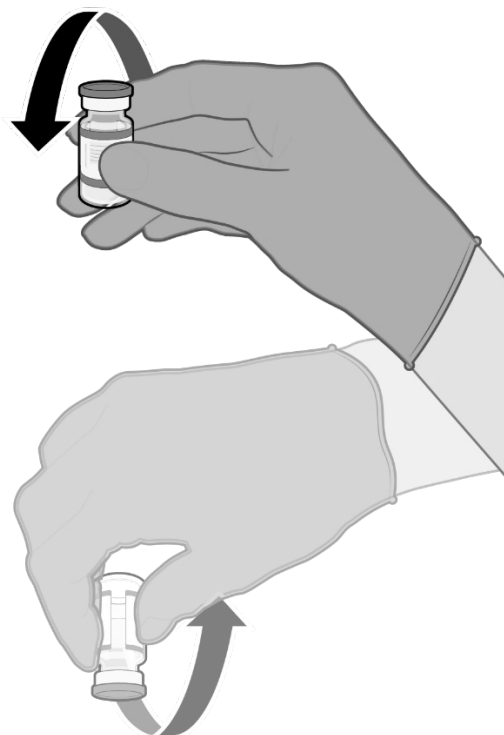
- Verify that the vial has a maroon plastic cap.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has a grey plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose dispersion for injection, Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

**HANDLING PRIOR TO USE OF COMIRNATY 3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 2 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

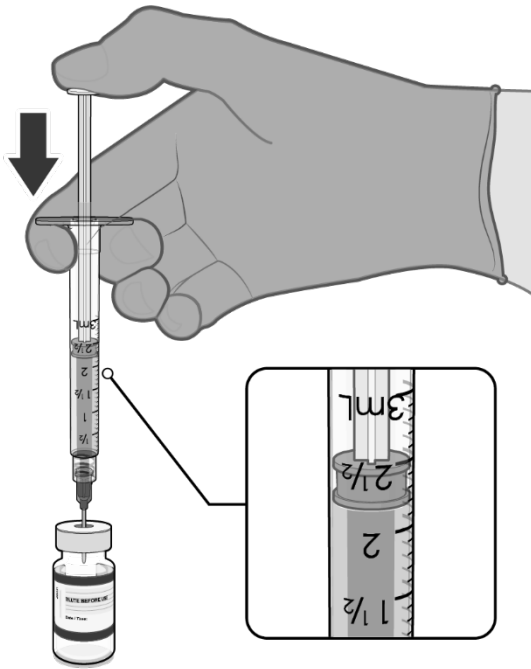
**MIXING PRIOR TO DILUTION OF COMIRNATY 3 MICROGRAMS/DOSE  
CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN  
6 MONTHS TO 4 YEARS)**



**Gently × 10**

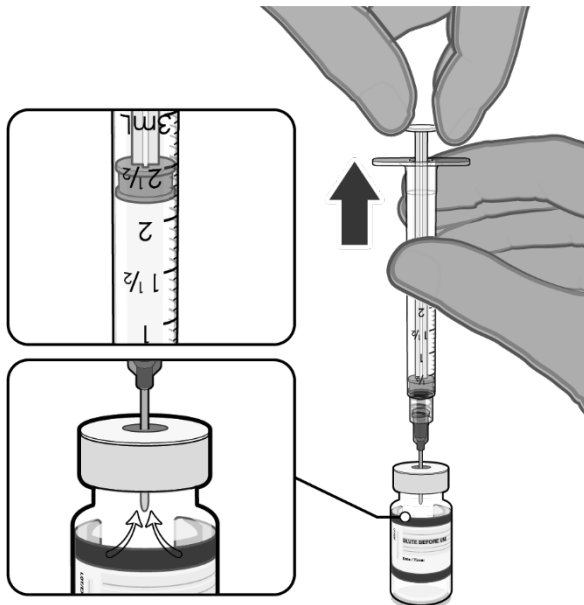
- Allow the thawed vial to come to room temperature and gently invert it 10 times prior to dilution. Do not shake.
- Prior to dilution, the thawed dispersion may contain white to off-white opaque amorphous particles.

**DILUTION OF COMIRNATY 3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



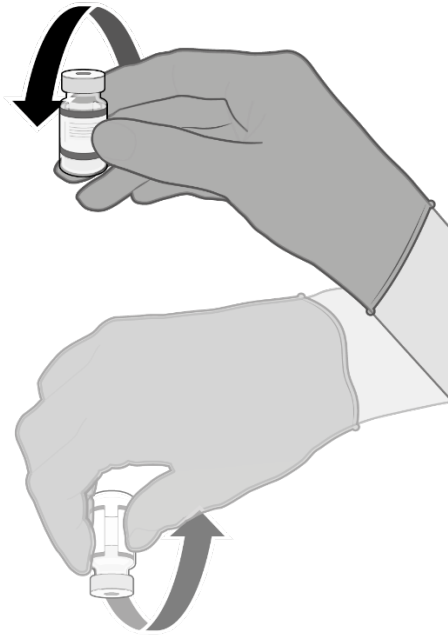
**2.2 mL of sodium chloride 9 mg/mL (0.9%) solution for injection.**

- The thawed vaccine must be diluted in its original vial with 2.2 mL sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques.



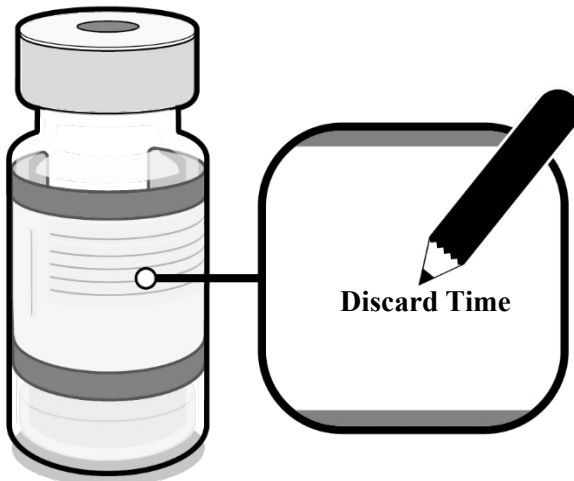
**Pull back plunger to 2.2 mL to remove air from vial.**

- Equalise vial pressure before removing the needle from the vial stopper by withdrawing 2.2 mL air into the empty diluent syringe.



**Gently × 10**

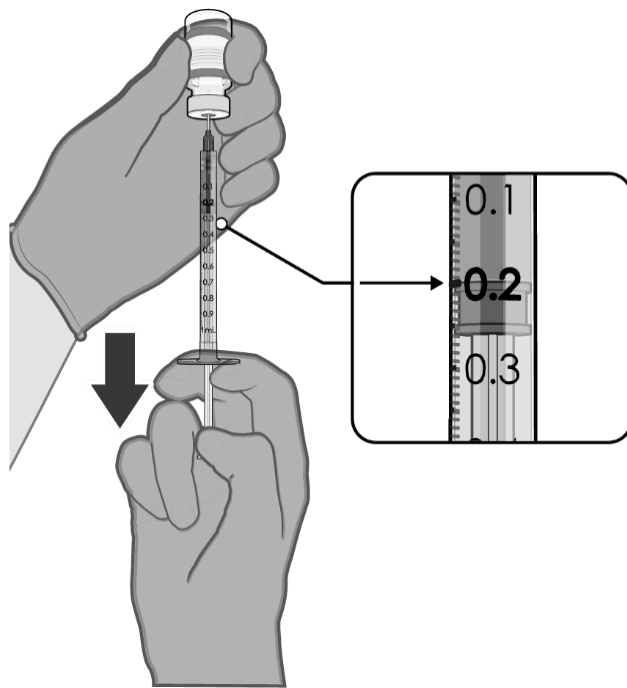
- Gently invert the diluted dispersion 10 times. Do not shake.
- The diluted vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discoloration are present.



**Record appropriate date and time.  
Use within 12 hours after dilution.**

- The diluted vials should be marked with the appropriate date and time.
- After dilution, store at 2 °C to 30 °C and use within 12 hours.
- Do not freeze or shake the diluted dispersion. If refrigerated, allow the diluted dispersion to come to room temperature prior to use.

**PREPARATION OF INDIVIDUAL 0.2 mL DOSES OF COMIRNATY  
3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION  
(INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



**0.2 mL diluted vaccine**

- After dilution, the vial contains 2.6 mL from which 10 doses of 0.2 mL can be extracted.
- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.2 mL of Comirnaty for infants and children age 6 months to 4 years.

Low dead-volume syringes and/or needles should be used in order to extract 10 doses from a single vial. 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 ten doses from a single vial.

- 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.
- Discard any unused vaccine within 12 hours after dilution.

Disposal

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

**7. MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz  
Germany  
Phone: +49 6131 9084-0  
Fax: +49 6131 9084-2121  
service@biontech.de

**8.     MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/010

**9.     DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 21 December 2020

Date of latest renewal: 10 October 2022

**10.    DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>.



▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 for how to report adverse reactions.

## 1. NAME OF THE MEDICINAL PRODUCT

Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection  
COVID-19 mRNA Vaccine (nucleoside modified)

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with a grey cap. Do not dilute prior to use.

One vial (2.25 mL) contains 6 doses of 0.3 mL, see sections 4.2 and 6.6.

One dose (0.3 mL) contains 15 micrograms of tozinameran and 15 micrograms of riltozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran is a 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 SARS-CoV-2 (Original). Riltozinameran is a 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 SARS-CoV-2 (Omicron BA.1).

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Dispersion for injection.

The vaccine is a white to off-white frozen dispersion (pH: 6.9 - 7.9).

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection is indicated for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in individuals 12 years of age and older who have previously received at least a primary vaccination course against COVID-19 (see sections 4.2 and 5.1).

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

### 4.2 Posology and method of administration

#### Posology

The dose of Comirnaty Original/Omicron BA.1 is 0.3 mL given intramuscularly.

There should be an interval of at least 3 months between administration of Comirnaty Original/Omicron BA.1 and the last prior dose of a COVID-19 vaccine.

Comirnaty Original/Omicron BA.1 is only indicated for individuals who have previously received at least a primary vaccination course against COVID-19.

For details on the primary vaccination course for ages 12 and above, please refer to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection and Comirnaty 30 micrograms/dose dispersion for injection.

#### Paediatric population

The safety and efficacy of Comirnaty Original/Omicron BA.1 in children aged less than 12 years of age have not yet been established. No data are available.

#### Elderly population

No dosage adjustment is required in elderly individuals  $\geq$  65 years of age.

#### Method of administration

Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection should be administered intramuscularly (see section 6.6). Do not dilute prior to use.

Vials of Comirnaty Original/Omicron BA.1 contain 6 doses of 0.3 mL of vaccine. In order to extract 6 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 a sixth dose from a single vial. Irrespective of the type of syringe and needle:

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Do not pool excess vaccine from multiple vials.

The preferred site is the deltoid muscle of the upper arm.

Do not inject the vaccine intravascularly, subcutaneously or intradermally.

The vaccine should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering the vaccine, see section 4.4.

For instructions regarding thawing, handling and disposal of the vaccine, see section 6.6.

### **4.3 Contraindications**

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

### **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.

Close observation for at least 15 minutes is recommended following vaccination. No further dose of the vaccine should be given to those who have experienced anaphylaxis after a prior dose of Comirnaty.

### Myocarditis and pericarditis

There is an increased risk of myocarditis and pericarditis following vaccination with Comirnaty. These conditions can develop within just a few days after vaccination, and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. Available data suggest that the course of myocarditis and pericarditis following vaccination is not different from myocarditis or pericarditis in general (see section 4.8).

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis. Vaccinees (including parents or caregivers) 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.

Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

### Anxiety-related reactions

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation or stress-related reactions (e.g. dizziness, palpitations, increases in heart rate, alterations in blood pressure, paraesthesia, hypoaesthesia and sweating) may occur in association with the vaccination process itself. Stress-related reactions are temporary and resolve on their own. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation. It is important that precautions are 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

The efficacy and safety of the vaccine has not been assessed in immunocompromised individuals, including those receiving immunosuppressant therapy. The efficacy of Comirnaty Original/Omicron BA.1 may be lower in immunocompromised individuals.

### 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.1 may not protect all vaccine recipients.

## **4.5 Interaction with other medicinal products and other forms of interaction**

No interaction studies have been performed.

Concomitant administration of Comirnaty Original/Omicron BA.1 with other vaccines has not been studied.

## **4.6 Fertility, pregnancy and lactation**

### Pregnancy

No data are available yet regarding the use of Comirnaty Original/Omicron BA.1 during pregnancy.

However, a large amount of observational data from pregnant women vaccinated with the initially approved Comirnaty vaccine during the second and third trimester have not shown an increase in adverse pregnancy outcomes. While data on pregnancy outcomes following vaccination during the first trimester are presently limited, no increased risk for miscarriage has been seen. Animal studies do not indicate direct or indirect harmful effects with respect to pregnancy, embryo/foetal development, parturition or post-natal development (see section 5.3). Since differences between products are confined to the spike protein sequence, and there are no clinically meaningful differences in reactogenicity, Comirnaty Original/Omicron BA.1 can be used during pregnancy.

### Breast-feeding

No data are available yet regarding the use of Comirnaty Original/Omicron BA.1 during breast-feeding.

However, no effects on the breast-fed newborn/infant are anticipated since the systemic exposure of breast-feeding woman to the vaccine is negligible. Observational data from women who were breast-feeding after vaccination with the initially approved Comirnaty vaccine have not shown a risk for adverse effects in breast-fed newborns/infants. Comirnaty Original/Omicron BA.1 can be used during breast-feeding.

### Fertility

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity (see section 5.3).

## **4.7 Effects on ability to drive and use machines**

Comirnaty Original/Omicron BA.1 has no or negligible influence on the ability to drive and use machines. However, some of the effects mentioned under section 4.8 may temporarily affect the ability to drive or use machines.

## 4.8 Undesirable effects

### Summary of safety profile

#### Comirnaty Original/Omicron BA.1

*Participants > 55 years of age – after a booster dose of Comirnaty Original/Omicron BA.1 (fourth dose)*

In a subset from Study 4 (Phase 3), 305 adults > 55 years of age who had completed 3 doses of Comirnaty, received a booster (fourth dose) of Comirnaty Original/Omicron BA.1 (15/15 mcg) 4.7 to 11.5 months after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty Original/Omicron BA.1 had a median follow-up time of at least 1.7 months.

The overall safety profile for the Comirnaty Original/Omicron BA.1 booster (fourth dose) was similar to that seen after the Comirnaty booster (third dose). The most frequent adverse reactions in participants greater than 55 years of age were injection site pain (> 50%), fatigue (> 40%), headache (> 30%), myalgia (> 20%), chills and arthralgia (> 10%). No new adverse reactions were identified for Comirnaty Original/Omicron BA.1.

The safety of a Comirnaty Original/Omicron BA.1 booster dose in individuals from 18 to ≤ 55 years of age is extrapolated from safety data from a subset of 315 adults 18 to ≤ 55 years of age who received a booster (fourth dose) of Omicron BA.1 30 mcg (monovalent) after completing 3 doses of Comirnaty. The most frequent adverse reactions in these participants 18 to ≤ 55 years of age were injection site pain (> 70%), fatigue (> 60%), headache (> 40%), myalgia (> 30%), chills (> 30%) and arthralgia (> 20%).

#### Comirnaty 30 mcg

*Participants 16 years of age and older – after 2 doses*

In Study 2, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty 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 vaccine and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty.

At the time of the analysis of Study 2 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 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 and 7,407 placebo) participants 16 to 55 years of age and a total of 10,540 (5,327 Comirnaty and 5,213 placebo) participants 56 years of age 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 participants 16 years of age and older receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

*Adolescents 12 to 15 years of age – after 2 doses*

In an analysis of long-term safety follow-up in Study 2, 2,260 adolescents (1,131 Comirnaty and 1,129 placebo) were 12 to 15 years of age. Of these, 1,559 adolescents (786 Comirnaty and 773 placebo) have been followed for ≥ 4 months after the second dose of Comirnaty. The safety evaluation in Study 2 is ongoing.

The overall safety profile of Comirnaty in adolescents 12 to 15 years of age was similar to that seen in participants 16 years of age and older. 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 booster dose*

A subset from Study 2 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty 2-dose course, received a booster dose of Comirnaty approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2.

The overall safety profile for the booster dose was similar to that seen after 2 doses. 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 4, a placebo-controlled booster study, participants 16 years of age and older recruited from Study 2 received a booster dose of Comirnaty (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty. Overall, participants who received a booster dose, had a median follow-up time of 2.5 months after the booster dose to the cut-off date (5 October 2021). No new adverse reactions of Comirnaty were identified.

*Booster dose following primary vaccination with another authorised COVID-19 vaccine*

In 5 independent studies on the use of a Comirnaty booster dose in individuals who had completed primary vaccination with another authorised COVID-19 vaccine (heterologous booster dose), no new safety issues were identified (see section 5.1).

Tabulated list of adverse reactions from clinical studies of Comirnaty and Comirnaty Original/Omicron BA.1 and post-authorisation experience of Comirnaty in individuals 12 years of age and older

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 and Comirnaty Original/Omicron BA.1 clinical trials and Comirnaty post-authorisation experience in individuals 12 years of age and older**

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)	Very rare (< 1/10,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy <sup>a</sup>			
Immune system disorders			Hypersensitivity reactions (e.g. rash, pruritus, urticaria <sup>b</sup> , angioedema <sup>b</sup> )			Anaphylaxis
Metabolism and nutrition disorders			Decreased appetite			
Psychiatric disorders			Insomnia			
Nervous system disorders	Headache		Lethargy	Acute peripheral facial paralysis <sup>c</sup>		Paraesthesia <sup>d</sup> ; Hypoaesthesia <sup>d</sup>
Cardiac disorders					Myocarditis <sup>d</sup> ; Pericarditis <sup>d</sup>	
Gastrointestinal disorders	Diarrhoea <sup>d</sup>	Nausea; Vomiting <sup>d</sup>				
Skin and subcutaneous tissue disorder			Hyperhidrosis; Night sweats			Erythema multiforme <sup>d</sup>
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia		Pain in extremity <sup>e</sup>			
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Pyrexia <sup>f</sup> ; Injection site swelling	Injection site redness	Asthenia; Malaise; Injection site pruritus			Extensive swelling of vaccinated limb <sup>d</sup> ; Facial swelling <sup>g</sup>

- A higher frequency of lymphadenopathy (2.8% vs. 0.4%) was observed in participants receiving a booster dose in Study 4 compared to participants receiving 2 doses.
- The frequency category for urticaria and angioedema was rare.
- 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 COVID-19 mRNA Vaccine 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.
- Adverse reaction determined post-authorisation.
- Refers to vaccinated arm.
- A higher frequency of pyrexia was observed after the second dose compared to the first dose.
- Facial swelling in vaccine recipients with a history of injection of dermatological fillers has been reported in the post-marketing phase.

## Description of selected adverse reactions

### Myocarditis and pericarditis

The increased risk of myocarditis after vaccination with Comirnaty is highest in younger males (see section 4.4).

Two large European pharmacoepidemiological studies have estimated the excess risk in younger males following the second dose of Comirnaty. One study showed that in a period of 7 days after the second dose there were about 0.265 (95% CI 0.255 - 0.275) extra cases of myocarditis in 12-29 year old males per 10,000 compared to unexposed persons. In another study, in a period of 28 days after the second dose there were 0.56 [95% CI 0.37 – 0.74] extra cases of myocarditis in 16-24 year old males per 10,000 compared to unexposed persons.

Limited data indicate that the risk of myocarditis and pericarditis after vaccination with Comirnaty in children aged 5 to 11 years seems lower than in ages 12 to 17 years.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available.

## **4.9 Overdose**

Overdose data is available from 52 study participants included in the clinical trial that due to an error in dilution received 58 micrograms of Comirnaty. The vaccine recipients did not report an increase in reactogenicity or adverse reactions.

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

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BX03

#### Mechanism of action

The nucleoside-modified messenger RNA in Comirnaty 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 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 neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.



## Efficacy

### Comirnaty Original/Omicron BA.1

#### *Relative vaccine immunogenicity in participants > 55 years of age – after a booster dose of Comirnaty Original/Omicron BA.1 (fourth dose)*

In an interim analysis of a subset from Study 4 (Substudy E), 610 adults greater than 55 years of age who had completed a series of 3 doses of Comirnaty received 1 of the following as a booster dose (fourth dose): Comirnaty (30 mcg) or Comirnaty Original/Omicron BA.1 (15/15 mcg). GMRs and seroresponse rates were evaluated at 1 month after Comirnaty Original/Omicron BA.1 (15/15 mcg) booster vaccination up to a data cut-off date of 16 May 2022, which represents a median of at least 1.7 months post-booster follow-up. The Comirnaty Original/Omicron BA.1 (15/15 mcg) booster dose was administered 4.7 to 11.5 months (median 6.3 months) after the third dose.

The primary objective of the analysis was to assess superiority with respect to level of neutralising titre and noninferiority with respect to seroresponse rate of the anti-Omicron immune response induced by a dose of Comirnaty Original/Omicron BA.1 (15/15 mcg) relative to the response elicited by a dose of Comirnaty (30 mcg) given as a fourth dose in Comirnaty-experienced participants greater than 55 years of age.

Superiority of Comirnaty Original/Omicron BA.1 (15/15 mcg) to Comirnaty (30 mcg) was met, as the lower bound of the 2-sided 95% CI for GMR was > 1 (Table 2).

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

The difference in percentages of participants who achieved seroresponse to Omicron variant between the Comirnaty Original/Omicron BA.1 group (71.6%) and Comirnaty group (57%) was 14.6% (2-sided 95% CI: 4.0%, 24.9%). Thus, noninferiority was met.

**Table 2: Substudy E - Geometric mean ratios for between vaccine group comparison – participants without evidence of infection up to 1 month after Dose 4 – expanded cohort – immunogenicity subset – participants greater than 55 years of age – evaluable immunogenicity population**

<b>Assay</b>	<b>Vaccine group (as randomised)</b>	<b>Sampling time point<sup>a</sup></b>	<b>N<sup>b</sup></b>	<b>GMT (95% CI)<sup>c</sup></b>	<b>GMR (95% CI)<sup>d</sup></b>
SARS-CoV-2 neutralisation assay - Omicron BA.1 - NT50 (titre)	Comirnaty (30 mcg)	1 month	163	455.8 (365.9, 567.6)	
	Comirnaty Original/Omicron BA.1 (15/15 mcg)	1 month	178	711.0 (588.3, 859.2)	1.56 (1.17, 2.08)
SARS-CoV-2 neutralisation assay - reference strain - NT50 (titre)	Comirnaty (30 mcg)	1 month	182	5998.1 (5223.6, 6887.4)	
	Comirnaty Original/Omicron BA.1 (15/15 mcg)	1 month	186	5933.2 (5188.2, 6785.2)	0.99 (0.82, 1.20)

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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.

Note: Immunogenicity subset = a random sample of 230 participants in each vaccine group selected from the expanded cohort.

Note: Participants who had no serological or virological evidence (prior to the 1-month post-study vaccination blood sample collection) of past SARS-CoV-2 infection (i.e. N-binding antibody [serum] result negative at the study vaccination and the 1-month post-study vaccination visits, negative NAAT [nasal swab] result at the study vaccination visit, and any unscheduled visit prior to the 1-month post-study vaccination blood sample collection) and had no medical history of COVID-19 were included in the analysis.

- 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. GMRs and 2-sided 95% CIs were calculated by exponentiating the mean difference of the logarithms of the titres (vaccine group in the corresponding row - Comirnaty [30 mcg]) and the corresponding CI (based on the Student  $t$  distribution).

### Comirnaty 30 mcg

Study 2 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  $\geq$  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 hospitalization for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with human immunodeficiency virus (HIV), hepatitis C virus (HCV) or hepatitis B virus (HBV).

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

In the Phase 2/3 portion of Study 2, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine. 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 within through conclusion of the study in order to receive either placebo or COVID-19 mRNA Vaccine.

The population for the analysis of the primary efficacy endpoint included, 36,621 participants 12 years of age and older (18,242 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine group and 68 in the placebo group) and 1,616 participants 75 years of age and older (804 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine and in total 2,222 person-years in 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)  $\geq 30$  kg/m<sup>2</sup>, chronic pulmonary disease, diabetes mellitus, hypertension).

The vaccine efficacy information is presented in Table 3.

**Table 3: 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**

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants	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 1,000 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. CI not adjusted for multiplicity.

Efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% confidence interval of 89.6% to 97.6%) 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, representing up to 6 months after Dose 2 in the efficacy population.

The updated vaccine efficacy information is presented in Table 4.

**Table 4: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup>=20,998 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=21,096 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>e</sup>)</b>
All participants <sup>f</sup>	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 1,000 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 95% 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 COVID-19 mRNA Vaccine group; 16 in the placebo group.

In the updated efficacy analysis, efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 91.1% (95% CI of 88.8% to 93.0%) in participants in the evaluable efficacy population with or without evidence of prior infection with SARS-CoV-2.

Additionally, the updated efficacy analyses by subgroup showed similar efficacy point estimates across sexes, ethnic groups, geography and participants with medical comorbidities and obesity associated with high risk of severe COVID-19.

#### *Efficacy against severe COVID-19*

Updated efficacy analyses of secondary efficacy endpoints supported benefit of the COVID-19 mRNA Vaccine in preventing severe COVID-19.

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 5) 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 COVID-19 mRNA Vaccine and placebo groups.

**Table 5: Vaccine efficacy – First severe COVID-19 occurrence in participants with or without prior SARS-CoV-2 infection based on the Food and Drug Administration (FDA)\* after Dose 1 or from 7 days after Dose 2 in the placebo-controlled follow-up**

	<b>COVID-19 mRNA Vaccine Cases n1<sup>a</sup> Surveillance time (n2<sup>b</sup>)</b>	<b>Placebo Cases n1<sup>a</sup> Surveillance time (n2<sup>b</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>c</sup>)</b>
After Dose 1 <sup>d</sup>	1 8.439 <sup>e</sup> (22,505)	30 8.288 <sup>e</sup> (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 <sup>f</sup>	1 6.522 <sup>g</sup> (21,649)	21 6.404 <sup>g</sup> (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).

\* 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  $\geq 30$  breaths per minute, heart rate  $\geq 125$  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 1,000 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 1,000 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 and immunogenicity in adolescents 12 to 15 years of age – after 2 doses*

In an initial analysis of Study 2 in adolescents 12 to 15 years of age (representing a median follow-up duration of  $>2$  months after Dose 2) without evidence of prior infection, there were no cases in 1,005 participants who received the vaccine and 16 cases out of 978 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 75.3, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 18 cases in 1,110 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 78.1, 100.0).

Updated efficacy analyses were 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 updated efficacy analysis of Study 2 in adolescents 12 to 15 years of age without evidence of prior infection, there were no cases in 1,057 participants who received the vaccine and 28 cases out of 1,030 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 86.8, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 30 cases in 1,109 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 87.5, 100.0).

In Study 2, an analysis of SARS-CoV-2 neutralising titres 1 month after Dose 2 was conducted in a randomly selected subset of participants who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, comparing the response in adolescents 12 to 15 years of age (n = 190) to participants 16 to 25 years of age (n = 170).

The ratio of the geometric mean titres (GMT) in the 12 to 15 years of age group to the 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10. Therefore, the 1.5-fold noninferiority criterion was met as the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] was > 0.67.

*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% neutralizing antibody titres (NT50) against SARS-CoV-2 (USA\_WA1/2020) in Study 2. In this study, the booster dose was administered 5 to 8 months (median 7 months) after the second dose. In Study 2, analyses of NT50 1 month after the booster dose compared to 1 month after the primary series in individuals 18 through 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 geometric mean ratio (GMR) and difference in seroresponse rates. Seroresponse for a participant was defined as achieving a ≥ 4-fold rise in NT50 from baseline (before primary series). These analyses are summarized in Table 6.

**Table 6: SARS-CoV-2 neutralization assay - NT50 (titre)<sup>†</sup> (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 through 55 years of age without evidence of infection up to 1 month after booster dose\* – booster dose evaluable immunogenicity population<sup>‡</sup>**

	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)
<b>Geometric mean 50% neutralizing titre (GMT)<sup>b</sup></b>	212 <sup>a</sup>	2466.0 <sup>b</sup> (2202.6, 2760.8)	750.6 <sup>b</sup> (656.2, 858.6)	3.29 <sup>c</sup> (2.77, 3.90)	Y <sup>d</sup>
<b>Seroresponse rate (%) for 50% neutralizing titre<sup>†</sup></b>	200 <sup>e</sup>	199 <sup>f</sup> 99.5% (97.2%, 100.0%)	196 <sup>f</sup> 98.0% (95.0%, 99.5%)	1.5% <sup>g</sup> (-0.7%, 3.7% <sup>h</sup> )	Y <sup>i</sup>

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% neutralizing titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; Y/N = yes/no.

<sup>†</sup> SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralization Assay. The assay uses a fluorescent reporter virus derived from the USA\_WA1/2020 strain and virus neutralization is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralized.

\* 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.
- n = Number of participants with valid and determinate assay results at both sampling time points within specified window.
  - 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 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).
  - 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  $\geq 0.80$ .
  - 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.
  - 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 (1 month after booster dose – 1 month after Dose 2).
  - Adjusted Wald 2-sided CI for the difference in proportions, expressed as a percentage.
  - 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 4, a placebo-controlled booster study performed in approximately 10,000 participants 16 years of age and older who were recruited from Study 2, evaluated confirmed COVID-19 cases accrued from at least 7 days after booster vaccination up to a data cut-off date of 5 October 2021, which represents a median of 2.5 months post-booster follow-up. The booster dose was administered 5 to 13 months (median 11 months) after the second dose. 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 without prior evidence of SARS-CoV-2 infection is presented in Table 7. Relative vaccine efficacy in participants with or without evidence of prior SARS-CoV-2 infection was 94.6% (95% confidence interval of 88.5% to 97.9%), similar to that seen in those participants without evidence of prior infection. Primary COVID-19 cases observed from 7 days after booster vaccination were 7 primary cases in the Comirnaty group, and 124 primary cases in the placebo group.

**Table 7: Vaccine efficacy – First COVID-19 occurrence from 7 days after booster vaccination – participants 16 years of age and older without evidence of infection – evaluable efficacy population**

<b>First COVID-19 occurrence from 7 days after booster dose in participants without evidence of prior SARS-CoV-2 infection*</b>			
	<b>Comirnaty N<sup>a</sup>=4695 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=4671 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Relative Vaccine Efficacy<sup>e</sup> % (95% CI<sup>f</sup>)</b>
First COVID-19 occurrence from 7 days after booster vaccination	6 0.823 (4659)	123 0.792 (4614)	95.3 (89.5, 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 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.
- N = Number of participants in the specified group.
  - n1 = Number of participants meeting the endpoint definition.
  - Total surveillance time in 1,000 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.
  - n2 = Number of participants at risk for the endpoint.
  - Relative vaccine efficacy of the Comirnaty booster group relative to the placebo group (non-booster).
  - Two-sided confidence interval (CI) for relative vaccine efficacy is derived based on the Clopper and Pearson method adjusted for surveillance time.

#### *Immunogenicity of a booster dose following primary vaccination with another authorised COVID-19 vaccine*

Effectiveness of a Comirnaty booster dose (30 mcg) in individuals who completed primary vaccination with another authorised COVID-19 vaccine (heterologous booster dose) is inferred from immunogenicity data from an independent National Institutes of Health (NIH) study phase 1/2 open-label clinical trial (NCT04889209) conducted in the United States. In this study, adults (range 19 to 80 years of age) who had completed primary vaccination with Moderna 100 mcg 2-dose series (N = 51, mean age 54±17), Janssen single dose (N = 53, mean age 48±14), or Comirnaty 30 mcg 2-dose series (N = 50, mean age 50±18) at least 12 weeks prior to enrolment and who reported no history of SARS-CoV-2 infection received a booster dose of Comirnaty (30 mcg). The boost with Comirnaty induced a 36, 12, and 20 GMR-fold rise in neutralising titres following the Janssen, Moderna, and Comirnaty primary doses, respectively.

Heterologous boosting with Comirnaty was also evaluated in the CoV-BOOST study (EudraCT 2021-002175-19), a multicentre, randomised, controlled, phase 2 trial of third dose booster vaccination against COVID-19, in which 107 adult participants (median age 71 years of age, interquartile range 54 to 77 years of age) were randomised at least 70 days post 2 doses of AstraZeneca COVID-19 Vaccine. After the AstraZeneca COVID-19 Vaccine primary series, pseudovirus (wild-type), neutralising antibody NT50 GMR-fold change increased 21.6-fold with heterologous Comirnaty booster (n = 95).

#### Paediatric population

The European Medicines Agency has deferred the obligation to submit the results of studies with Comirnaty in the paediatric population in prevention of COVID-19 (see section 4.2 for information on paediatric use).

### **5.2 Pharmacokinetic properties**

Not applicable.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of repeat dose toxicity and reproductive and developmental toxicity.

#### General toxicity

Rats intramuscularly administered Comirnaty (receiving 3 full human doses once weekly, generating relatively higher levels in rats due to body weight differences) demonstrated some injection site oedema and erythema and increases in white blood cells (including basophils and eosinophils) consistent with an inflammatory response as well as vacuolation of portal hepatocytes without evidence of liver injury. All effects were reversible.



## Genotoxicity/Carcinogenicity

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

## Reproductive toxicity

Reproductive and developmental toxicity were investigated in rats in a combined fertility and developmental toxicity study where female rats were intramuscularly administered Comirnaty prior to mating and during gestation (receiving 4 full human doses that generate relatively higher levels in rat due to body weight differences, spanning between pre-mating day 21 and gestational day 20). SARS-CoV-2 neutralizing antibody responses were present in maternal animals from prior to mating to the end of the study on postnatal day 21 as well as in foetuses and offspring. There were no vaccine-related effects on female fertility, pregnancy, or embryo-foetal or offspring development. No Comirnaty data are available on vaccine placental transfer or excretion in milk.

## **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.

### **6.3 Shelf life**

#### Unopened vial

#### Frozen vial

12 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 6 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

#### Thawed vial

10 weeks storage and transportation at 2 °C to 8 °C within the 12-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.

- If the vaccine is received at 2 °C to 8 °C it should be stored at 2 °C to 8 °C. The expiry date on the outer carton should have been updated to reflect the refrigerated expiry date and the original expiry date should have been crossed out.

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

Thawed vials can be handled in room light conditions.

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

#### Handling of temperature excursions during refrigerated storage

- Stability data indicate that the unopened vial is stable for up to 10 weeks when stored at temperatures from -2 °C to 2 °C, within the 10-week storage period between 2 °C and 8 °C.
- Stability data indicate the vial can be stored for up to 24 hours at temperatures of 8 °C to 30 °C, including up to 12 hours following first puncture.

This information is intended to guide healthcare professionals only in case of temporary temperature excursion.

#### Opened vial

Chemical and physical in-use stability has been demonstrated for 12 hours at 2 °C to 30 °C, which includes up to 6 hours transportation time. From a microbiological point of view, unless the method of opening precludes the risks 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**

Store in a freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For storage conditions after thawing and first opening, see section 6.3.

### **6.5 Nature and contents of container**

2.25 mL dispersion in a 2 mL clear multidose vial (type I glass) with a stopper (synthetic bromobutyl rubber) and a grey flip-off plastic cap with aluminium seal. Each vial contains 6 doses, see section 6.6.

Pack sizes: 10 vials or 195 vials

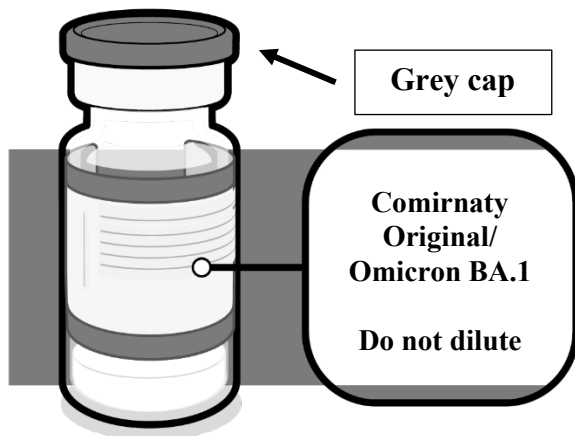
Not all pack sizes may be marketed.

### **6.6 Special precautions for disposal and other handling**

#### Handling instructions

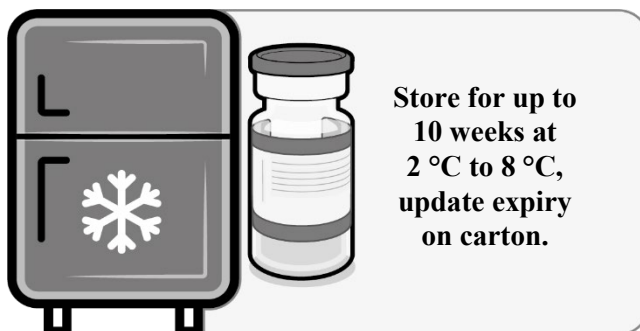
Comirnaty Original/Omicron BA.1 should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY ORIGINAL/OMICRON BA.1  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**

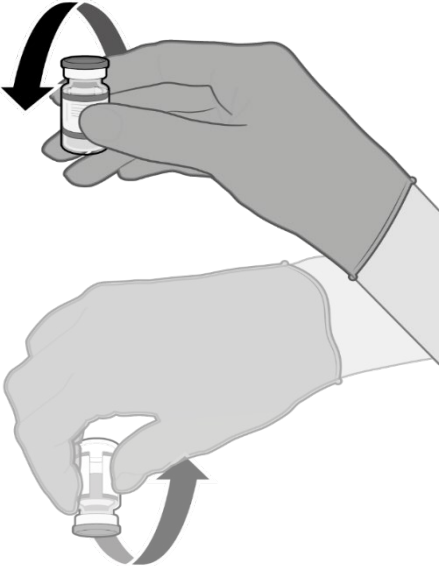


- Verify that the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection.
- If the vial has a grey plastic cap and a grey border and the product name is Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection, please make reference to the Summary of Product Characteristics for that formulation.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

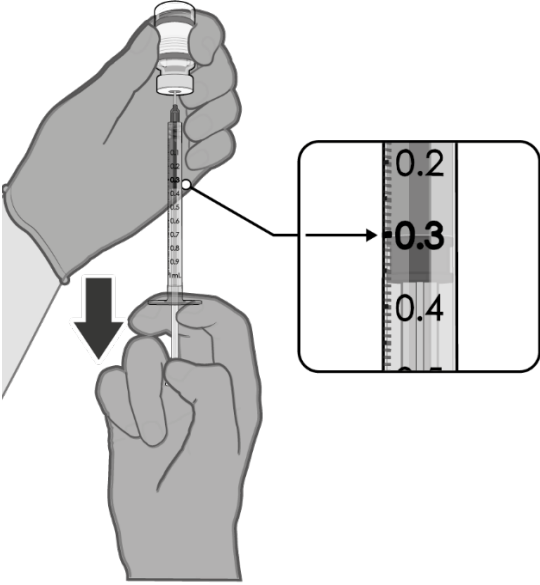
**HANDLING PRIOR TO USE OF COMIRNATY ORIGINAL/OMICRON BA.1  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 6 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

 <p style="text-align: center;"><b>Gently × 10</b></p>	<ul style="list-style-type: none"> <li>• Gently mix by inverting vials 10 times prior to use. Do not shake.</li> <li>• Prior to mixing, the thawed dispersion may contain white to off-white opaque amorphous particles.</li> <li>• After mixing, the vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the vaccine if particulates or discoloration are present.</li> </ul>
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**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY ORIGINAL/OMICRON BA.1 (15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**

 <p style="text-align: center;"><b>0.3 mL vaccine</b></p>	<ul style="list-style-type: none"> <li>• Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.</li> <li>• Withdraw 0.3 mL of Comirnaty Original/Omicron BA.1.</li> </ul> <p>Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. The low dead-volume syringe and needle combination should have a dead volume of no more than 35 microlitres.</p> <p>If standard syringes and needles are used, there may not be sufficient volume to extract a sixth dose from a single vial.</p> <ul style="list-style-type: none"> <li>• Each dose must contain 0.3 mL of vaccine.</li> <li>• If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.</li> <li>• Record the appropriate date/time on the vial. Discard any unused vaccine 12 hours after first puncture.</li> </ul>
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Disposal

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

## **7. MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz  
Germany  
Phone: +49 6131 9084-0  
Fax: +49 6131 9084-2121  
service@biontech.de

## **8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/006  
EU/1/20/1528/007

## **9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 21 December 2020  
Date of latest renewal: 10 October 2022

## **10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>.

▼ This medicinal product is subject to additional monitoring. This will allow quick identification of new safety information. Healthcare professionals are asked to report any suspected adverse reactions. See section 4.8 for how to report adverse reactions.

## 1. NAME OF THE MEDICINAL PRODUCT

Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection  
COVID-19 mRNA Vaccine (nucleoside modified)

## 2. QUALITATIVE AND QUANTITATIVE COMPOSITION

This is a multidose vial with a grey cap. Do not dilute prior to use.

One vial (2.25 mL) contains 6 doses of 0.3 mL, see sections 4.2 and 6.6.

One dose (0.3 mL) contains 15 micrograms of tozinameran and 15 micrograms of famtozinameran, a COVID-19 mRNA Vaccine (embedded in lipid nanoparticles).

Tozinameran is a 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 SARS-CoV-2 (Original). Famtozinameran is a 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 SARS-CoV-2 (Omicron BA.4-5).

For the full list of excipients, see section 6.1.

## 3. PHARMACEUTICAL FORM

Dispersion for injection.

The vaccine is a white to off-white frozen dispersion (pH: 6.9 - 7.9).

## 4. CLINICAL PARTICULARS

### 4.1 Therapeutic indications

Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection is indicated for active immunisation to prevent COVID-19 caused by SARS-CoV-2, in individuals 12 years of age and older who have previously received at least a primary vaccination course against COVID-19 (see sections 4.2 and 5.1).

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

### 4.2 Posology and method of administration

#### Posology

The dose of Comirnaty Original/Omicron BA.4-5 is 0.3 mL given intramuscularly.

There should be an interval of at least 3 months between administration of Comirnaty Original/Omicron BA.4-5 and the last prior dose of a COVID-19 vaccine.

Comirnaty Original/Omicron BA.4-5 is only indicated for individuals who have previously received at least a primary vaccination course against COVID-19.

For details on the primary vaccination course for ages 12 and above, please refer to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection and Comirnaty 30 micrograms/dose dispersion for injection.

#### Paediatric population

The safety and efficacy of Comirnaty Original/Omicron BA.4-5 in children aged less than 12 years of age have not yet been established. No data are available.

#### Elderly population

No dosage adjustment is required in elderly individuals  $\geq 65$  years of age.

#### Method of administration

Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection should be administered intramuscularly (see section 6.6). Do not dilute prior to use.

Vials of Comirnaty Original/Omicron BA.4-5 contain 6 doses of 0.3 mL of vaccine. In order to extract 6 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 a sixth dose from a single vial. Irrespective of the type of syringe and needle:

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Do not pool excess vaccine from multiple vials.

The preferred site is the deltoid muscle of the upper arm.

Do not inject the vaccine intravascularly, subcutaneously or intradermally.

The vaccine should not be mixed in the same syringe with any other vaccines or medicinal products.

For precautions to be taken before administering the vaccine, see section 4.4.

For instructions regarding thawing, handling and disposal of the vaccine, see section 6.6.

### **4.3 Contraindications**

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

### **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.

Close observation for at least 15 minutes is recommended following vaccination. No further dose of the vaccine should be given to those who have experienced anaphylaxis after a prior dose of Comirnaty.

### Myocarditis and pericarditis

There is an increased risk of myocarditis and pericarditis following vaccination with Comirnaty. These conditions can develop within just a few days after vaccination, and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. Available data suggest that the course of myocarditis and pericarditis following vaccination is not different from myocarditis or pericarditis in general (see section 4.8).

Healthcare professionals should be alert to the signs and symptoms of myocarditis and pericarditis. Vaccinees (including parents or caregivers) 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.

Healthcare professionals should consult guidance and/or specialists to diagnose and treat this condition.

### Anxiety-related reactions

Anxiety-related reactions, including vasovagal reactions (syncope), hyperventilation or stress-related reactions (e.g. dizziness, palpitations, increases in heart rate, alterations in blood pressure, paraesthesia, hypoaesthesia and sweating) may occur in association with the vaccination process itself. Stress-related reactions are temporary and resolve on their own. Individuals should be advised to bring symptoms to the attention of the vaccination provider for evaluation. It is important that precautions are 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

The efficacy and safety of the vaccine has not been assessed in immunocompromised individuals, including those receiving immunosuppressant therapy. The efficacy of Comirnaty Original/Omicron BA.4-5 may be lower in immunocompromised individuals.



### 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.

## **4.5 Interaction with other medicinal products and other forms of interaction**

No interaction studies have been performed.

Concomitant administration of Comirnaty Original/Omicron BA.4-5 with other vaccines has not been studied.

## **4.6 Fertility, pregnancy and lactation**

### Pregnancy

No data are available yet regarding the use of Comirnaty Original/Omicron BA.4-5 during pregnancy.

However, a large amount of observational data from pregnant women vaccinated with the initially approved Comirnaty vaccine during the second and third trimester have not shown an increase in adverse pregnancy outcomes. While data on pregnancy outcomes following vaccination during the first trimester are presently limited, no increased risk for miscarriage has been seen. Animal studies do not indicate direct or indirect harmful effects with respect to pregnancy, embryo/foetal development, parturition or post-natal development (see section 5.3). Based on data available with other vaccine variants, Comirnaty Original/Omicron BA.4-5 can be used during pregnancy.

### Breast-feeding

No data are available yet regarding the use of Comirnaty Original/Omicron BA.4-5 during breast-feeding.

However, no effects on the breast-fed newborn/infant are anticipated since the systemic exposure of breast-feeding woman to the vaccine is negligible. Observational data from women who were breast-feeding after vaccination with the initially approved Comirnaty vaccine have not shown a risk for adverse effects in breast-fed newborns/infants. Comirnaty Original/Omicron BA.4-5 can be used during breast-feeding.

### Fertility

Animal studies do not indicate direct or indirect harmful effects with respect to reproductive toxicity (see section 5.3).

## **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 may temporarily affect the ability to drive or use machines.

## 4.8 Undesirable effects

### Summary of safety profile

The safety of a booster dose of Comirnaty Original/Omicron BA.4-5 is inferred from safety data for a booster dose of an Omicron BA.1 adapted vaccine, as well as for a booster dose of Comirnaty Original.

#### Comirnaty 30 mcg

##### *Participants 16 years of age and older – after 2 doses*

In Study 2, a total of 22,026 participants 16 years of age or older received at least 1 dose of Comirnaty 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 vaccine and placebo groups, respectively). A total of 20,519 participants 16 years of age or older received 2 doses of Comirnaty.

At the time of the analysis of Study 2 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 and 12,620 placebo) 16 years of age and older were followed up for  $\geq 4$  months after the second dose. This included a total of 15,111 (7,704 Comirnaty and 7,407 placebo) participants 16 to 55 years of age and a total of 10,540 (5,327 Comirnaty and 5,213 placebo) participants 56 years of age 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 participants 16 years of age and older receiving Comirnaty, that were seropositive for SARS-CoV-2 at baseline, was similar to that seen in the general population.

##### *Adolescents 12 to 15 years of age – after 2 doses*

In an analysis of long-term safety follow-up in Study 2, 2,260 adolescents (1,131 Comirnaty and 1,129 placebo) were 12 to 15 years of age. Of these, 1,559 adolescents (786 Comirnaty and 773 placebo) have been followed for  $\geq 4$  months after the second dose of Comirnaty. The safety evaluation in Study 2 is ongoing.

The overall safety profile of Comirnaty in adolescents 12 to 15 years of age was similar to that seen in participants 16 years of age and older. 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 booster dose*

A subset from Study 2 Phase 2/3 participants of 306 adults 18 to 55 years of age who completed the original Comirnaty 2-dose course, received a booster dose of Comirnaty approximately 6 months (range of 4.8 to 8.0 months) after receiving Dose 2.

The overall safety profile for the booster dose was similar to that seen after 2 doses. 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 4, a placebo-controlled booster study, participants 16 years of age and older recruited from Study 2 received a booster dose of Comirnaty (5,081 participants), or placebo (5,044 participants) at least 6 months after the second dose of Comirnaty. Overall, participants who received a booster dose, had a median follow-up time of 2.5 months after the booster dose to the cut-off date (5 October 2021). No new adverse reactions of Comirnaty were identified.

Booster dose following primary vaccination with another authorised COVID-19 vaccine

In 5 independent studies on the use of a Comirnaty booster dose in individuals who had completed primary vaccination with another authorised COVID-19 vaccine (heterologous booster dose), no new safety issues were identified (see section 5.1).

Participants > 55 years of age – after a booster dose of Comirnaty Original/Omicron BA.1 (fourth dose)

In a subset from Study 4 (Phase 3), 305 adults > 55 years of age who had completed 3 doses of Comirnaty, received a booster (fourth dose) of Comirnaty Original/Omicron BA.1 (15/15 mcg) 4.7 to 11.5 months after receiving Dose 3. Participants who received a booster (fourth dose) of Comirnaty Original/Omicron BA.1 had a median follow-up time of at least 1.7 months.

The overall safety profile for the Comirnaty Original/Omicron BA.1 booster (fourth dose) was similar to that seen after the Comirnaty booster (third dose). The most frequent adverse reactions in participants greater than 55 years of age were injection site pain (> 50%), fatigue (> 40%), headache (> 30%), myalgia (> 20%), chills and arthralgia (> 10%). No new adverse reactions were identified for Comirnaty Original/Omicron BA.1.

The safety of a Comirnaty Original/Omicron BA.1 booster dose in individuals from 18 to ≤ 55 years of age is extrapolated from safety data from a subset of 315 adults 18 to ≤ 55 years of age who received a booster (fourth dose) of Omicron BA.1 30 mcg (monovalent) after completing 3 doses of Comirnaty. The most frequent adverse reactions in these participants 18 to ≤ 55 years of age were injection site pain (> 70%), fatigue (> 60%), headache (> 40%), myalgia (> 30%), chills (> 30%) and arthralgia (> 20%).

Tabulated list of adverse reactions from clinical studies of Comirnaty and Comirnaty Original/Omicron BA.1 and post-authorisation experience of Comirnaty in individuals 12 years of age and older

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 and Comirnaty Original/Omicron BA.1 clinical trials and Comirnaty post-authorisation experience in individuals 12 years of age and older**

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)	Very rare (< 1/10,000)	Not known (cannot be estimated from the available data)
Blood and lymphatic system disorders			Lymphadenopathy <sup>a</sup>			
Immune system disorders			Hypersensitivity reactions (e.g. rash, pruritus, urticaria <sup>b</sup> , angioedema <sup>b</sup> )			Anaphylaxis
Metabolism and nutrition disorders			Decreased appetite			
Psychiatric disorders			Insomnia			
Nervous system disorders	Headache		Lethargy	Acute peripheral facial paralysis <sup>c</sup>		Paraesthesia <sup>d</sup> ; Hypoaesthesia <sup>d</sup>
Cardiac disorders					Myocarditis <sup>d</sup> ; Pericarditis <sup>d</sup>	
Gastrointestinal disorders	Diarrhoea <sup>d</sup>	Nausea; Vomiting <sup>d</sup>				
Skin and subcutaneous tissue disorder			Hyperhidrosis; Night sweats			Erythema multiforme <sup>d</sup>
Musculoskeletal and connective tissue disorders	Arthralgia; Myalgia		Pain in extremity <sup>e</sup>			
General disorders and administration site conditions	Injection site pain; Fatigue; Chills; Pyrexia <sup>f</sup> ; Injection site swelling	Injection site redness	Asthenia; Malaise; Injection site pruritus			Extensive swelling of vaccinated limb <sup>d</sup> ; Facial swelling <sup>g</sup>

- A higher frequency of lymphadenopathy (2.8% vs. 0.4%) was observed in participants receiving a booster dose in Study 4 compared to participants receiving 2 doses.
- The frequency category for urticaria and angioedema was rare.
- 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 COVID-19 mRNA Vaccine 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.
- Adverse reaction determined post-authorisation.
- Refers to vaccinated arm.
- A higher frequency of pyrexia was observed after the second dose compared to the first dose.
- Facial swelling in vaccine recipients with a history of injection of dermatological fillers has been reported in the post-marketing phase.

## Description of selected adverse reactions

### Myocarditis and pericarditis

The increased risk of myocarditis after vaccination with Comirnaty is highest in younger males (see section 4.4).

Two large European pharmacoepidemiological studies have estimated the excess risk in younger males following the second dose of Comirnaty. One study showed that in a period of 7 days after the second dose there were about 0.265 (95% CI 0.255 - 0.275) extra cases of myocarditis in 12-29 year old males per 10,000 compared to unexposed persons. In another study, in a period of 28 days after the second dose there were 0.56 [95% CI 0.37 – 0.74] extra cases of myocarditis in 16-24 year old males per 10,000 compared to unexposed persons.

Limited data indicate that the risk of myocarditis and pericarditis after vaccination with Comirnaty in children aged 5 to 11 years seems lower than in ages 12 to 17 years.

### Reporting of suspected adverse reactions

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available.

## **4.9 Overdose**

Overdose data is available from 52 study participants included in the clinical trial that due to an error in dilution received 58 micrograms of Comirnaty. The vaccine recipients did not report an increase in reactogenicity or adverse reactions.

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

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: vaccines, other viral vaccines, ATC code: J07BX03

#### Mechanism of action

The nucleoside-modified messenger RNA in Comirnaty 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 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 neutralizing antibody and cellular immune responses to the spike (S) antigen, which may contribute to protection against COVID-19.

#### Efficacy

##### Omicron-adapted Comirnaty

The efficacy of a booster dose of Comirnaty Original/Omicron BA.4-5 is inferred from the immunogenicity of an Omicron BA.1 adapted vaccine.

Comirnaty Original/Omicron BA.1

*Relative vaccine immunogenicity in participants > 55 years of age – after a booster dose of Comirnaty Original/Omicron BA.1 (fourth dose)*

In an interim analysis of a subset from Study 4 (Substudy E), 610 adults greater than 55 years of age who had completed a series of 3 doses of Comirnaty received 1 of the following as a booster dose (fourth dose): Comirnaty (30 mcg) or Comirnaty Original/Omicron BA.1 (15/15 mcg). GMRs and seroresponse rates were evaluated at 1 month after Comirnaty Original/Omicron BA.1 (15/15 mcg) booster vaccination up to a cut-off date of 16 May 2022, which represents a median of at least 1.7 months post-booster follow-up. The Comirnaty Original/Omicron BA.1 (15/15 mcg) booster dose was administered 4.7 to 11.5 months (median 6.3 months) after the third dose.

The primary objective of the analysis was to assess superiority with respect to level of neutralising titre and noninferiority with respect to seroresponse rate of the anti-Omicron immune response induced by a dose of Comirnaty Original/Omicron BA.1 (15/15 mcg) relative to the response elicited by a dose of Comirnaty (30 mcg) given as a fourth dose in Comirnaty-experienced participants greater than 55 years of age.

Superiority of Comirnaty Original/Omicron BA.1 (15/15 mcg) to Comirnaty (30 mcg) was met, as the lower bound of the 2-sided 95% CI for GMR was > 1 (Table 2).

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

The difference in percentages of participants who achieved seroresponse to Omicron variant between the Comirnaty Original/Omicron BA.1 group (71.6%) and Comirnaty group (57%) was 14.6% (2-sided 95% CI: 4.0%, 24.9%). Thus, noninferiority was met.

**Table 2: Substudy E - Geometric mean ratios for between vaccine group comparison – participants without evidence of infection up to 1 month after Dose 4 – expanded cohort – immunogenicity subset – participants greater than 55 years of age – evaluable immunogenicity population**

Assay	Vaccine group (as randomised)	Sampling time point <sup>a</sup>	N <sup>b</sup>	GMT (95% CI) <sup>c</sup>	GMR (95% CI) <sup>d</sup>
SARS-CoV-2 neutralisation assay - Omicron BA.1 - NT50 (titre)	Comirnaty (30 mcg)	1 month	163	455.8 (365.9, 567.6)	
	Comirnaty Original/Omicron BA.1 (15/15 mcg)	1 month	178	711.0 (588.3, 859.2)	1.56 (1.17, 2.08)
SARS-CoV-2 neutralisation assay - reference strain - NT50 (titre)	Comirnaty (30 mcg)	1 month	182	5998.1 (5223.6, 6887.4)	
	Comirnaty Original/Omicron BA.1 (15/15 mcg)	1 month	186	5933.2 (5188.2, 6785.2)	0.99 (0.82, 1.20)

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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.

Note: Immunogenicity subset = a random sample of 230 participants in each vaccine group selected from the expanded cohort.

Note: Participants who had no serological or virological evidence (prior to the 1-month post-study vaccination blood sample collection) of past SARS-CoV-2 infection (i.e. N-binding antibody [serum] result negative at the study vaccination and the 1-month post-study vaccination visits, negative NAAT [nasal swab] result at the study vaccination visit, and any unscheduled visit prior to the 1-month post-study vaccination blood sample collection) and had no medical history of COVID-19 were included in the analysis.

- 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  $0.5 \times \text{LLOQ}$ .
- d. GMRs and 2-sided 95% CIs were calculated by exponentiating the mean difference of the logarithms of the titres (vaccine group in the corresponding row - Comirnaty [30 mcg]) and the corresponding CI (based on the Student t distribution).

### Comirnaty 30 mcg

Study 2 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  $\geq 56$ -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 hospitalization for worsening disease during the 6 weeks before enrolment, were included as were participants with known stable infection with human immunodeficiency virus (HIV), hepatitis C virus (HCV) or hepatitis B virus (HBV).

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

In the Phase 2/3 portion of Study 2, based on data accrued through 14 November 2020, approximately 44,000 participants were randomised equally and were to receive 2 doses of COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine. 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 within through conclusion of the study in order to receive either placebo or COVID-19 mRNA Vaccine.

The population for the analysis of the primary efficacy endpoint included, 36,621 participants 12 years of age and older (18,242 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine group and 68 in the placebo group) and 1,616 participants 75 years of age and older (804 in the COVID-19 mRNA Vaccine 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 COVID-19 mRNA Vaccine and in total 2,222 person-years in 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)  $\geq 30$  kg/m<sup>2</sup>, chronic pulmonary disease, diabetes mellitus, hypertension).

The vaccine efficacy information is presented in Table 3.

**Table 3: 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**

<b>First COVID-19 occurrence from 7 days after Dose 2 in participants without evidence of prior SARS-CoV-2 infection*</b>			
<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup> = 18,198 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Placebo N<sup>a</sup> = 18,325 Cases n<sup>1b</sup> Surveillance time<sup>c</sup> (n<sup>2d</sup>)</b>	<b>Vaccine efficacy % (95% CI)<sup>e</sup></b>
All participants	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.
- n<sup>1</sup> = Number of participants meeting the endpoint definition.
- Total surveillance time in 1,000 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.
- n<sup>2</sup> = 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. CI not adjusted for multiplicity.

Efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 94.6% (95% confidence interval of 89.6% to 97.6%) 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, representing up to 6 months after Dose 2 in the efficacy population.

The updated vaccine efficacy information is presented in Table 4.



**Table 4: Vaccine efficacy – First COVID-19 occurrence from 7 days after Dose 2, by age subgroup – participants without evidence of prior SARS-CoV-2 infection\* prior to 7 days after Dose 2 – evaluable efficacy (7 days) population during the placebo-controlled follow-up period**

<b>Subgroup</b>	<b>COVID-19 mRNA Vaccine N<sup>a</sup>=20,998 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=21,096 Cases n1<sup>b</sup> Surveillance time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>e</sup>)</b>
All participants <sup>f</sup>	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 1,000 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 95% 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 COVID-19 mRNA Vaccine group; 16 in the placebo group.

In the updated efficacy analysis, efficacy of COVID-19 mRNA Vaccine in preventing first COVID-19 occurrence from 7 days after Dose 2 compared to placebo was 91.1% (95% CI of 88.8% to 93.0%) in participants in the evaluable efficacy population with or without evidence of prior infection with SARS-CoV-2.

Additionally, the updated efficacy analyses by subgroup showed similar efficacy point estimates across sexes, ethnic groups, geography and participants with medical comorbidities and obesity associated with high risk of severe COVID-19.

#### *Efficacy against severe COVID-19*

Updated efficacy analyses of secondary efficacy endpoints supported benefit of the COVID-19 mRNA Vaccine in preventing severe COVID-19.

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 5) 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 COVID-19 mRNA Vaccine and placebo groups.

**Table 5: Vaccine efficacy – First severe COVID-19 occurrence in participants with or without prior SARS-CoV-2 infection based on the Food and Drug Administration (FDA)\* after Dose 1 or from 7 days after Dose 2 in the placebo-controlled follow-up**

	<b>COVID-19 mRNA Vaccine Cases n1<sup>a</sup> Surveillance time (n2<sup>b</sup>)</b>	<b>Placebo Cases n1<sup>a</sup> Surveillance time (n2<sup>b</sup>)</b>	<b>Vaccine efficacy % (95% CI<sup>c</sup>)</b>
After Dose 1 <sup>d</sup>	1 8.439 <sup>e</sup> (22,505)	30 8.288 <sup>e</sup> (22,435)	96.7 (80.3, 99.9)
7 days after Dose 2 <sup>f</sup>	1 6.522 <sup>g</sup> (21,649)	21 6.404 <sup>g</sup> (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).

\* 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  $\geq 30$  breaths per minute, heart rate  $\geq 125$  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 1,000 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 1,000 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 and immunogenicity in adolescents 12 to 15 years of age – after 2 doses*

In an initial analysis of Study 2 in adolescents 12 to 15 years of age (representing a median follow-up duration of  $>2$  months after Dose 2) without evidence of prior infection, there were no cases in 1,005 participants who received the vaccine and 16 cases out of 978 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 75.3, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 18 cases in 1,110 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 78.1, 100.0).

Updated efficacy analyses were 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 updated efficacy analysis of Study 2 in adolescents 12 to 15 years of age without evidence of prior infection, there were no cases in 1,057 participants who received the vaccine and 28 cases out of 1,030 who received placebo. The point estimate for efficacy is 100% (95% confidence interval 86.8, 100.0). In participants with or without evidence of prior infection there were 0 cases in the 1,119 who received vaccine and 30 cases in 1,109 participants who received placebo. This also indicates the point estimate for efficacy is 100% (95% confidence interval 87.5, 100.0).

In Study 2, an analysis of SARS-CoV-2 neutralising titres 1 month after Dose 2 was conducted in a randomly selected subset of participants who had no serological or virological evidence of past SARS-CoV-2 infection up to 1 month after Dose 2, comparing the response in adolescents 12 to 15 years of age (n = 190) to participants 16 to 25 years of age (n = 170).

The ratio of the geometric mean titres (GMT) in the 12 to 15 years of age group to the 16 to 25 years of age group was 1.76, with a 2-sided 95% CI of 1.47 to 2.10. Therefore, the 1.5-fold noninferiority criterion was met as the lower bound of the 2-sided 95% CI for the geometric mean ratio [GMR] was > 0.67.

*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% neutralizing antibody titres (NT50) against SARS-CoV-2 (USA\_WA1/2020) in Study 2. In this study, the booster dose was administered 5 to 8 months (median 7 months) after the second dose. In Study 2, analyses of NT50 1 month after the booster dose compared to 1 month after the primary series in individuals 18 through 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 geometric mean ratio (GMR) and difference in seroresponse rates. Seroresponse for a participant was defined as achieving a ≥ 4-fold rise in NT50 from baseline (before primary series). These analyses are summarized in Table 6.

**Table 6: SARS-CoV-2 neutralization assay - NT50 (titre)<sup>†</sup> (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 through 55 years of age without evidence of infection up to 1 month after booster dose\* – booster dose evaluable immunogenicity population<sup>‡</sup>**

	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)
<b>Geometric mean 50% neutralizing titre (GMT)<sup>b</sup></b>	212 <sup>a</sup>	2466.0 <sup>b</sup> (2202.6, 2760.8)	750.6 <sup>b</sup> (656.2, 858.6)	3.29 <sup>c</sup> (2.77, 3.90)	Y <sup>d</sup>
<b>Seroresponse rate (%) for 50% neutralizing titre<sup>†</sup></b>	200 <sup>e</sup>	199 <sup>f</sup> 99.5% (97.2%, 100.0%)	196 <sup>f</sup> 98.0% (95.0%, 99.5%)	1.5% <sup>g</sup> (-0.7%, 3.7% <sup>h</sup> )	Y <sup>i</sup>

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% neutralizing titre; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; Y/N = yes/no.

<sup>†</sup> SARS-CoV-2 NT50 were determined using the SARS-CoV-2 mNeonGreen Virus Microneutralization Assay. The assay uses a fluorescent reporter virus derived from the USA\_WA1/2020 strain and virus neutralization is read on Vero cell monolayers. The sample NT50 is defined as the reciprocal serum dilution at which 50% of the virus is neutralized.

\* 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.
- n = Number of participants with valid and determinate assay results at both sampling time points within specified window.
  - 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 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).
  - 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  $\geq 0.80$ .
  - 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.
  - 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 (1 month after booster dose – 1 month after Dose 2).
  - Adjusted Wald 2-sided CI for the difference in proportions, expressed as a percentage.
  - 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 4, a placebo-controlled booster study performed in approximately 10,000 participants 16 years of age and older who were recruited from Study 2, evaluated confirmed COVID-19 cases accrued from at least 7 days after booster vaccination up to a data cut-off date of 5 October 2021, which represents a median of 2.5 months post-booster follow-up. The booster dose was administered 5 to 13 months (median 11 months) after the second dose. 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 without prior evidence of SARS-CoV-2 infection is presented in Table 7. Relative vaccine efficacy in participants with or without evidence of prior SARS-CoV-2 infection was 94.6% (95% confidence interval of 88.5% to 97.9%), similar to that seen in those participants without evidence of prior infection. Primary COVID-19 cases observed from 7 days after booster vaccination were 7 primary cases in the Comirnaty group, and 124 primary cases in the placebo group.

**Table 7: Vaccine efficacy – First COVID-19 occurrence from 7 days after booster vaccination – participants 16 years of age and older without evidence of infection – evaluable efficacy population**

<b>First COVID-19 occurrence from 7 days after booster dose in participants without evidence of prior SARS-CoV-2 infection*</b>			
	<b>Comirnaty N<sup>a</sup>=4695 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Placebo N<sup>a</sup>=4671 Cases n1<sup>b</sup> Surveillance Time<sup>c</sup> (n2<sup>d</sup>)</b>	<b>Relative Vaccine Efficacy<sup>e</sup> % (95% CI<sup>f</sup>)</b>
First COVID-19 occurrence from 7 days after booster vaccination	6 0.823 (4659)	123 0.792 (4614)	95.3 (89.5, 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 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.
- N = Number of participants in the specified group.
  - n1 = Number of participants meeting the endpoint definition.
  - Total surveillance time in 1,000 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.
  - n2 = Number of participants at risk for the endpoint.
  - Relative vaccine efficacy of the Comirnaty booster group relative to the placebo group (non-booster).
  - Two-sided confidence interval (CI) for relative vaccine efficacy is derived based on the Clopper and Pearson method adjusted for surveillance time.

#### *Immunogenicity of a booster dose following primary vaccination with another authorised COVID-19 vaccine*

Effectiveness of a Comirnaty booster dose (30 mcg) in individuals who completed primary vaccination with another authorised COVID-19 vaccine (heterologous booster dose) is inferred from immunogenicity data from an independent National Institutes of Health (NIH) study phase 1/2 open-label clinical trial (NCT04889209) conducted in the United States. In this study, adults (range 19 to 80 years of age) who had completed primary vaccination with Moderna 100 mcg 2-dose series (N = 51, mean age 54±17), Janssen single dose (N = 53, mean age 48±14), or Comirnaty 30 mcg 2-dose series (N = 50, mean age 50±18) at least 12 weeks prior to enrolment and who reported no history of SARS-CoV-2 infection received a booster dose of Comirnaty (30 mcg). The boost with Comirnaty induced a 36, 12, and 20 GMR-fold rise in neutralising titres following the Janssen, Moderna, and Comirnaty primary doses, respectively.

Heterologous boosting with Comirnaty was also evaluated in the CoV-BOOST study (EudraCT 2021-002175-19), a multicentre, randomised, controlled, phase 2 trial of third dose booster vaccination against COVID-19, in which 107 adult participants (median age 71 years of age, interquartile range 54 to 77 years of age) were randomised at least 70 days post 2 doses of AstraZeneca COVID-19 Vaccine. After the AstraZeneca COVID-19 Vaccine primary series, pseudovirus (wild-type), neutralising antibody NT50 GMR-fold change increased 21.6-fold with heterologous Comirnaty booster (n = 95).

#### Paediatric population

The European Medicines Agency has deferred the obligation to submit the results of studies with Comirnaty in the paediatric population in prevention of COVID-19 (see section 4.2 for information on paediatric use).

### **5.2 Pharmacokinetic properties**

Not applicable.

### **5.3 Preclinical safety data**

Non-clinical data reveal no special hazard for humans based on conventional studies of repeat dose toxicity and reproductive and developmental toxicity.

#### General toxicity

Rats intramuscularly administered Comirnaty (receiving 3 full human doses once weekly, generating relatively higher levels in rats due to body weight differences) demonstrated some injection site oedema and erythema and increases in white blood cells (including basophils and eosinophils) consistent with an inflammatory response as well as vacuolation of portal hepatocytes without evidence of liver injury. All effects were reversible.

## Genotoxicity/Carcinogenicity

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

## Reproductive toxicity

Reproductive and developmental toxicity were investigated in rats in a combined fertility and developmental toxicity study where female rats were intramuscularly administered Comirnaty prior to mating and during gestation (receiving 4 full human doses that generate relatively higher levels in rat due to body weight differences, spanning between pre-mating day 21 and gestational day 20). SARS-CoV-2 neutralizing antibody responses were present in maternal animals from prior to mating to the end of the study on postnatal day 21 as well as in foetuses and offspring. There were no vaccine-related effects on female fertility, pregnancy, or embryo-foetal or offspring development. No Comirnaty data are available on vaccine placental transfer or excretion in milk.

## **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.

### **6.3 Shelf life**

#### Unopened vial

#### Frozen vial

12 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 6 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

#### Thawed vial

10 weeks storage and transportation at 2 °C to 8 °C within the 12-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.

- If the vaccine is received at 2 °C to 8 °C it should be stored at 2 °C to 8 °C. The expiry date on the outer carton should have been updated to reflect the refrigerated expiry date and the original expiry date should have been crossed out.

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

Thawed vials can be handled in room light conditions.

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

#### Handling of temperature excursions during refrigerated storage

- Stability data indicate that the unopened vial is stable for up to 10 weeks when stored at temperatures from -2 °C to 2 °C, within the 10-week storage period between 2 °C and 8 °C.
- Stability data indicate the vial can be stored for up to 24 hours at temperatures of 8 °C to 30 °C, including up to 12 hours following first puncture.

This information is intended to guide healthcare professionals only in case of temporary temperature excursion.

#### Opened vial

Chemical and physical in-use stability has been demonstrated for 12 hours at 2 °C to 30 °C, which includes up to 6 hours transportation time. From a microbiological point of view, unless the method of opening precludes the risks 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**

Store in a freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

During storage, minimise exposure to room light, and avoid exposure to direct sunlight and ultraviolet light.

For storage conditions after thawing and first opening, see section 6.3.

### **6.5 Nature and contents of container**

2.25 mL dispersion in a 2 mL clear multidose vial (type I glass) with a stopper (synthetic bromobutyl rubber) and a grey flip-off plastic cap with aluminium seal. Each vial contains 6 doses, see section 6.6.

Pack sizes: 10 vials or 195 vials

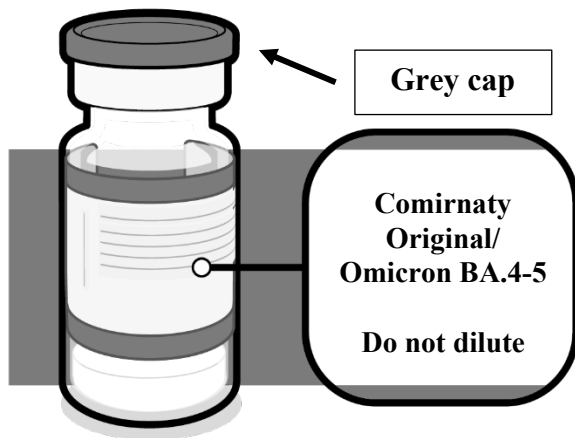
Not all pack sizes may be marketed.

### **6.6 Special precautions for disposal and other handling**

#### Handling instructions

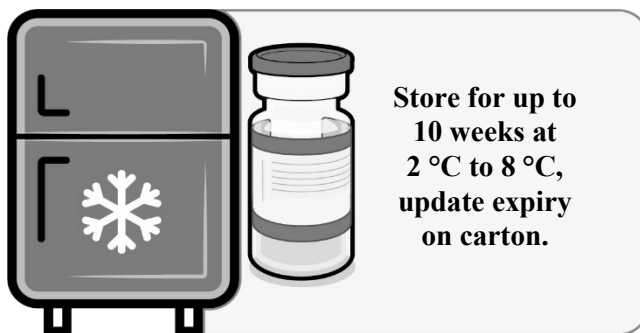
Comirnaty Original/Omicron BA.4-5 should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY ORIGINAL/OMICRON BA.4-5  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



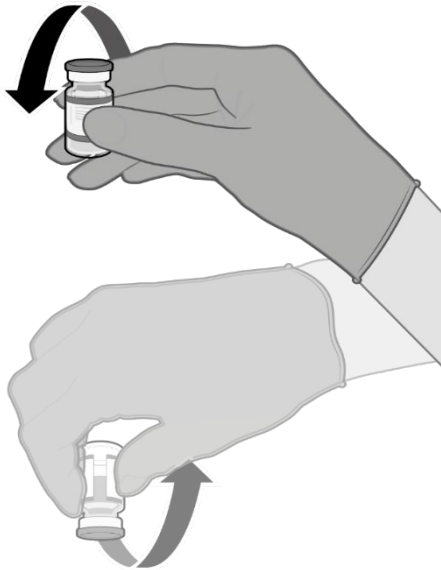
- Verify that the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.
- If the vial has a grey plastic cap and a grey border and the product name is Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, please make reference to the Summary of Product Characteristics for that formulation.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

**HANDLING PRIOR TO USE OF COMIRNATY ORIGINAL/OMICRON BA.4-5  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 6 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

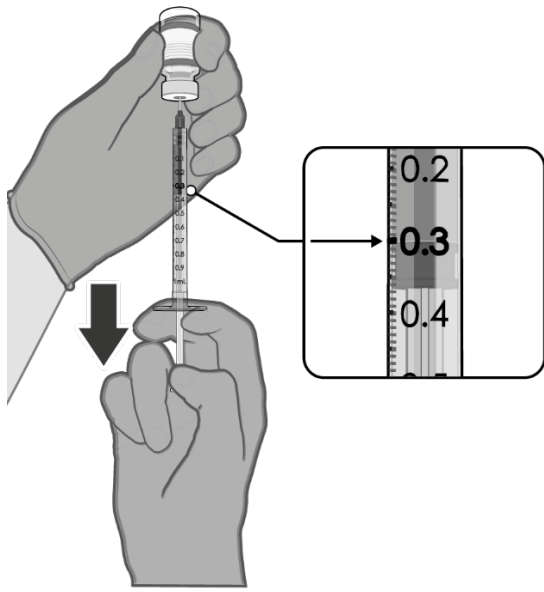




Gently × 10

- Gently mix by inverting vials 10 times prior to use. Do not shake.
- Prior to mixing, the thawed dispersion may contain white to off-white opaque amorphous particles.
- After mixing, the vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the vaccine if particulates or discoloration are present.

**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY ORIGINAL/OMICRON BA.4-5 (15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



0.3 mL vaccine

- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.3 mL of Comirnaty Original/Omicron BA.4-5.

Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. 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 a sixth dose from a single vial.

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Record the appropriate date/time on the vial. Discard any unused vaccine 12 hours after first puncture.

Disposal

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

**7. MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz  
Germany  
Phone: +49 6131 9084-0  
Fax: +49 6131 9084-2121  
service@biontech.de

**8. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/008  
EU/1/20/1528/009

**9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

Date of first authorisation: 21 December 2020  
Date of latest renewal: 10 October 2022

**10. DATE OF REVISION OF THE TEXT**

Detailed information on this medicinal product is available on the website of the European Medicines Agency <http://www.ema.europa.eu>.

## **ANNEX II**

- A. MANUFACTURERS OF THE BIOLOGICAL ACTIVE SUBSTANCES AND MANUFACTURERS RESPONSIBLE FOR BATCH RELEASE**
- B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE**
- C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION**
- D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT**

**A. MANUFACTURERS OF THE BIOLOGICAL ACTIVE SUBSTANCES AND MANUFACTURERS RESPONSIBLE FOR BATCH RELEASE**

Name and address of the manufacturers of the biological active substance(s)

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz  
Germany

BioNTech Manufacturing Marburg GmbH  
Emil-von-Behring-Strasse 76  
35401 Marburg  
Germany

Pfizer Ireland Pharmaceuticals  
Grange Castle Business Park  
Clondalkin  
Dublin 22  
Ireland

Rentschler Biopharma SE  
Erwin-Rentschler-Strasse 21  
88471 Laupheim  
Germany

Wyeth BioPharma Division of Wyeth Pharmaceuticals LLC  
1 Burt Road  
Andover, MA 01810  
USA

Name and address of the manufacturers responsible for batch release

BioNTech Manufacturing GmbH  
Kupferbergterrasse 17 - 19  
55116 Mainz  
Germany

Pfizer Manufacturing Belgium NV  
Rijksweg 12  
2870 Puurs  
Belgium

The printed package leaflet of the medicinal product must state the name and address of the manufacturer responsible for the release of the concerned batch.

**B. CONDITIONS OR RESTRICTIONS REGARDING SUPPLY AND USE**

Medicinal product subject to medical prescription.

• **Official batch release**

In accordance with Article 114 of Directive 2001/83/EC, the official batch release will be undertaken by a state laboratory or a laboratory designated for that purpose.

## **C. OTHER CONDITIONS AND REQUIREMENTS OF THE MARKETING AUTHORISATION**

- **Periodic safety update reports (PSURs)**

The requirements for submission of PSURs for this medicinal product are set out in the list of Union reference dates (EURD list) provided for under Article 107c(7) of Directive 2001/83/EC and any subsequent updates published on the European medicines web-portal.

The marketing authorisation holder (MAH) shall submit the first PSUR for this product within 6 months following authorisation.

## **D. CONDITIONS OR RESTRICTIONS WITH REGARD TO THE SAFE AND EFFECTIVE USE OF THE MEDICINAL PRODUCT**

- **Risk management plan (RMP)**

The marketing authorisation holder (MAH) shall perform the required pharmacovigilance activities and interventions detailed in the agreed RMP presented in Module 1.8.2 of the marketing authorisation and any agreed subsequent updates of the RMP.

An updated RMP should be submitted:

- At the request of the European Medicines Agency;
- Whenever the risk management system is modified, especially as the result of new information being received that may lead to a significant change to the benefit/risk profile or as the result of an important (pharmacovigilance or risk minimisation) milestone being reached.

**ANNEX III**  
**LABELLING AND PACKAGE LEAFLET**

## **A. LABELLING**

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**CARTON BOX LABEL**

**1. NAME OF THE MEDICINAL PRODUCT**

COMIRNATY 30 micrograms/dose concentrate for dispersion for injection  
Adults and adolescents from 12 years  
COVID-19 mRNA Vaccine (nucleoside modified)  
tozinameran

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

After dilution, each vial contains 6 doses of 0.3 mL.

**3. LIST OF EXCIPIENTS**

Excipients: ALC-0315, ALC-0159, DSPC, cholesterol, potassium chloride, potassium dihydrogen phosphate, sodium chloride, disodium phosphate dihydrate, sucrose, water for injections, sodium hydroxide, hydrochloric acid

**4. PHARMACEUTICAL FORM AND CONTENTS**

Concentrate for dispersion for injection  
195 multidose vials

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Intramuscular use after dilution.  
Read the package leaflet before use.

Scan QR code for more information.

Dilute before use: Dilute each vial with 1.8 mL sodium chloride 9 mg/mL (0.9%) solution for injection.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**



**8. EXPIRY DATE**

EXP (at -90 °C to -60 °C)  
Expiry date at 2 °C to 8 °C: .....  
(Maximum 1 month. Cross out former expiry date.)

**9. SPECIAL STORAGE CONDITIONS**

Storage:  
Prior to dilution, store at -90 °C to -60 °C in the original package in order to protect from light.  
After dilution, store the vaccine at 2 °C to 30 °C and use within 6 hours.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz, Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/001

**13. BATCH NUMBER**

LOT

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted.

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC  
SN  
NN

**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

COMIRNATY 30 mcg sterile concentrate  
COVID-19 mRNA Vaccine  
tozinameran  
IM

**2. METHOD OF ADMINISTRATION**

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

LOT

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

6 doses of 30 mcg after dilution

**6. OTHER**

Discard time:

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**CARTON**

**1. NAME OF THE MEDICINAL PRODUCT**

COMIRNATY 30 micrograms/dose dispersion for injection  
Adults and adolescents from 12 years  
COVID-19 mRNA Vaccine (nucleoside modified)  
tozinameran

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each vial contains 6 doses of 0.3 mL.

**3. LIST OF EXCIPIENTS**

Excipients: ALC-0315, ALC-0159, DSPC, cholesterol, trometamol, trometamol hydrochloride, sucrose, water for injections

**4. PHARMACEUTICAL FORM AND CONTENTS**

Dispersion for injection  
10 multidose vials  
195 multidose vials

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Intramuscular use.  
Do not dilute prior to use

Scan QR code for more information.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP (at -90 °C to -60 °C)  
Expiry date at 2 °C to 8 °C: .....  
(Maximum 10 weeks. Cross out former expiry date.)

**9. SPECIAL STORAGE CONDITIONS**

Storage:

Store at 2 °C to 8 °C after receipt. Do not refreeze once thawed.

Store in the original package in order to protect from light.

Read the package leaflet before use and for additional storage information.

After first puncture, store at 2 °C to 30 °C and use within 12 hours.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH

An der Goldgrube 12

55131 Mainz, Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/002 10 multidose vials

EU/1/20/1528/003 195 multidose vials

**13. BATCH NUMBER**

LOT

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted.

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC

SN

NN

**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

COMIRNATY 30 mcg injection  
COVID-19 mRNA Vaccine  
tozinameran  
IM

**2. METHOD OF ADMINISTRATION**

Do not dilute

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

LOT

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

6 doses of 30 mcg

**6. OTHER**

Discard time:

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**CARTON**

**1. NAME OF THE MEDICINAL PRODUCT**

COMIRNATY 10 micrograms/dose concentrate for dispersion for injection  
Children 5 to 11 years  
COVID-19 mRNA Vaccine (nucleoside modified)  
tozinameran

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

After dilution, each vial contains 10 doses of 0.2 mL.

**3. LIST OF EXCIPIENTS**

Excipients: ALC-0315, ALC-0159, DSPC, cholesterol, trometamol, trometamol hydrochloride  
sucrose, water for injections

**4. PHARMACEUTICAL FORM AND CONTENTS**

Concentrate for dispersion for injection  
10 multidose vials  
195 multidose vials

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Intramuscular use after dilution.  
Read the package leaflet before use and for additional storage information.

Scan QR code for more information.

Dilute before use: Dilute each vial with 1.3 mL sodium chloride 9 mg/mL (0.9%) solution for injection.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP (at -90 °C to -60 °C)

Expiry date at 2 °C to 8 °C: .....

(Maximum 10 weeks. Cross out former expiry date.)

**9. SPECIAL STORAGE CONDITIONS**

Storage:

Store at 2 °C to 8 °C after receipt. Do not refreeze once thawed.

Keep in the original package in order to protect from light.

After dilution, store the vaccine at 2 °C to 30 °C and use within 12 hours.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH

An der Goldgrube 12

55131 Mainz, Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/004 10 multidose vials

EU/1/20/1528/005 195 multidose vials

**13. BATCH NUMBER**

LOT

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted.

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.



**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC  
SN  
NN

**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

COMIRNATY 10 mcg sterile concentrate  
COVID-19 mRNA Vaccine  
tozinameran  
IM

**2. METHOD OF ADMINISTRATION**

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

LOT

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

10 doses of 10 mcg after dilution

**6. OTHER**

Discard time:

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**CARTON**

**1. NAME OF THE MEDICINAL PRODUCT**

COMIRNATY 3 micrograms/dose concentrate for dispersion for injection  
Children 6 months to 4 years  
COVID-19 mRNA Vaccine (nucleoside modified)  
tozinameran

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

After dilution, each vial contains 10 doses of 0.2 mL.

**3. LIST OF EXCIPIENTS**

Excipients: ALC-0315, ALC-0159, DSPC, cholesterol, trometamol, trometamol hydrochloride, sucrose, water for injections

**4. PHARMACEUTICAL FORM AND CONTENTS**

Concentrate for dispersion for injection  
10 multidose vials

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Intramuscular use after dilution.  
Read the package leaflet before use and for additional storage information.

Scan QR code for more information.

Dilute before use: Dilute each vial with 2.2 mL sodium chloride 9 mg/mL (0.9%) solution for injection.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP (at -90 °C to -60 °C)  
Expiry date at 2 °C to 8 °C: .....  
(Maximum 10 weeks. Cross out former expiry date.)

**9. SPECIAL STORAGE CONDITIONS**

Storage:  
Store at 2 °C to 8 °C after receipt. Do not refreeze once thawed.  
Keep in the original package in order to protect from light.  
After dilution, store the vaccine at 2 °C to 30 °C and use within 12 hours.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE**

**11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz, Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/010

**13. BATCH NUMBER**

LOT

**14. GENERAL CLASSIFICATION FOR SUPPLY**

**15. INSTRUCTIONS ON USE**

**16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted.

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC  
SN  
NN

**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

COMIRNATY 3 mcg sterile concentrate  
COVID-19 mRNA Vaccine  
tozinameran  
IM

**2. METHOD OF ADMINISTRATION**

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

LOT

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

10 doses of 3 mcg after dilution

**6. OTHER**

Discard time:

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**CARTON**

**1. NAME OF THE MEDICINAL PRODUCT**

COMIRNATY Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection  
adults and adolescents from 12 years  
COVID-19 mRNA Vaccine (nucleoside modified)  
tozinameran/riltozinameran

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each vial contains 6 doses of 0.3 mL.  
One dose contains 15 micrograms tozinameran and 15 micrograms riltozinameran.

**3. LIST OF EXCIPIENTS**

Excipients: ALC-0315, ALC-0159, DSPC, cholesterol, trometamol, trometamol hydrochloride,  
sucrose, water for injections

**4. PHARMACEUTICAL FORM AND CONTENTS**

Dispersion for injection  
10 multidose vials  
195 multidose vials

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Intramuscular use.  
Do not dilute prior to use

Scan QR code for more information.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP (at -90 °C to -60 °C)  
Expiry date at 2 °C to 8 °C: .....  
(Maximum 10 weeks. Cross out former expiry date.)

**9. SPECIAL STORAGE CONDITIONS**

Storage:

Store at 2 °C to 8 °C after receipt. Do not refreeze once thawed.

Store in the original package in order to protect from light.

Read the package leaflet before use and for additional storage information.

After first puncture, store at 2 °C to 30 °C and use within 12 hours.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH

An der Goldgrube 12

55131 Mainz, Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/006 10 multidose vials

EU/1/20/1528/007 195 multidose vials

**13. BATCH NUMBER**

LOT

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted.

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC  
SN  
NN



**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

COMIRNATY Original/Omicron BA.1 15/15 mcg injection  
COVID-19 mRNA Vaccine  
tozinameran/ritozinameran  
IM

**2. METHOD OF ADMINISTRATION**

Do not dilute

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

LOT

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

6 doses 15/15 mcg

**6. OTHER**

Discard time:

**PARTICULARS TO APPEAR ON THE OUTER PACKAGING**

**CARTON**

**1. NAME OF THE MEDICINAL PRODUCT**

COMIRNATY Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection  
adults and adolescents from 12 years  
COVID-19 mRNA Vaccine (nucleoside modified)  
tozinameran/famtozinameran

**2. STATEMENT OF ACTIVE SUBSTANCE(S)**

Each vial contains 6 doses of 0.3 mL.  
One dose contains 15 micrograms tozinameran and 15 micrograms famtozinameran.

**3. LIST OF EXCIPIENTS**

Excipients: ALC-0315, ALC-0159, DSPC, cholesterol, trometamol, trometamol hydrochloride,  
sucrose, water for injections

**4. PHARMACEUTICAL FORM AND CONTENTS**

Dispersion for injection  
10 multidose vials  
195 multidose vials

**5. METHOD AND ROUTE(S) OF ADMINISTRATION**

Intramuscular use.  
Do not dilute prior to use

Scan QR code for more information.

**6. SPECIAL WARNING THAT THE MEDICINAL PRODUCT MUST BE STORED OUT OF THE SIGHT AND REACH OF CHILDREN**

Keep out of the sight and reach of children.

**7. OTHER SPECIAL WARNING(S), IF NECESSARY**

**8. EXPIRY DATE**

EXP (at -90 °C to -60 °C)  
Expiry date at 2 °C to 8 °C: .....  
(Maximum 10 weeks. Cross out former expiry date.)

**9. SPECIAL STORAGE CONDITIONS**

Storage:

Store at 2 °C to 8 °C after receipt. Do not refreeze once thawed.

Store in the original package in order to protect from light.

Read the package leaflet before use and for additional storage information.

After first puncture, store at 2 °C to 30 °C and use within 12 hours.

**10. SPECIAL PRECAUTIONS FOR DISPOSAL OF UNUSED MEDICINAL PRODUCTS OR WASTE MATERIALS DERIVED FROM SUCH MEDICINAL PRODUCTS, IF APPROPRIATE****11. NAME AND ADDRESS OF THE MARKETING AUTHORISATION HOLDER**

BioNTech Manufacturing GmbH

An der Goldgrube 12

55131 Mainz, Germany

**12. MARKETING AUTHORISATION NUMBER(S)**

EU/1/20/1528/008 10 multidose vials

EU/1/20/1528/009 195 multidose vials

**13. BATCH NUMBER**

LOT

**14. GENERAL CLASSIFICATION FOR SUPPLY****15. INSTRUCTIONS ON USE****16. INFORMATION IN BRAILLE**

Justification for not including Braille accepted.

**17. UNIQUE IDENTIFIER – 2D BARCODE**

2D barcode carrying the unique identifier included.

**18. UNIQUE IDENTIFIER - HUMAN READABLE DATA**

PC  
SN  
NN

**MINIMUM PARTICULARS TO APPEAR ON SMALL IMMEDIATE PACKAGING UNITS**

**VIAL LABEL**

**1. NAME OF THE MEDICINAL PRODUCT AND ROUTE(S) OF ADMINISTRATION**

COMIRNATY Original/Omicron BA.4-5 15/15 mcg injection  
COVID-19 mRNA Vaccine  
tozinameran/famtozinameran  
IM

**2. METHOD OF ADMINISTRATION**

Do not dilute

**3. EXPIRY DATE**

EXP

**4. BATCH NUMBER**

LOT

**5. CONTENTS BY WEIGHT, BY VOLUME OR BY UNIT**

6 doses 15/15 mcg

**6. OTHER**

Discard time:

**B. PACKAGE LEAFLET**

## Package leaflet: Information for the user

### Comirnaty 30 micrograms/dose concentrate for dispersion for injection Adults and adolescents from 12 years COVID-19 mRNA Vaccine (nucleoside modified) tozinameran

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects you may get. See the end of section 4 for how to report side effects.

**Read all of this leaflet carefully before you receive this vaccine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Comirnaty is and what it is used for
2. What you need to know before you receive Comirnaty
3. How Comirnaty is given
4. Possible side effects
5. How to store Comirnaty
6. Contents of the pack and other information

#### 1. What Comirnaty is and what it is used for

Comirnaty is a vaccine used for preventing COVID-19 caused by SARS-CoV-2.

Comirnaty 30 micrograms/dose concentrate for dispersion for injection is given to adults and adolescents from 12 years of age and older.

The vaccine causes the immune system (the body's natural defences) to produce antibodies and blood cells that work against the virus, so giving protection against COVID-19.

As Comirnaty does not contain the virus to produce immunity, it cannot give you COVID-19.

#### 2. What you need to know before you receive Comirnaty

##### Comirnaty should not be given

- if you are allergic to the active substance or any of the other ingredients of this medicine (listed in section 6)

##### Warnings and precautions

Talk to your doctor, pharmacist or nurse before you are given the vaccine if:

- you have ever had a severe allergic reaction or breathing problems after any other vaccine injection or after you were given Comirnaty in the past.
- you are feeling nervous about the vaccination process or have ever fainted following any needle injection.
- you have a severe illness or infection with high fever. However, you can have your vaccination if you have a mild fever or upper airway infection like a cold.

- you have a bleeding problem, you bruise easily or you use a medicine to prevent blood-clots.
- you have a weakened immune system, because of a disease such as HIV infection or a medicine such as corticosteroid that affects your immune system.

There is an increased risk of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the lining outside the heart) after vaccination with Comirnaty (see section 4). These conditions can develop within just a few days after vaccination and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. The risk of myocarditis and pericarditis seems lower in children ages 5 to 11 years compared with ages 12 to 17 years. Following vaccination, you should be alert to signs of myocarditis and pericarditis, such as breathlessness, palpitations and chest pain, and seek immediate medical attention should these occur.

As with any vaccine, Comirnaty may not fully protect all those who receive it and it is not known how long you will be protected.

You may receive a booster dose of Comirnaty. The efficacy of Comirnaty, even after a booster dose, may be lower in people who are immunocompromised. In these cases, you should continue to maintain physical precautions to help prevent COVID-19. In addition, your close contacts should be vaccinated as appropriate. Discuss appropriate individual recommendations with your doctor.

### **Children**

Comirnaty 30 micrograms/dose concentrate for dispersion for injection is not recommended for children aged under 12 years.

There is a paediatric presentation available for infants and children 6 months to 4 years of age. For details, please refer to the Package Leaflet for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

There is a paediatric presentation available for children 5 to 11 years of age (i.e. 5 to less than 12 years of age). For details, please refer to the Package Leaflet for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

Comirnaty is not recommended for infants aged under 6 months.

### **Other medicines and Comirnaty**

Tell your doctor or pharmacist if you are using, have recently used or might use any other medicines or have recently received any other vaccine.

### **Pregnancy and breast-feeding**

If you are pregnant or think you may be pregnant, tell your doctor, nurse or pharmacist before you receive this vaccine.

Comirnaty can be used during pregnancy. A large amount of information from pregnant women vaccinated with Comirnaty during the second and third trimester have not shown negative effects on the pregnancy or the newborn baby. While information on effects on pregnancy or the newborn baby after vaccination during the first trimester is limited, no change to the risk for miscarriage has been seen.

Comirnaty can be given during breast-feeding.

### **Driving and using machines**

Some of the effects of vaccination mentioned in section 4 (Possible side effects) may temporarily affect your ability to drive or use machines. Wait until these effects have worn off before you drive or use machines.

### **Comirnaty contains potassium and sodium**

This vaccine contains less than 1 mmol potassium (39 mg) per dose, that is to say essentially 'potassium-free'.

This vaccine contains less than 1 mmol sodium (23 mg) per dose, that is to say essentially 'sodium-free'.

### **3. How Comirnaty is given**

Comirnaty is given after dilution as an injection of 0.3 mL into a muscle of your upper arm.

You will receive 2 injections.

It is recommended to receive the second dose of the same vaccine 3 weeks after the first dose to complete the vaccination course.

If you are immunocompromised, you may receive a third dose of Comirnaty at least 28 days after the second dose.

A booster dose of Comirnaty may be given at least 3 months after the most recent dose of a COVID-19 vaccine in individuals 12 years of age and older.

Please check with your healthcare provider regarding eligibility for and timing of the booster dose.

If you have any further questions on the use of Comirnaty, ask your doctor, pharmacist or nurse.

### **4. Possible side effects**

Like all vaccines, Comirnaty can cause side effects, although not everybody gets them.

**Very common side effects:** may affect more than 1 in 10 people

- injection site: pain, swelling
- tiredness
- headache
- muscle pain
- chills
- joint pain
- diarrhoea
- fever

Some of these side effects were slightly more frequent in adolescents 12 to 15 years than in adults.

**Common side effects:** may affect up to 1 in 10 people

- injection site redness
- nausea
- vomiting

**Uncommon side effects:** may affect up to 1 in 100 people

- enlarged lymph nodes (more frequently observed after the booster dose)
- feeling unwell
- arm pain
- insomnia
- injection site itching
- allergic reactions such as rash or itching



- feeling weak or lack of energy/sleepy
- decreased appetite
- excessive sweating
- night sweats

**Rare side effects:** may affect up to 1 in 1,000 people

- temporary one sided facial drooping
- allergic reactions such as hives or swelling of the face

**Very rare side effects:** may affect up to 1 in 10,000 people

- inflammation of the heart muscle (myocarditis) or inflammation of the lining outside the heart (pericarditis) which can result in breathlessness, palpitations or chest pain

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

- severe allergic reaction
- extensive swelling of the vaccinated limb
- swelling of the face (swelling of the face may occur in patients who have had facial dermatological fillers)
- a skin reaction that causes red spots or patches on the skin, that may look like a target or “bulls-eye” with a dark red centre surrounded by paler red rings (erythema multiforme)
- unusual feeling in the skin, such as tingling or a crawling feeling (paraesthesia)
- decreased feeling or sensitivity, especially in the skin (hypoesthesia)

### Reporting of side effects

If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system](#) listed in [Appendix V](#) and include batch/Lot number if available. By reporting side effects you can help provide more information on the safety of this medicine.

## 5. How to store Comirnaty

Keep this medicine out of the sight and reach of children.

The following information about storage, expiry and use and handling is intended for healthcare professionals.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

Store in freezer at -90 °C to -60 °C. Unopened vials may be stored and transported at -25 °C to -15 °C for a single period of up to 2 weeks and can be returned to -90 °C to -60 °C; not exceeding the printed expiry date (EXP).

Store in the original package in order to protect from light.

When stored frozen at -90 °C to -60 °C, 195-vial packs of the vaccine can be thawed at 2 °C to 8 °C for 3 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

*Transfers of frozen vials stored at ultra-low temperature (< -60 °C)*

- Closed-lid vial trays containing 195 vials removed from ultra-low temperature frozen storage (< -60 °C) may be at temperatures up to 25 °C for up to 5 minutes.
- Open-lid vial trays, or vial trays containing less than 195 vials, removed from ultra-low temperature frozen storage (< -60 °C) may be at temperatures up to 25 °C for up to 3 minutes.
- After vial trays are returned to frozen storage following temperature exposure up to 25 °C, they must remain in frozen storage for at least 2 hours before they can be removed again.

*Transfers of frozen vials stored at -25 °C to -15 °C*

- Closed-lid vial trays containing 195 vials removed from frozen storage (-25 °C to -15 °C) may be at temperatures up to 25 °C for up to 3 minutes.
- Open-lid vial trays, or vial trays containing less than 195 vials, removed from frozen storage (-25 °C to -15 °C) may be at temperatures up to 25 °C for up to 1 minute.

Once a vial is removed from the vial tray, it should be thawed for use.

After thawing, the vaccine should be diluted and used immediately. However, in-use stability data have demonstrated that once removed from freezer, the undiluted vaccine can be stored for up to 1 month at 2 °C to 8 °C; not exceeding the printed expiry date (EXP). Within the 1-month shelf life at 2 °C to 8 °C, up to 48 hours may be used for transportation. Prior to use, the unopened vaccine can be stored for up to 2 hours at temperatures up to 30 °C.

Thawed vials can be handled in room light conditions.

After dilution, store and transport the vaccine at 2 °C to 30 °C and use within 6 hours. Discard any unused vaccine.

Once removed from the freezer and diluted, the vials should be marked with the new discard date and time. Once thawed, the vaccine cannot be re-frozen.

Do not use this vaccine if you notice particulates in the dilution or discolouration.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.

## **6. Contents of the pack and other information**

### **What Comirnaty contains**

- The active substance is COVID-19 mRNA Vaccine called tozinameran. After dilution, the vial contains 6 doses of 0.3 mL with 30 micrograms tozinameran each.
- The other ingredients are:
  - ((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
  - potassium chloride
  - potassium dihydrogen phosphate
  - sodium chloride
  - disodium phosphate dihydrate
  - sucrose
  - water for injections
  - sodium hydroxide (for pH adjustment)
  - hydrochloric acid (for pH adjustment)

### **What Comirnaty looks like and contents of the pack**

The vaccine is a white to off-white dispersion (pH: 6.9 - 7.9) provided in a multidose vial of 6 doses in a 2 mL clear vial (type I glass), with a rubber stopper and a purple flip-off plastic cap with aluminium seal.

Pack size: 195 vials

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For any information about this medicine, please contact the local representative of the Marketing Authorisation Holder:

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**This leaflet was last revised in**

Scan the code with a mobile device to get the package leaflet in different languages.



URL: [www.comirnatyglobal.com](http://www.comirnatyglobal.com)

Detailed information on this medicine is available on the European Medicines Agency website:  
<http://www.ema.europa.eu>.

This package leaflet is available in all EU/EEA languages on the European Medicines Agency website.

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**The following information is intended for healthcare professionals only:**

Administer Comirnaty intramuscularly after dilution as a primary course of 2 doses (0.3 mL each) 3 weeks apart.

A third dose may be given at least 28 days after the second dose to individuals who are severely immunocompromised.

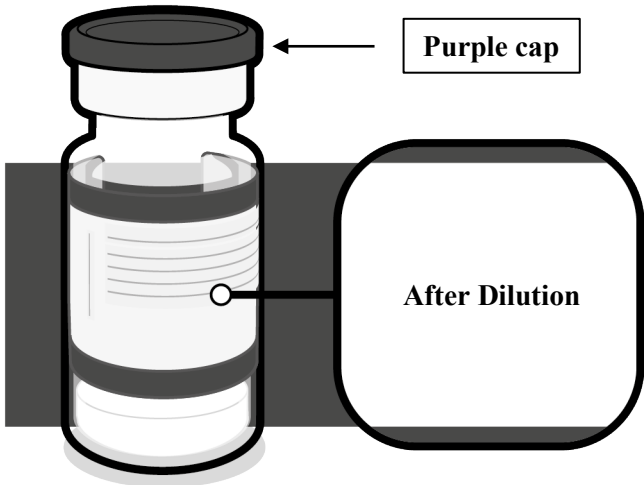
A booster dose of Comirnaty (0.3 mL) may be given at least 3 months after the most recent dose of a COVID-19 vaccine in individuals 12 years of age and older.

### Traceability

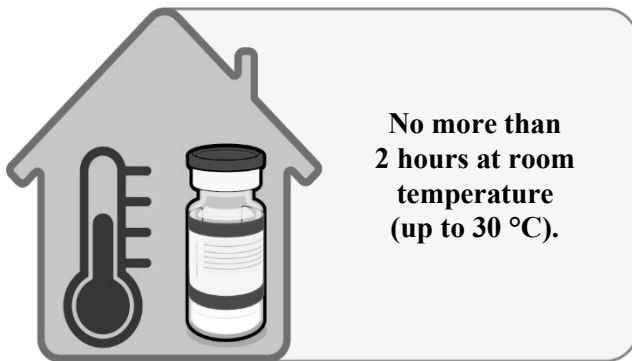
In order to improve the traceability of biological medicinal products, the name and the batch number of the administered product should be clearly recorded.

### **Handling instructions**

Comirnaty should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

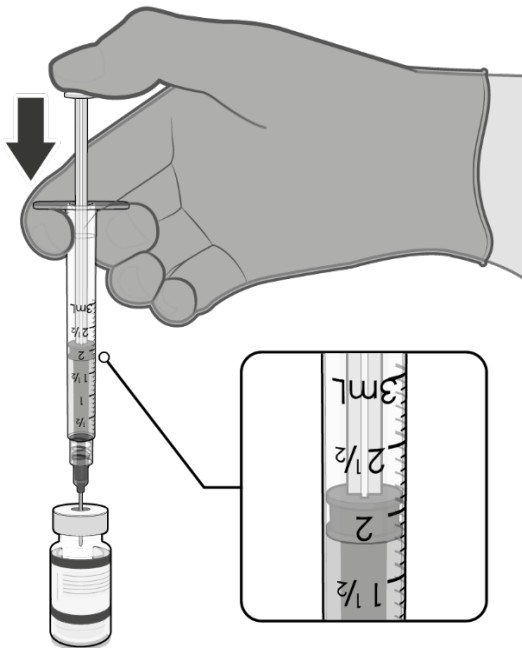
<b>VIAL VERIFICATION OF COMIRNATY 30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (12 YEARS AND OLDER)</b>	
 <p>The diagram shows a glass vial with a purple plastic cap. An arrow points from the text 'Purple cap' to the cap. The vial has a label with a small circle. An arrow points from the text 'After Dilution' to this circle. The vial is partially filled with a liquid.</p>	<ul style="list-style-type: none"><li>• Verify that the vial has a purple plastic cap.</li><li>• If the vial has a grey plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose dispersion for injection, Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.</li><li>• If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.</li><li>• If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.</li></ul>

**THAWING PRIOR TO DILUTION OF COMIRNATY 30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (12 YEARS AND OLDER)**

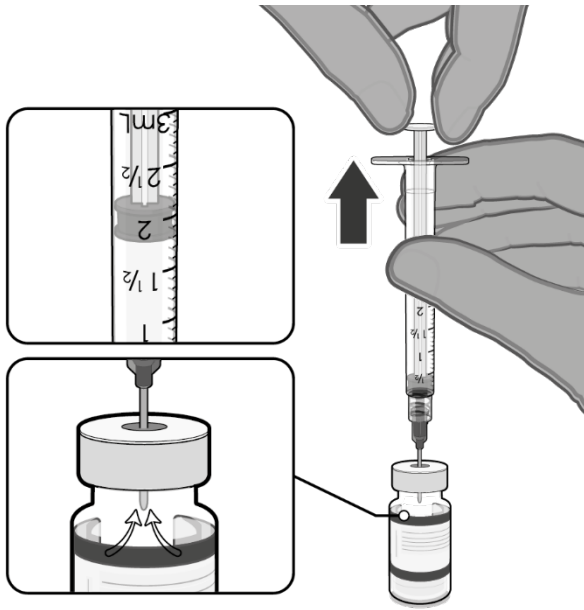


- The multidose vial is stored frozen and must be thawed prior to dilution. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 195 vial pack may take 3 hours to thaw. Alternatively, frozen vials may also be thawed for 30 minutes at temperatures up to 30 °C for immediate use.
- The unopened vial can be stored for up to 1 month at 2 °C to 8 °C; not exceeding the printed expiry date (EXP). Within the 1-month shelf life at 2 °C to 8 °C, up to 48 hours may be used for transportation.
- Allow the thawed vial to come to room temperature. Prior to use, the unopened vial can be stored for up to 2 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.
- Gently invert the vial 10 times prior to dilution. Do not shake.
- Prior to dilution, the thawed dispersion may contain white to off-white opaque amorphous particles.

**DILUTION OF COMIRNATY 30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (12 YEARS AND OLDER)**

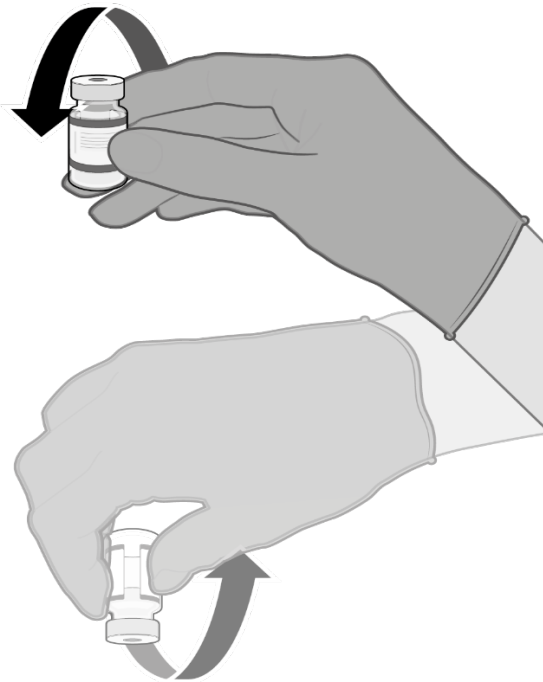


- The thawed vaccine must be diluted in its original vial with 1.8 mL of sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques.



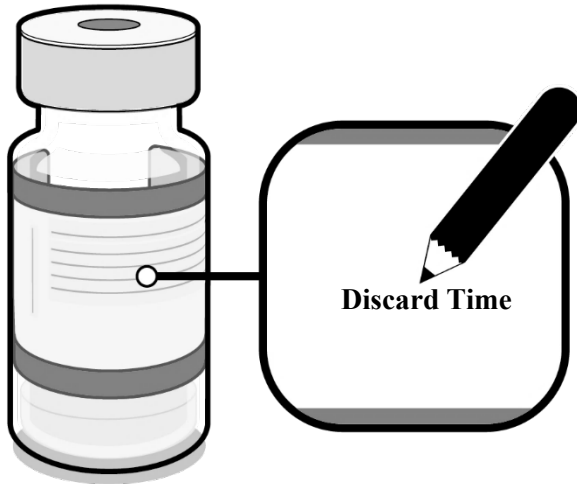
**Pull back plunger to 1.8 mL to remove air from vial.**

- Equalise vial pressure before removing the needle from the vial stopper by withdrawing 1.8 mL air into the empty diluent syringe.



**Gently × 10**

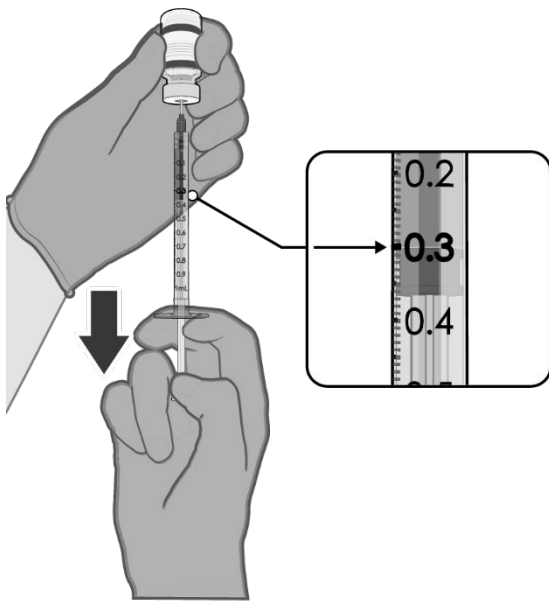
- Gently invert the diluted dispersion 10 times. Do not shake.
- The diluted vaccine should present as an off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discolouration are present.



**Record appropriate date and time.  
Use within 6 hours after dilution.**

- The diluted vials should be marked with the appropriate date and time.
- After dilution, store at 2 °C to 30 °C and use within 6 hours, including any transportation time.
- Do not freeze or shake the diluted dispersion. If refrigerated, allow the diluted dispersion to come to room temperature prior to use.

**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY  
30 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION  
(12 YEARS AND OLDER)**



**0.3 mL diluted vaccine**

- After dilution, the vial contains 2.25 mL from which 6 doses of 0.3 mL can be extracted.
- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.3 mL of Comirnaty.

Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. 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 a sixth dose from a single vial.

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Discard any unused vaccine within 6 hours after dilution.

**Disposal**

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



## Package leaflet: Information for the user

### Comirnaty 30 micrograms/dose dispersion for injection Adults and adolescents from 12 years COVID-19 mRNA Vaccine (nucleoside modified) tozinameran

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects you may get. See the end of section 4 for how to report side effects.

**Read all of this leaflet carefully before you receive this vaccine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Comirnaty is and what it is used for
2. What you need to know before you receive Comirnaty
3. How Comirnaty is given
4. Possible side effects
5. How to store Comirnaty
6. Contents of the pack and other information

#### 1. What Comirnaty is and what it is used for

Comirnaty is a vaccine used for preventing COVID-19 caused by SARS-CoV-2.

Comirnaty 30 micrograms/dose dispersion for injection is given to adults and adolescents from 12 years of age and older.

The vaccine causes the immune system (the body's natural defences) to produce antibodies and blood cells that work against the virus, so giving protection against COVID-19.

As Comirnaty does not contain the virus to produce immunity, it cannot give you COVID-19.

#### 2. What you need to know before you receive Comirnaty

##### Comirnaty should not be given

- if you are allergic to the active substance or any of the other ingredients of this medicine (listed in section 6)

##### Warnings and precautions

Talk to your doctor, pharmacist or nurse before you are given the vaccine if:

- you have ever had a severe allergic reaction or breathing problems after any other vaccine injection or after you were given Comirnaty in the past.
- you are feeling nervous about the vaccination process or have ever fainted following any needle injection.
- you have a severe illness or infection with high fever. However, you can have your vaccination if you have a mild fever or upper airway infection like a cold.

- you have a bleeding problem, you bruise easily or you use a medicine to prevent blood-clots.
- you have a weakened immune system, because of a disease such as HIV infection or a medicine such as corticosteroid that affects your immune system.

There is an increased risk of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the lining outside the heart) after vaccination with Comirnaty (see section 4). These conditions can develop within just a few days after vaccination and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. The risk of myocarditis and pericarditis seems lower in children ages 5 to 11 years compared with ages 12 to 17 years. Following vaccination, you should be alert to signs of myocarditis and pericarditis, such as breathlessness, palpitations and chest pain, and seek immediate medical attention should these occur.

As with any vaccine, Comirnaty may not fully protect all those who receive it and it is not known how long you will be protected.

You may receive a booster dose of Comirnaty. The efficacy of Comirnaty, even after a booster dose, may be lower in people who are immunocompromised. In these cases, you should continue to maintain physical precautions to help prevent COVID-19. In addition, your close contacts should be vaccinated as appropriate. Discuss appropriate individual recommendations with your doctor.

### **Children**

Comirnaty 30 micrograms/dose dispersion for injection is not recommended for children aged under 12 years.

There is a paediatric presentation available for infants and children 6 months to 4 years of age. For details, please refer to the Package Leaflet for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

There is a paediatric presentation available for children 5 to 11 years of age (i.e. 5 to less than 12 years of age). For details, please refer to the Package Leaflet for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

Comirnaty is not recommended for infants aged under 6 months.

### **Other medicines and Comirnaty**

Tell your doctor or pharmacist if you are using, have recently used or might use any other medicines or have recently received any other vaccine.

### **Pregnancy and breast-feeding**

If you are pregnant or think you may be pregnant, tell your doctor, nurse or pharmacist before you receive this vaccine.

Comirnaty can be used during pregnancy. A large amount of information from pregnant women vaccinated with Comirnaty during the second and third trimester have not shown negative effects on the pregnancy or the newborn baby. While information on effects on pregnancy or the newborn baby after vaccination during the first trimester is limited, no change to the risk for miscarriage has been seen.

Comirnaty can be given during breast-feeding.

### **Driving and using machines**

Some of the effects of vaccination mentioned in section 4 (Possible side effects) may temporarily affect your ability to drive or use machines. Wait until these effects have worn off before you drive or use machines.

### 3. How Comirnaty is given

Comirnaty is given as an injection of 0.3 mL into a muscle of your upper arm.

You will receive 2 injections.

It is recommended to receive the second dose of the same vaccine 3 weeks after the first dose to complete the vaccination course.

If you are immunocompromised, you may receive a third dose of Comirnaty at least 28 days after the second dose.

A booster dose of Comirnaty may be given at least 3 months after the most recent dose of a COVID-19 vaccine in individuals 12 years of age and older.

Please check with your healthcare provider regarding eligibility for and timing of the booster dose.

If you have any further questions on the use of Comirnaty, ask your doctor, pharmacist or nurse.

### 4. Possible side effects

Like all vaccines, Comirnaty can cause side effects, although not everybody gets them.

**Very common side effects:** may affect more than 1 in 10 people

- injection site: pain, swelling
- tiredness
- headache
- muscle pain
- chills
- joint pain
- diarrhoea
- fever

Some of these side effects were slightly more frequent in adolescents 12 to 15 years than in adults.

**Common side effects:** may affect up to 1 in 10 people

- injection site redness
- nausea
- vomiting

**Uncommon side effects:** may affect up to 1 in 100 people

- enlarged lymph nodes (more frequently observed after the booster dose)
- feeling unwell
- arm pain
- insomnia
- injection site itching
- allergic reactions such as rash or itching
- feeling weak or lack of energy/sleepy
- decreased appetite
- excessive sweating
- night sweats

**Rare side effects:** may affect up to 1 in 1,000 people

- temporary one sided facial drooping
- allergic reactions such as hives or swelling of the face

**Very rare side effects:** may affect up to 1 in 10,000 people

- inflammation of the heart muscle (myocarditis) or inflammation of the lining outside the heart (pericarditis) which can result in breathlessness, palpitations or chest pain

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

- severe allergic reaction
- extensive swelling of the vaccinated limb
- swelling of the face (swelling of the face may occur in patients who have had facial dermatological fillers)
- a skin reaction that causes red spots or patches on the skin, that may look like a target or “bulls-eye” with a dark red centre surrounded by paler red rings (erythema multiforme)
- unusual feeling in the skin, such as tingling or a crawling feeling (paraesthesia)
- decreased feeling or sensitivity, especially in the skin (hypoesthesia)

### **Reporting of side effects**

If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system](#) listed in [Appendix V](#) and include batch/Lot number if available. By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Comirnaty**

Keep this medicine out of the sight and reach of children.

The following information about storage, expiry and use and handling is intended for healthcare professionals.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

Store in freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

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 6 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

Once removed from the freezer, the unopened vial may be stored and transported refrigerated at 2 °C to 8 °C for up to 10 weeks; not exceeding the printed expiry date (EXP). The outer carton should be marked with the new discard date at 2 °C to 8 °C. Once thawed, the vaccine cannot be re-frozen.

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

Thawed vials can be handled in room light conditions.

After first puncture, store the vaccine at 2 °C to 30 °C and use within 12 hours, which includes up to 6 hours transportation time. Discard any unused vaccine.

Do not use this vaccine if you notice particulates or discolouration.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.

## 6. Contents of the pack and other information

### What Comirnaty contains

- The active substance is COVID-19 mRNA Vaccine called tozinameran. The vial contains 6 doses of 0.3 mL with 30 micrograms tozinameran each.
- The other ingredients are:
  - ((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

### What Comirnaty looks like and contents of the pack

The vaccine is a white to off-white dispersion (pH: 6.9 - 7.9) provided in a multidose vial of 6 doses in a 2 mL clear vial (type I glass), with a rubber stopper and a grey flip-off plastic cap with aluminium seal.

Pack sizes: 10 vials or 195 vials

Not all pack sizes may be marketed.

### Marketing Authorisation Holder

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**This leaflet was last revised in**

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URL: [www.comirnatyglobal.com](http://www.comirnatyglobal.com)

Detailed information on this medicine is available on the European Medicines Agency website:  
<http://www.ema.europa.eu>.

This package leaflet is available in all EU/EEA languages on the European Medicines Agency website.

---

**The following information is intended for healthcare professionals only:**

Administer Comirnaty intramuscularly as a primary course of 2 doses (0.3 mL each) 3 weeks apart.

A third dose may be given at least 28 days after the second dose to individuals who are severely immunocompromised.

A booster dose of Comirnaty (0.3 mL) may be given at least 3 months after the most recent dose of a COVID-19 vaccine in individuals 12 years of age and older.

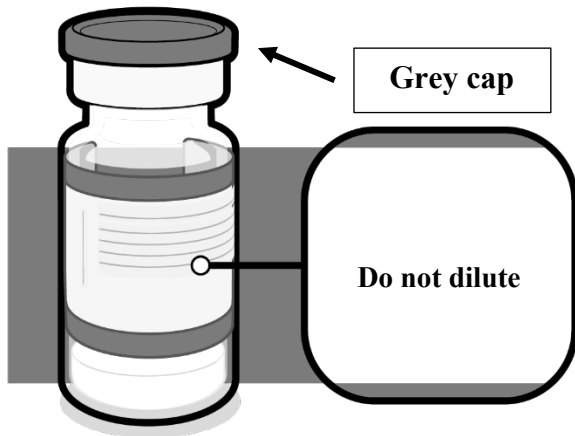
**Traceability**

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

**Handling instructions**

Comirnaty should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

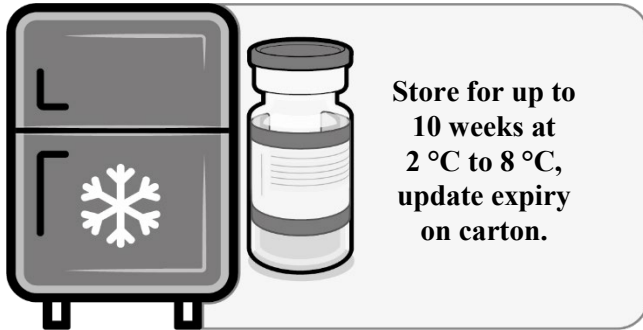
**VIAL VERIFICATION OF COMIRNATY 30 MICROGRAMS/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



- Verify that the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty 30 micrograms/dose dispersion for injection.
- If the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection, please make reference to the Summary of Product Characteristics for that formulation.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

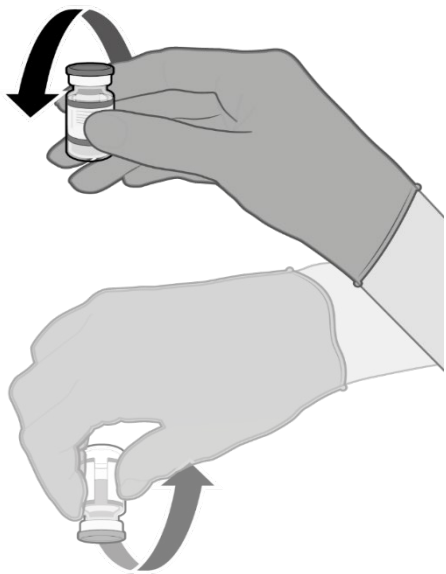
**HANDLING PRIOR TO USE OF COMIRNATY 30 MICROGRAMS/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**





Store for up to  
10 weeks at  
2 °C to 8 °C,  
update expiry  
on carton.

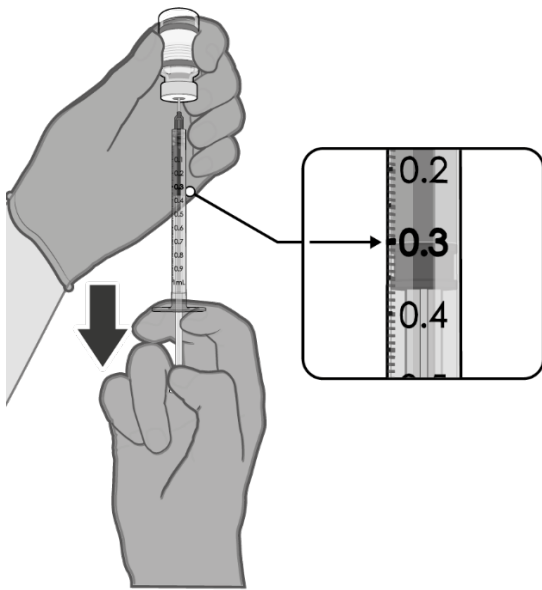
- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 6 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C. Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.



Gently × 10

- Gently mix by inverting vials 10 times prior to use. Do not shake.
- Prior to mixing, the thawed dispersion may contain white to off-white opaque amorphous particles.
- After mixing, the vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the vaccine if particulates or discolouration are present.

**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY  
30 MICROGRAMS/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



**0.3 mL vaccine**

- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.3 mL of Comirnaty.

Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. 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 a sixth dose from a single vial.

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Record the appropriate date/time on the vial. Discard any unused vaccine 12 hours after first puncture.

**Disposal**

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

## Package leaflet: Information for the user

### Comirnaty 10 micrograms/dose concentrate for dispersion for injection Children 5 to 11 years COVID-19 mRNA Vaccine (nucleoside modified) tozinameran

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects your child may get. See the end of section 4 for how to report side effects.

**Read all of this leaflet carefully before you receive this vaccine because it contains important information for you.**

- Read this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If your child gets any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Comirnaty is and what it is used for
2. What you need to know before your child receives Comirnaty
3. How Comirnaty is given
4. Possible side effects
5. How to store Comirnaty
6. Contents of the pack and other information

#### 1. What Comirnaty is and what it is used for

Comirnaty is a vaccine used for preventing COVID-19 caused by SARS-CoV-2.

Comirnaty 10 micrograms/dose concentrate for dispersion for injection is given to children from 5 to 11 years of age.

The vaccine causes the immune system (the body's natural defences) to produce antibodies and blood cells that work against the virus, so giving protection against COVID-19.

As Comirnaty does not contain the virus to produce immunity, it cannot give your child COVID-19.

#### 2. What you need to know before your child receives Comirnaty

##### Comirnaty should not be given

- if your child is allergic to the active substance or any of the other ingredients of this medicine (listed in section 6)

##### Warnings and precautions

Talk to your doctor, pharmacist or nurse before your child is given the vaccine if your child:

- has ever had a severe allergic reaction or breathing problems after any other vaccine injection or after having been given Comirnaty in the past.
- is feeling nervous about the vaccination process or has ever fainted following any needle injection.
- has a severe illness or infection with high fever. However, your child can have the vaccination if he/she have a mild fever or upper airway infection like a cold.

- has a bleeding problem, bruises easily or uses a medicine to prevent blood-clots.
- has a weakened immune system, because of a disease such as HIV infection or a medicine such as corticosteroid that affects the immune system.

There is an increased risk of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the lining outside the heart) after vaccination with Comirnaty (see section 4). These conditions can develop within just a few days after vaccination and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. The risk of myocarditis and pericarditis seems lower in children ages 5 to 11 years compared with ages 12 to 17 years. Following vaccination, you should be alert to signs of myocarditis and pericarditis, such as breathlessness, palpitations and chest pain, and seek immediate medical attention should these occur.

As with any vaccine, Comirnaty may not fully protect all those who receive it and it is not known how long you will be protected.

Your child may receive a third dose of Comirnaty. The efficacy of Comirnaty, even after a third dose, may be lower in people who are immunocompromised. In these cases, you should continue to maintain physical precautions to help prevent COVID-19. In addition, your close contacts should be vaccinated as appropriate. Discuss appropriate individual recommendations with your doctor.

### **Children**

There is a paediatric presentation available for infants and children 6 months to 4 years of age. For details, please refer to the Package Leaflet for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

Comirnaty is not recommended for infants aged under 6 months.

### **Other medicines and Comirnaty**

Tell your doctor or pharmacist if your child is using, has recently used or might use any other medicines or has recently received any other vaccine.

### **Pregnancy and breast-feeding**

If your child is pregnant, tell your doctor, nurse or pharmacist before your child receives this vaccine.

Comirnaty can be used during pregnancy. A large amount of information from pregnant women vaccinated with Comirnaty during the second and third trimester have not shown negative effects on the pregnancy or the newborn baby. While information on effects on pregnancy or the newborn baby after vaccination during the first trimester is limited, no change to the risk for miscarriage has been seen.

Comirnaty can be given during breast-feeding.

### **Driving and using machines**

Some of the effects of vaccination mentioned in section 4 (Possible side effects) may temporarily affect your ability to use machines or undertake activities such as cycling. Wait until these effects have worn off before resuming activities that require your full attention.

## **3. How Comirnaty is given**

Comirnaty is given after dilution as an injection of 0.2 mL into a muscle of the upper arm.

Your child will receive 2 injections.

It is recommended to receive the second dose of the same vaccine 3 weeks after the first dose to complete the vaccination course.

If your child is immunocompromised, he or she may receive a third dose of Comirnaty at least 28 days after the second dose.

If a child turns 12 years old between their doses in the primary vaccination course, he/she should complete the series at the same 10 micrograms dose level.

A booster dose of Comirnaty may be given at least 6 months after the primary vaccination course in children 5 to 11 years of age.

If you have any further questions on the use of Comirnaty, ask your doctor, pharmacist or nurse.

#### **4. Possible side effects**

Like all vaccines, Comirnaty can cause side effects, although not everybody gets them.

**Very common side effects:** may affect more than 1 in 10 people

- injection site: pain, swelling
- tiredness
- headache
- muscle pain
- chills
- joint pain
- diarrhoea
- fever

**Common side effects:** may affect up to 1 in 10 people

- nausea
- vomiting
- injection site redness ('very common' in 5 to 11 years of age)

**Uncommon side effects:** may affect up to 1 in 100 people

- enlarged lymph nodes (more frequently observed after the booster dose)
- feeling unwell
- arm pain
- insomnia
- injection site itching
- allergic reactions such as rash or itching
- feeling weak or lack of energy/sleepy
- decreased appetite
- excessive sweating
- night sweats

**Rare side effects:** may affect up to 1 in 1,000 people

- temporary one sided facial drooping
- allergic reactions such as hives or swelling of the face

**Very rare side effects:** may affect up to 1 in 10,000 people

- inflammation of the heart muscle (myocarditis) or inflammation of the lining outside the heart (pericarditis) which can result in breathlessness, palpitations or chest pain

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

- severe allergic reaction
- extensive swelling of the vaccinated limb

- swelling of the face (swelling of the face may occur in patients who have had facial dermatological fillers)
- a skin reaction that causes red spots or patches on the skin, that may look like a target or “bulls-eye” with a dark red centre surrounded by paler red rings (erythema multiforme)
- unusual feeling in the skin, such as tingling or a crawling feeling (paraesthesia)
- decreased feeling or sensitivity, especially in the skin (hypoaesthesia)

### Reporting of side effects

If your child gets any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system listed in Appendix V](#) and include batch/Lot number if available. By reporting side effects you can help provide more information on the safety of this medicine.

## 5. How to store Comirnaty

Keep this medicine out of the sight and reach of children.

The following information about storage, expiry and use and handling is intended for healthcare professionals.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

Store in freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

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 4 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

Once removed from the freezer, the unopened vial may be stored and transported refrigerated at 2 °C to 8 °C for up to 10 weeks; not exceeding the printed expiry date (EXP). The outer carton should be marked with the new discard date at 2 °C to 8 °C. Once thawed, the vaccine cannot be re-frozen.

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

Thawed vials can be handled in room light conditions.

After dilution, store the vaccine at 2 °C to 30 °C and use within 12 hours, which includes up to 6 hours transportation time. Discard any unused vaccine.

Do not use this vaccine if you notice particulates in the dilution or discolouration.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.

## 6. Contents of the pack and other information

### What Comirnaty contains

- The active substance is COVID-19 mRNA Vaccine called tozinameran. After dilution, the vial contains 10 doses of 0.2 mL with 10 micrograms tozinameran each.
- The other ingredients are:
  - ((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

### What Comirnaty looks like and contents of the pack

The vaccine is a white to off-white dispersion (pH: 6.9 - 7.9) provided in a multidose vial of 10 doses in a 2 mL clear vial (type I glass), with a rubber stopper and an orange flip-off plastic cap with aluminium seal.

Pack sizes: 10 vials or 195 vials

Not all pack sizes may be marketed.

### Marketing Authorisation Holder

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<http://www.ema.europa.eu>.

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---

**The following information is intended for healthcare professionals only:**

Administer Comirnaty intramuscularly after dilution as a course of 2 doses (0.2 mL each) 3 weeks apart.

A booster dose of Comirnaty may be given at least 6 months after the primary vaccination course in children 5 to 11 years of age.

A third dose may be given at least 28 days after the second dose to individuals who are severely immunocompromised.

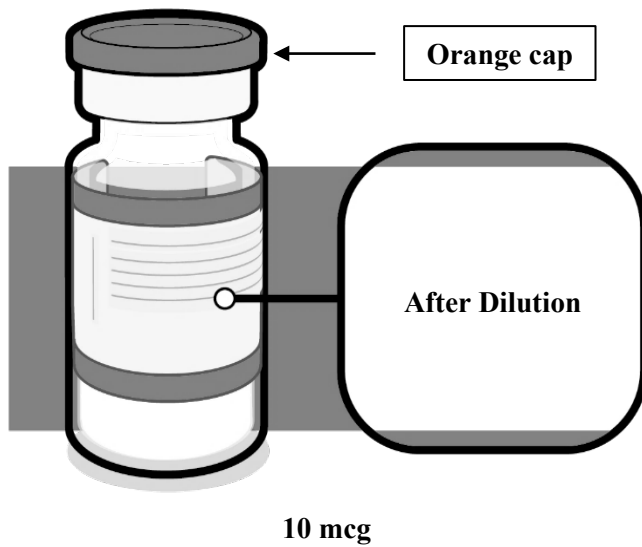
Traceability

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

**Handling instructions**

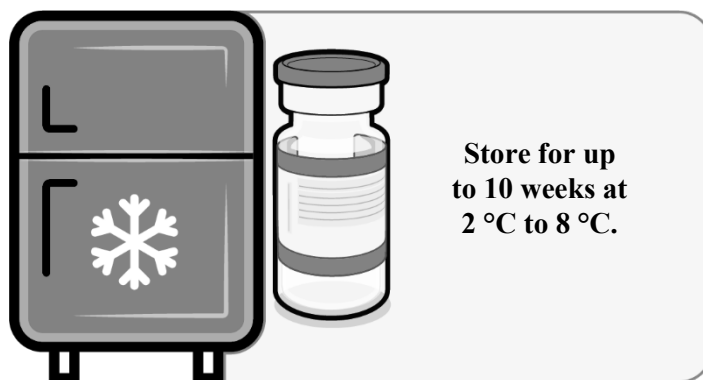
Comirnaty 10 micrograms/dose should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY 10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



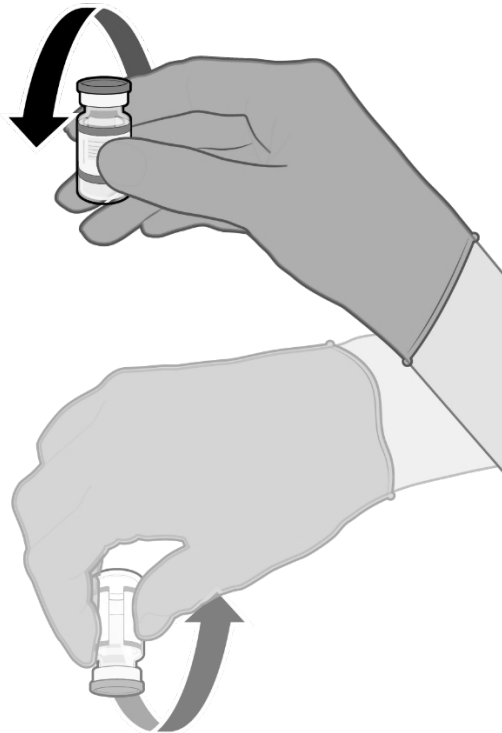
- Verify that the vial has an orange plastic cap.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has a grey plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose dispersion for injection, Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

**HANDLING PRIOR TO USE OF COMIRNATY 10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 4 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

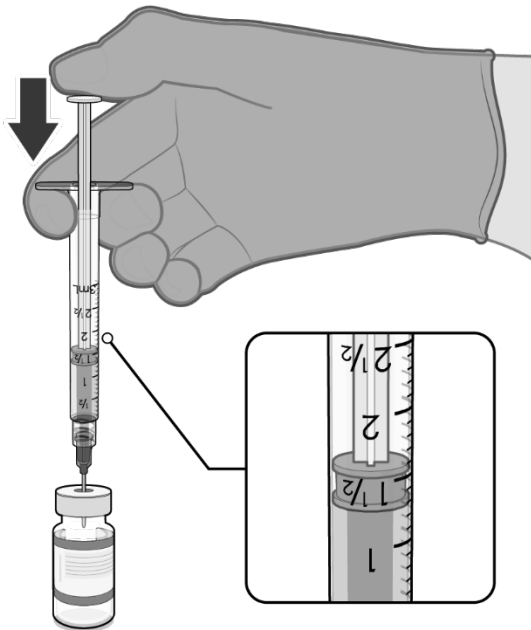
**MIXING PRIOR TO DILUTION OF COMIRNATY 10 MICROGRAMS/DOSE  
CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



**Gently × 10**

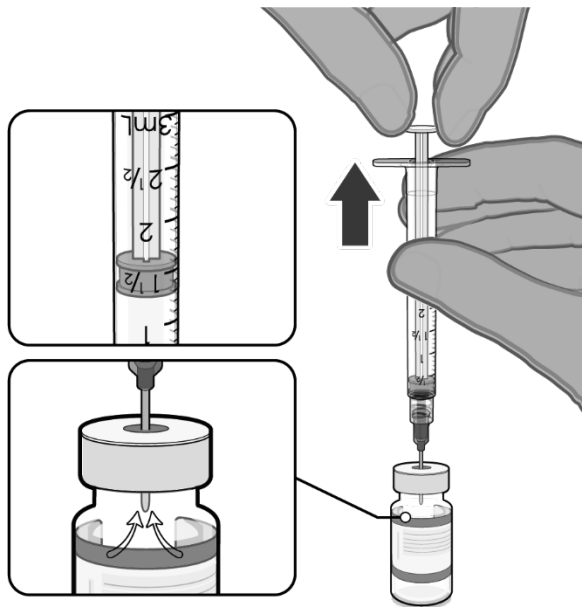
- Allow the thawed vial to come to room temperature and gently invert it 10 times prior to dilution. Do not shake.
- Prior to dilution, the thawed dispersion may contain white to off-white opaque amorphous particles.

**DILUTION OF COMIRNATY 10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (CHILDREN 5 TO 11 YEARS)**



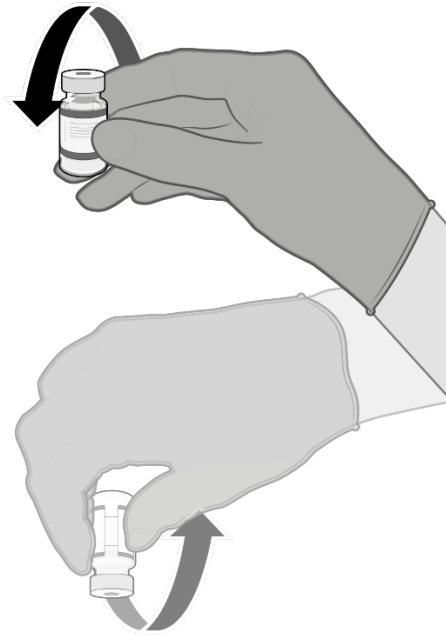
**1.3 mL of sodium chloride 9 mg/mL (0.9%)  
solution for injection**

- The thawed vaccine must be diluted in its original vial with 1.3 mL sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques.



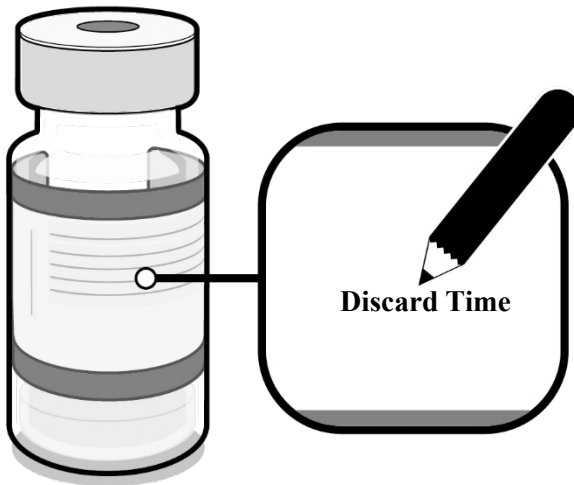
**Pull back plunger to 1.3 mL to remove air  
from vial.**

- Equalise vial pressure before removing the needle from the vial stopper by withdrawing 1.3 mL air into the empty diluent syringe.



**Gently × 10**

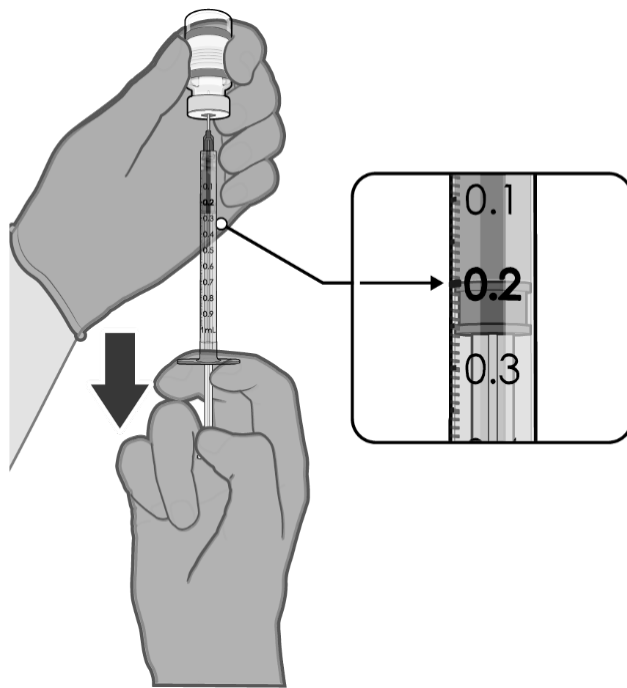
- Gently invert the diluted dispersion 10 times. Do not shake.
- The diluted vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discoloration are present.



**Record appropriate date and time.  
Use within 12 hours after dilution.**

- The diluted vials should be marked with the appropriate date and time.
- After dilution, store at 2 °C to 30 °C and use within 12 hours.
- Do not freeze or shake the diluted dispersion. If refrigerated, allow the diluted dispersion to come to room temperature prior to use.

**PREPARATION OF INDIVIDUAL 0.2 mL DOSES OF COMIRNATY  
10 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION  
(CHILDREN 5 TO 11 YEARS)**



**0.2 mL diluted vaccine**

- After dilution, the vial contains 2.6 mL from which 10 doses of 0.2 mL can be extracted.
- Using aseptic technique, cleanse the vial stopper with a single use antiseptic swab.
- Withdraw 0.2 mL of Comirnaty for children age 5 to 11 years.

Low dead-volume syringes and/or needles should be used in order to extract 10 doses from a single vial. 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 ten doses from a single vial.

- 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.
- Discard any unused vaccine within 12 hours after dilution.

**Disposal**

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

## Package leaflet: Information for the user

### Comirnaty 3 micrograms/dose concentrate for dispersion for injection Infants and children 6 months to 4 years COVID-19 mRNA Vaccine (nucleoside modified) tozinameran

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects your child may get. See the end of section 4 for how to report side effects.

**Read all of this leaflet carefully before you receive this vaccine because it contains important information for you.**

- Read this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If your child gets any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Comirnaty is and what it is used for
2. What you need to know before your child receives Comirnaty
3. How Comirnaty is given
4. Possible side effects
5. How to store Comirnaty
6. Contents of the pack and other information

#### 1. What Comirnaty is and what it is used for

Comirnaty is a vaccine used for preventing COVID-19 caused by SARS-CoV-2.

Comirnaty 3 micrograms/dose concentrate for dispersion for injection is given to infants and children from 6 months to 4 years of age.

The vaccine causes the immune system (the body's natural defences) to produce antibodies and blood cells that work against the virus, so giving protection against COVID-19.

As Comirnaty does not contain the virus to produce immunity, it cannot give your child COVID-19.

#### 2. What you need to know before your child receives Comirnaty

##### Comirnaty should not be given

- if your child is allergic to the active substance or any of the other ingredients of this medicine (listed in section 6)

##### Warnings and precautions

Talk to your doctor, pharmacist or nurse before your child is given the vaccine if your child:

- has ever had a severe allergic reaction or breathing problems after any other vaccine injection or after having been given Comirnaty in the past.
- is feeling nervous about the vaccination process or has ever fainted following any needle injection.
- has a severe illness or infection with high fever. However, your child can have the vaccination if he/she have a mild fever or upper airway infection like a cold.

- has a bleeding problem, bruises easily or uses a medicine to prevent blood-clots.
- has a weakened immune system, because of a disease such as HIV infection or a medicine such as corticosteroid that affects the immune system.

There is an increased risk of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the lining outside the heart) after vaccination with Comirnaty (see section 4). These conditions can develop within just a few days after vaccination and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. The risk of myocarditis and pericarditis seems lower in children ages 5 to 11 years compared with ages 12 to 17 years. Following vaccination, you should be alert to signs of myocarditis and pericarditis, such as breathlessness, palpitations and chest pain, and seek immediate medical attention should these occur.

As with any vaccine, Comirnaty may not fully protect all those who receive it and it is not known how long you will be protected.

The efficacy of Comirnaty, even after a third dose, may be lower in people who are immunocompromised. In these cases, you should continue to maintain physical precautions to help prevent COVID-19. In addition, your close contacts should be vaccinated as appropriate. Discuss appropriate individual recommendations with your doctor.

### **Children**

Comirnaty 3 micrograms/dose concentrate for dispersion for injection is not recommended for children aged 5 years to 11 years. There is a paediatric presentation available for infants and children 5 years to 11 years. For details, please refer to the Package Leaflet for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

Comirnaty is not recommended for infants aged under 6 months.

### **Other medicines and Comirnaty**

Tell your doctor or pharmacist if your child is using, has recently used or might use any other medicines or has recently received any other vaccine.

### **Pregnancy and breast-feeding**

Comirnaty 3 micrograms/dose concentrate for dispersion 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 Package Leaflet for Comirnaty 30 micrograms/dose concentrate for dispersion for injection, Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

### **Driving and using machines**

Some of the effects of vaccination mentioned in section 4 (Possible side effects) may temporarily affect your ability to use machines or undertake activities such as cycling. Wait until these effects have worn off before resuming activities that require your full attention.

## **3. How Comirnaty is given**

Comirnaty is given after dilution as an injection of 0.2 mL into a muscle of the thigh in infants from 6 to less than 12 months of age. In infants and children 1 year of age or older, Comirnaty is given after dilution as an injection of 0.2 mL into a muscle of the thigh or into a muscle of the upper arm.

Your child will receive 3 injections.



It is recommended to receive the second dose of the same vaccine 3 weeks after the first dose followed by a third dose at least 8 weeks after the second dose to complete the vaccination course.

If a child turns 5 years old between their doses in the vaccination course, he/she should complete the series at the same 3 micrograms dose level.

If you have any further questions on the use of Comirnaty, ask your doctor, pharmacist or nurse.

#### **4. Possible side effects**

Like all vaccines, Comirnaty can cause side effects, although not everybody gets them.

**Very common side effects:** may affect more than 1 in 10 people

- irritability (6 months to < 2 years)
- injection site: pain/tenderness, swelling
- tiredness
- headache
- drowsiness (6 months to <2 years)
- muscle pain
- chills
- joint pain
- diarrhoea
- fever

**Common side effects:** may affect up to 1 in 10 people

- nausea
- vomiting
- injection site redness ('very common' in 6 months to 11 years)

**Uncommon side effects:** may affect up to 1 in 100 people

- enlarged lymph nodes (more frequently observed after the booster dose)
- feeling unwell
- arm pain
- insomnia
- injection site itching
- allergic reactions such as rash ('common' for 6 months to < 2 years) or itching
- feeling weak or lack of energy/sleepy
- decreased appetite ('very common' for 6 months to < 2 years)
- excessive sweating
- night sweats

**Rare side effects:** may affect up to 1 in 1,000 people

- temporary one sided facial drooping
- allergic reactions such as hives or swelling of the face

**Very rare side effects:** may affect up to 1 in 10,000 people

- inflammation of the heart muscle (myocarditis) or inflammation of the lining outside the heart (pericarditis) which can result in breathlessness, palpitations or chest pain

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

- severe allergic reaction
- extensive swelling of the vaccinated limb
- swelling of the face (swelling of the face may occur in patients who have had facial dermatological fillers)

- a skin reaction that causes red spots or patches on the skin, that may look like a target or “bulls-eye” with a dark red centre surrounded by paler red rings (erythema multiforme)
- unusual feeling in the skin, such as tingling or a crawling feeling (paraesthesia)
- decreased feeling or sensitivity, especially in the skin (hypoesthesia)

### **Reporting of side effects**

If your child gets any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via [the national reporting system listed in Appendix V](#) and include batch/Lot number if available. By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Comirnaty**

Keep this medicine out of the sight and reach of children.

The following information about storage, expiry and use and handling is intended for healthcare professionals.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

Store in freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

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.

Once removed from the freezer, the unopened vial may be stored and transported refrigerated at 2 °C to 8 °C for up to 10 weeks; not exceeding the printed expiry date (EXP). The outer carton should be marked with the new discard date at 2 °C to 8 °C. Once thawed, the vaccine cannot be re-frozen.

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

Thawed vials can be handled in room light conditions.

After dilution, store the vaccine at 2 °C to 30 °C and use within 12 hours, which includes up to 6 hours transportation time. Discard any unused vaccine.

Do not use this vaccine if you notice particulates in the dilution or discolouration.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.

## 6. Contents of the pack and other information

### What Comirnaty contains

- The active substance is COVID-19 mRNA Vaccine called tozinameran. After dilution, the vial contains 10 doses of 0.2 mL with 3 micrograms tozinameran each.
- The other ingredients are:
  - ((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

### What Comirnaty looks like and contents of the pack

The vaccine is a white to off-white dispersion (pH: 6.9 - 7.9) provided in a multidose vial of 10 doses in a 2 mL clear vial (type I glass), with a rubber stopper and a maroon flip-off plastic cap with aluminium seal.

Pack sizes: 10 vials

Not all pack sizes may be marketed.

### Marketing Authorisation Holder

BioNTech Manufacturing GmbH  
An der Goldgrube 12  
55131 Mainz  
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Phone: +49 6131 9084-0  
Fax: +49 6131 9084-2121  
service@biontech.de

### Manufacturers

BioNTech Manufacturing GmbH  
Kupferbergterrasse 17 - 19  
55116 Mainz  
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Pfizer Manufacturing Belgium NV  
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2870 Puurs  
Belgium

For any information about this medicine, please contact the local representative of the Marketing Authorisation Holder:

**België/Belgique/Belgien**  
**Luxembourg/Luxemburg**  
Pfizer S.A./N.V.  
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+44 (0)1304 616161

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Icepharma hf  
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Τηλ: +357 22 817690

**Magyarország**

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**Nederland**

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Pfizer Corporation Austria Ges.m.b.H  
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Tel.: +48 22 335 61 00

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Laboratórios Pfizer, Lda.  
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**România**

Pfizer Romania S.R.L  
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**Slovenija**

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Pfizer, podružnica za svetovanje s področja  
farmacevtske dejavnosti, Ljubljana  
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**Sverige**

Pfizer AB  
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Pfizer Luxembourg SARL filiāle Latvijā

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**This leaflet was last revised in**

Scan the code with a mobile device to get the package leaflet in different languages.



URL: [www.comirnatyglobal.com](http://www.comirnatyglobal.com)

Detailed information on this medicine is available on the European Medicines Agency website:

<http://www.ema.europa.eu>.

This package leaflet is available in all EU/EEA languages on the European Medicines Agency website.

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**The following information is intended for healthcare professionals only:**

Administer Comirnaty intramuscularly after dilution as a course of 3 doses (0.2 mL each); the second dose of the same vaccine administered 3 weeks after the first dose followed by a third dose at least 8 weeks after the second dose to complete the vaccination course.

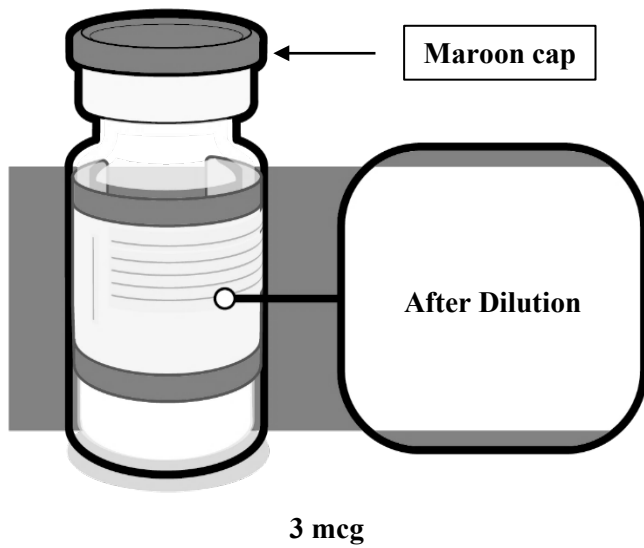
**Traceability**

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

**Handling instructions**

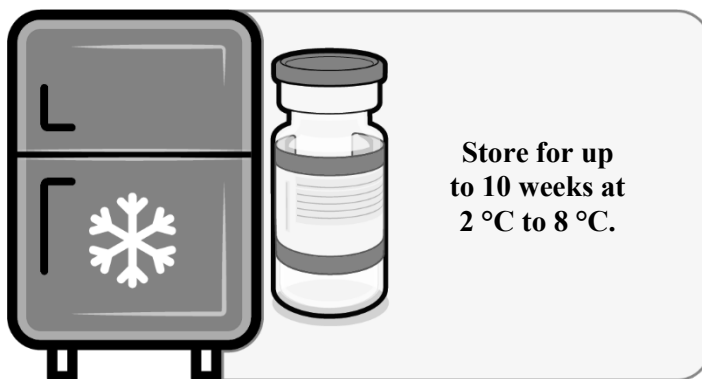
Comirnaty 3 micrograms/dose should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY 3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



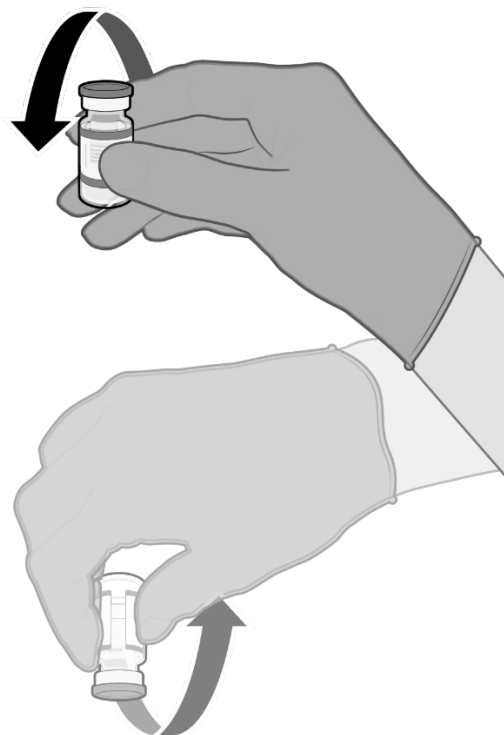
- Verify that the vial has a maroon plastic cap.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has a grey plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose dispersion for injection, Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.

**HANDLING PRIOR TO USE OF COMIRNATY 3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 2 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.

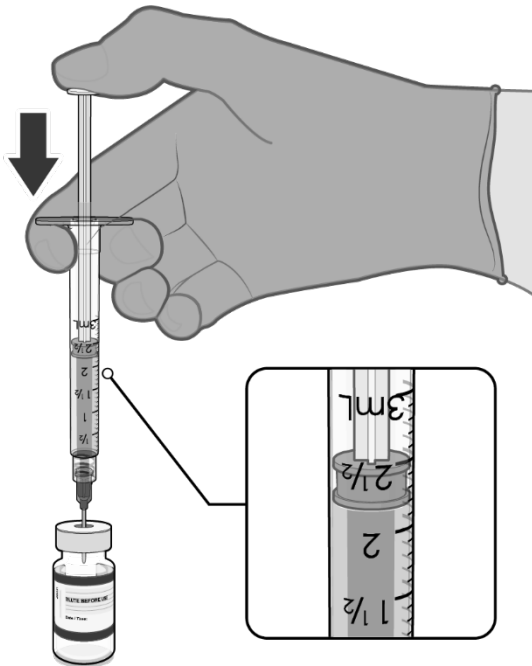
**MIXING PRIOR TO DILUTION OF COMIRNATY 3 MICROGRAMS/DOSE  
CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN  
6 MONTHS TO 4 YEARS)**



**Gently × 10**

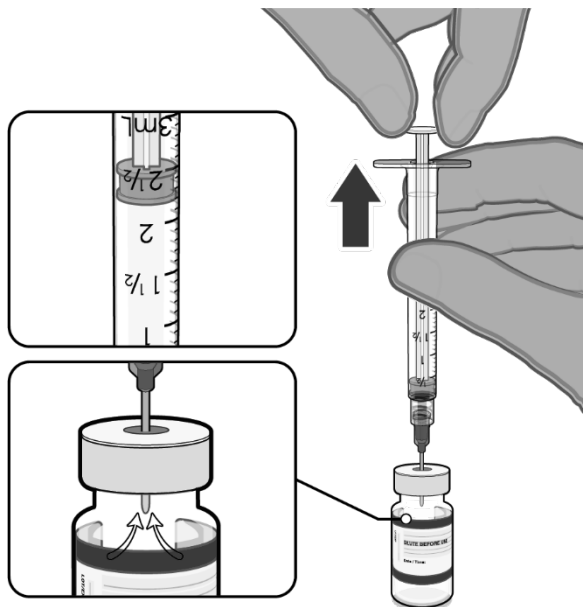
- Allow the thawed vial to come to room temperature and gently invert it 10 times prior to dilution. Do not shake.
- Prior to dilution, the thawed dispersion may contain white to off-white opaque amorphous particles.

**DILUTION OF COMIRNATY 3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION (INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



**2.2 mL of sodium chloride 9 mg/mL (0.9%) solution for injection.**

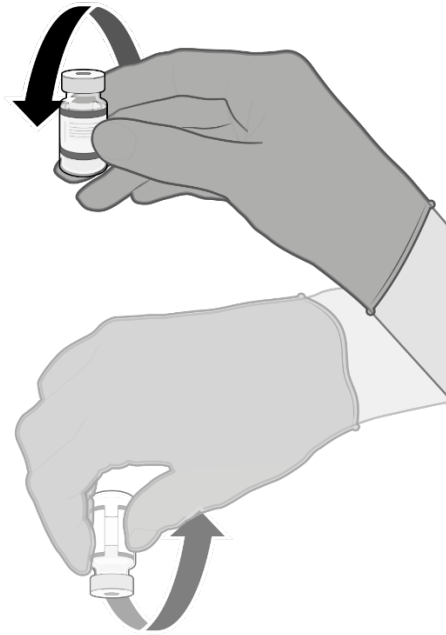
- The thawed vaccine must be diluted in its original vial with 2.2 mL sodium chloride 9 mg/mL (0.9%) solution for injection, using a 21 gauge or narrower needle and aseptic techniques.



**Pull back plunger to 2.2 mL to remove air from vial.**

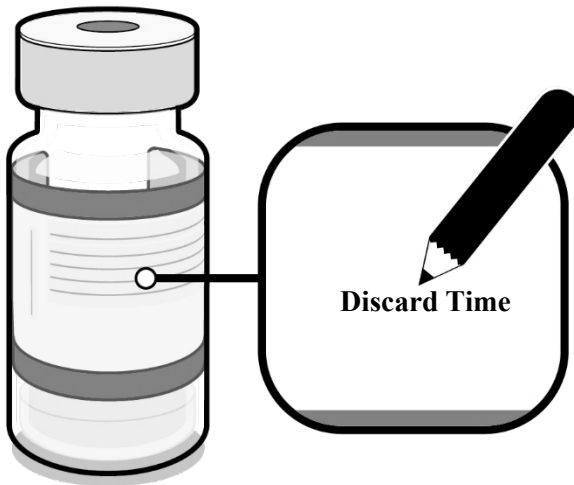
- Equalise vial pressure before removing the needle from the vial stopper by withdrawing 2.2 mL air into the empty diluent syringe.





**Gently × 10**

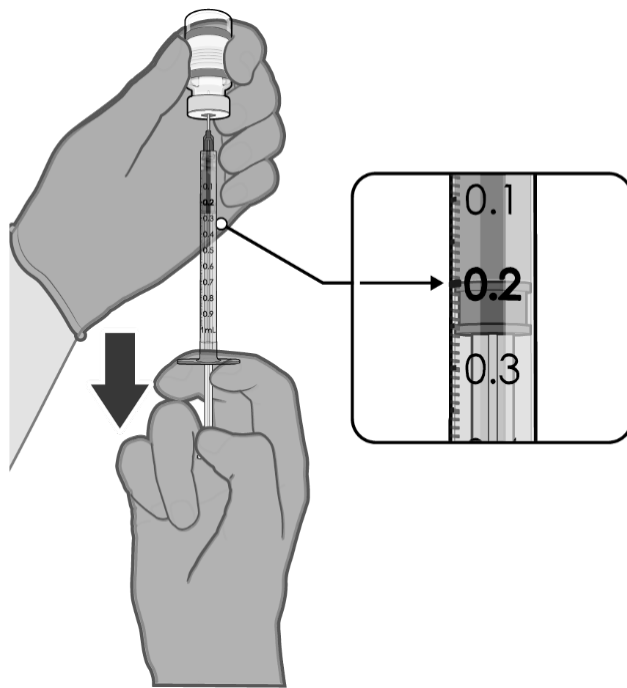
- Gently invert the diluted dispersion 10 times. Do not shake.
- The diluted vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the diluted vaccine if particulates or discoloration are present.



**Record appropriate date and time.  
Use within 12 hours after dilution.**

- The diluted vials should be marked with the appropriate date and time.
- After dilution, store at 2 °C to 30 °C and use within 12 hours.
- Do not freeze or shake the diluted dispersion. If refrigerated, allow the diluted dispersion to come to room temperature prior to use.

**PREPARATION OF INDIVIDUAL 0.2 mL DOSES OF COMIRNATY  
3 MICROGRAMS/DOSE CONCENTRATE FOR DISPERSION FOR INJECTION  
(INFANTS AND CHILDREN 6 MONTHS TO 4 YEARS)**



**0.2 mL diluted vaccine**

- After dilution, the vial contains 2.6 mL from which 10 doses of 0.2 mL can be extracted.
- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.2 mL of Comirnaty for infants and children age 6 months to 4 years.

Low dead-volume syringes and/or needles should be used in order to extract 10 doses from a single vial. 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 ten doses from a single vial.

- 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.
- Discard any unused vaccine within 12 hours after dilution.

**Disposal**

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

## Package leaflet: Information for the user

### Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection Adults and adolescents from 12 years COVID-19 mRNA Vaccine (nucleoside modified) tozinameran/riltozinameran

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects you may get. See the end of section 4 for how to report side effects.

**Read all of this leaflet carefully before you receive this vaccine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Comirnaty Original/Omicron BA.1 is and what it is used for
2. What you need to know before you receive Comirnaty Original/Omicron BA.1
3. How Comirnaty Original/Omicron BA.1 is given
4. Possible side effects
5. How to store Comirnaty Original/Omicron BA.1
6. Contents of the pack and other information

#### 1. What Comirnaty Original/Omicron BA.1 is and what it is used for

Comirnaty Original/Omicron BA.1 is a vaccine used for preventing COVID-19 caused by SARS-CoV-2. It is given to adults and adolescents from 12 years of age and older.

Comirnaty Original/Omicron BA.1 is only for individuals who have previously received at least a primary vaccination course against COVID-19.

The vaccine causes the immune system (the body's natural defences) to produce antibodies and blood cells that work against the virus, so giving protection against COVID-19.

As Comirnaty Original/Omicron BA.1 does not contain the virus to produce immunity, it cannot give you COVID-19.

#### 2. What you need to know before you receive Comirnaty Original/Omicron BA.1

##### Comirnaty Original/Omicron BA.1 should not be given

- if you are allergic to the active substance or any of the other ingredients of this medicine (listed in section 6)

#### Warnings and precautions

Talk to your doctor, pharmacist or nurse before you are given the vaccine if:

- you have ever had a severe allergic reaction or breathing problems after any other vaccine injection or after you were given Comirnaty in the past.
- you are feeling nervous about the vaccination process or have ever fainted following any needle injection.
- you have a severe illness or infection with high fever. However, you can have your vaccination if you have a mild fever or upper airway infection like a cold.

- you have a bleeding problem, you bruise easily or you use a medicine to prevent blood-clots.
- you have a weakened immune system, because of a disease such as HIV infection or a medicine such as corticosteroid that affects your immune system.

There is an increased risk of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the lining outside the heart) after vaccination with Comirnaty (see section 4). These conditions can develop within just a few days after vaccination and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. The risk of myocarditis and pericarditis seems lower in children ages 5 to 11 years compared with ages 12 to 17 years. Following vaccination, you should be alert to signs of myocarditis and pericarditis, such as breathlessness, palpitations and chest pain, and seek immediate medical attention should these occur.

As with any vaccine, Comirnaty Original/Omicron BA.1 may not fully protect all those who receive it and it is not known how long you will be protected.

The efficacy of Comirnaty Original/Omicron BA.1 may be lower in people who are immunocompromised. In these cases, you should continue to maintain physical precautions to help prevent COVID-19. In addition, your close contacts should be vaccinated as appropriate. Discuss appropriate individual recommendations with your doctor.

### **Children**

Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection is not recommended for children aged under 12 years.

### **Other medicines and Comirnaty Original/Omicron BA.1**

Tell your doctor or pharmacist if you are using, have recently used or might use any other medicines or have recently received any other vaccine.

### **Pregnancy and breast-feeding**

If you are pregnant or think you may be pregnant, tell your doctor, nurse or pharmacist before you receive this vaccine.

No data are available yet regarding the use of Comirnaty Original/Omicron BA.1 during pregnancy. However, a large amount of information from pregnant women vaccinated with the initially approved Comirnaty vaccine during the second and third trimester have not shown negative effects on the pregnancy or the newborn baby. While information on effects on pregnancy or the newborn baby after vaccination during the first trimester is limited, no change to the risk for miscarriage has been seen. Comirnaty Original/Omicron BA.1 can be used during pregnancy.

No data are available yet regarding the use of Comirnaty Original/Omicron BA.1 during breast-feeding. However, no effects on the breast-fed newborn/infant are anticipated. Data from women who were breast-feeding after vaccination with the initially approved Comirnaty vaccine have not shown a risk for adverse effects in breast-fed newborns/infants. Comirnaty Original/Omicron BA.1 can be used while breast-feeding.

### **Driving and using machines**

Some of the effects of vaccination mentioned in section 4 (Possible side effects) may temporarily affect your ability to drive or use machines. Wait until these effects have worn off before you drive or use machines.

## **3. How Comirnaty Original/Omicron BA.1 is given**

Comirnaty Original/Omicron BA.1 is given as an injection of 0.3 mL into a muscle of your upper arm.

Comirnaty Original/Omicron BA.1 may be given at least 3 months after the most recent dose of a COVID-19 vaccine.

Comirnaty Original/Omicron BA.1 is only indicated for individuals who have previously received at least a primary vaccination course against COVID-19.

Please check with your healthcare provider regarding eligibility for and timing of the booster dose.

For details on the primary vaccination course in individuals 12 years of age and older, please see the Package Leaflet for Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty 30 micrograms/dose concentrate for dispersion for injection.

If you have any further questions on the use of Comirnaty Original/Omicron BA.1, ask your doctor, pharmacist or nurse.

#### **4. Possible side effects**

Like all vaccines, Comirnaty Original/Omicron BA.1 can cause side effects, although not everybody gets them.

**Very common side effects:** may affect more than 1 in 10 people

- injection site: pain, swelling
- tiredness
- headache
- muscle pain
- chills
- joint pain
- diarrhoea
- fever

Some of these side effects were slightly more frequent in adolescents 12 to 15 years than in adults.

**Common side effects:** may affect up to 1 in 10 people

- injection site redness
- nausea
- vomiting

**Uncommon side effects:** may affect up to 1 in 100 people

- enlarged lymph nodes (more frequently observed after the booster dose)
- feeling unwell
- arm pain
- insomnia
- injection site itching
- allergic reactions such as rash or itching
- feeling weak or lack of energy/sleepy
- decreased appetite
- excessive sweating
- night sweats

**Rare side effects:** may affect up to 1 in 1,000 people

- temporary one sided facial drooping
- allergic reactions such as hives or swelling of the face

**Very rare side effects:** may affect up to 1 in 10,000 people

- inflammation of the heart muscle (myocarditis) or inflammation of the lining outside the heart (pericarditis) which can result in breathlessness, palpitations or chest pain

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

- severe allergic reaction
- extensive swelling of the vaccinated limb
- swelling of the face (swelling of the face may occur in patients who have had facial dermatological fillers)
- a skin reaction that causes red spots or patches on the skin, that may look like a target or “bulls-eye” with a dark red centre surrounded by paler red rings (erythema multiforme)
- unusual feeling in the skin, such as tingling or a crawling feeling (paraesthesia)
- decreased feeling or sensitivity, especially in the skin (hypoesthesia)

### **Reporting of side effects**

If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available. By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Comirnaty Original/Omicron BA.1**

Keep this medicine out of the sight and reach of children.

The following information about storage, expiry and use and handling is intended for healthcare professionals.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

Store in freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

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 6 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

Once removed from the freezer, the unopened vial may be stored and transported refrigerated at 2 °C to 8 °C for up to 10 weeks; not exceeding the printed expiry date (EXP). The outer carton should be marked with the new discard date at 2 °C to 8 °C. Once thawed, the vaccine cannot be re-frozen.

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

Thawed vials can be handled in room light conditions.

After first puncture, store the vaccine at 2 °C to 30 °C and use within 12 hours, which includes up to 6 hours transportation time. Discard any unused vaccine.

Do not use this vaccine if you notice particulates or discolouration.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.

## 6. Contents of the pack and other information

### What Comirnaty Original/Omicron BA.1 contains

- The active substance is COVID-19 mRNA Vaccine called tozinameran/riltozinameran. The vial contains 6 doses of 0.3 mL with 15 micrograms of tozinameran and 15 micrograms of riltozinameran (Omicron BA.1) per dose.
- The other ingredients are:
  - ((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

### What Comirnaty Original/Omicron BA.1 looks like and contents of the pack

The vaccine is a white to off-white dispersion (pH: 6.9 - 7.9) provided in a multidose vial of 6 doses in a 2 mL clear vial (type I glass), with a rubber stopper and a grey flip-off plastic cap with aluminium seal.

Pack sizes: 10 vials or 195 vials

Not all pack sizes may be marketed.

### Marketing Authorisation Holder

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service@biontech.de

### Manufacturers

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For any information about this medicine, please contact the local representative of the Marketing Authorisation Holder:

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## Latvija

Pfizer Luxembourg SARL filiāle Latvijā

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**This leaflet was last revised in {MM/YYYY}**

Scan the code with a mobile device to get the package leaflet in different languages.



URL: [www.comirnatyglobal.com](http://www.comirnatyglobal.com)

Detailed information on this medicine is available on the European Medicines Agency website:  
<http://www.ema.europa.eu>.

This package leaflet is available in all EU/EEA languages on the European Medicines Agency website.

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### **The following information is intended for healthcare professionals only:**

The dose of Comirnaty Original/Omicron BA.1 is 0.3 mL given intramuscularly.

There should be an interval of at least 3 months between administration of Comirnaty Original/Omicron BA.1 and the last prior dose of a COVID-19 vaccine.

Comirnaty Original/Omicron BA.1 is only indicated for individuals who have previously received at least a primary vaccination course against COVID-19.

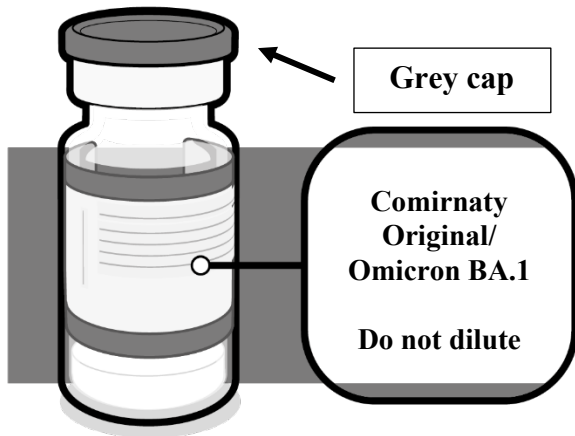
#### Traceability

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

#### **Handling instructions**

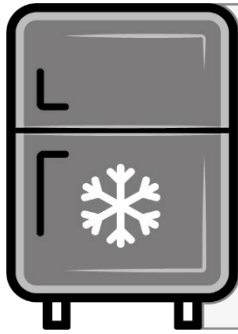
Comirnaty Original/Omicron BA.1 should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY ORIGINAL/OMICRON BA.1  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



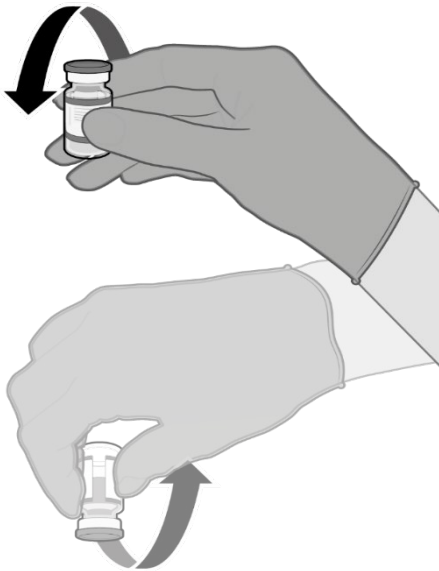
- Verify that the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection.
- If the vial has a grey plastic cap and a grey border and the product name is Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection, please make reference to the Summary of Product Characteristics for that formulation.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

**HANDLING PRIOR TO USE OF COMIRNATY ORIGINAL/OMICRON BA.1  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



**Store for up to 10 weeks at 2 °C to 8 °C, update expiry on carton.**

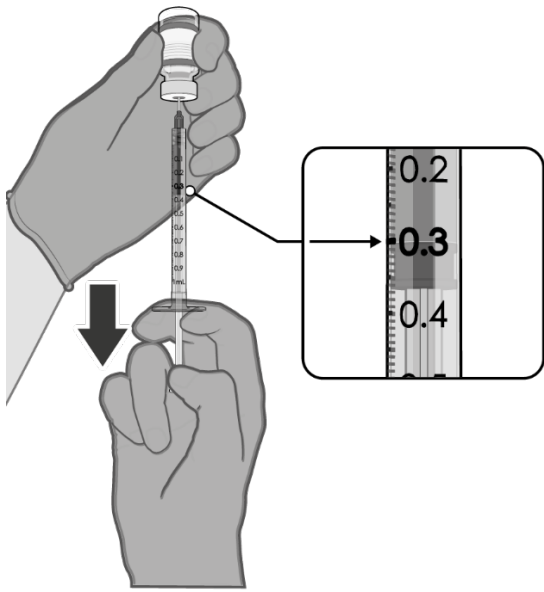
- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 6 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C. Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.



**Gently × 10**

- Gently mix by inverting vials 10 times prior to use. Do not shake.
- Prior to mixing, the thawed dispersion may contain white to off-white opaque amorphous particles.
- After mixing, the vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the vaccine if particulates or discolouration are present.

**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY ORIGINAL/OMICRON BA.1 (15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



**0.3 mL vaccine**

- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.3 mL of Comirnaty Original/Omicron BA.1.

Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. 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 a sixth dose from a single vial.

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Record the appropriate date/time on the vial. Discard any unused vaccine 12 hours after first puncture.

**Disposal**

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

## Package leaflet: Information for the user

### Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection Adults and adolescents from 12 years COVID-19 mRNA Vaccine (nucleoside modified) tozinameran/famtozinameran

▼ This medicine is subject to additional monitoring. This will allow quick identification of new safety information. You can help by reporting any side effects you may get. See the end of section 4 for how to report side effects.

**Read all of this leaflet carefully before you receive this vaccine because it contains important information for you.**

- Keep this leaflet. You may need to read it again.
- If you have any further questions, ask your doctor, pharmacist or nurse.
- If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. See section 4.

#### What is in this leaflet

1. What Comirnaty Original/Omicron BA.4-5 is and what it is used for
2. What you need to know before you receive Comirnaty Original/Omicron BA.4-5
3. How Comirnaty Original/Omicron BA.4-5 is given
4. Possible side effects
5. How to store Comirnaty Original/Omicron BA.4-5
6. Contents of the pack and other information

#### 1. What Comirnaty Original/Omicron BA.4-5 is and what it is used for

Comirnaty Original/Omicron BA.4-5 is a vaccine used for preventing COVID-19 caused by SARS-CoV-2. It is given to adults and adolescents from 12 years of age and older.

Comirnaty Original/Omicron BA.4-5 is only for individuals who have previously received at least a primary vaccination course against COVID-19.

The vaccine causes the immune system (the body's natural defences) to produce antibodies and blood cells that work against the virus, so giving protection against COVID-19.

As Comirnaty Original/Omicron BA.4-5 does not contain the virus to produce immunity, it cannot give you COVID-19.

#### 2. What you need to know before you receive Comirnaty Original/Omicron BA.4-5

##### Comirnaty Original/Omicron BA.4-5 should not be given

- if you are allergic to the active substance or any of the other ingredients of this medicine (listed in section 6)

##### Warnings and precautions

Talk to your doctor, pharmacist or nurse before you are given the vaccine if:

- you have ever had a severe allergic reaction or breathing problems after any other vaccine injection or after you were given Comirnaty in the past.
- you are feeling nervous about the vaccination process or have ever fainted following any needle injection.
- you have a severe illness or infection with high fever. However, you can have your vaccination if you have a mild fever or upper airway infection like a cold.

- you have a bleeding problem, you bruise easily or you use a medicine to prevent blood-clots.
- you have a weakened immune system, because of a disease such as HIV infection or a medicine such as corticosteroid that affects your immune system.

There is an increased risk of myocarditis (inflammation of the heart muscle) and pericarditis (inflammation of the lining outside the heart) after vaccination with Comirnaty (see section 4). These conditions can develop within just a few days after vaccination and have primarily occurred within 14 days. They have been observed more often after the second vaccination, and more often in younger males. The risk of myocarditis and pericarditis seems lower in children ages 5 to 11 years compared with ages 12 to 17 years. Following vaccination, you should be alert to signs of myocarditis and pericarditis, such as breathlessness, palpitations and chest pain, and seek immediate medical attention should these occur.

As with any vaccine, Comirnaty Original/Omicron BA.4-5 may not fully protect all those who receive it and it is not known how long you will be protected.

The efficacy of Comirnaty Original/Omicron BA.4-5 may be lower in people who are immunocompromised. In these cases, you should continue to maintain physical precautions to help prevent COVID-19. In addition, your close contacts should be vaccinated as appropriate. Discuss appropriate individual recommendations with your doctor.

### **Children**

Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection is not recommended for children aged under 12 years.

### **Other medicines and Comirnaty Original/Omicron BA.4-5**

Tell your doctor or pharmacist if you are using, have recently used or might use any other medicines or have recently received any other vaccine.

### **Pregnancy and breast-feeding**

If you are pregnant or think you may be pregnant, tell your doctor, nurse or pharmacist before you receive this vaccine.

No data are available yet regarding the use of Comirnaty Original/Omicron BA.4-5 during pregnancy. However, a large amount of information from pregnant women vaccinated with the initially approved Comirnaty vaccine during the second and third trimester have not shown negative effects on the pregnancy or the newborn baby. While information on effects on pregnancy or the newborn baby after vaccination during the first trimester is limited, no change to the risk for miscarriage has been seen. Comirnaty Original/Omicron BA.4-5 can be used during pregnancy.

No data are available yet regarding the use of Comirnaty Original/Omicron BA.4-5 during breast-feeding. However, no effects on the breast-fed newborn/infant are anticipated. Data from women who were breast-feeding after vaccination with the initially approved Comirnaty vaccine have not shown a risk for adverse effects in breastfed newborns/infants. Comirnaty Original/Omicron BA.4-5 can be used while breast-feeding.

### **Driving and using machines**

Some of the effects of vaccination mentioned in section 4 (Possible side effects) may temporarily affect your ability to drive or use machines. Wait until these effects have worn off before you drive or use machines.

## **3. How Comirnaty Original/Omicron BA.4-5 is given**

Comirnaty Original/Omicron BA.4-5 is given as an injection of 0.3 mL into a muscle of your upper arm.

Comirnaty Original/Omicron BA.4-5 may be given at least 3 months after the most recent dose of a COVID-19 vaccine.

Comirnaty Original/Omicron BA.4-5 is only indicated for individuals who have previously received at least a primary vaccination course against COVID-19.

Please check with your healthcare provider regarding eligibility for and timing of the booster dose.

For details on the primary vaccination course in individuals 12 years of age and older, please see the Package Leaflet for Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty 30 micrograms/dose concentrate for dispersion for injection.

If you have any further questions on the use of Comirnaty Original/Omicron BA.4-5, ask your doctor, pharmacist or nurse.

#### **4. Possible side effects**

Like all vaccines, Comirnaty Original/Omicron BA.4-5 can cause side effects, although not everybody gets them.

**Very common side effects:** may affect more than 1 in 10 people

- injection site: pain, swelling
- tiredness
- headache
- muscle pain
- chills
- joint pain
- diarrhoea
- fever

Some of these side effects were slightly more frequent in adolescents 12 to 15 years than in adults.

**Common side effects:** may affect up to 1 in 10 people

- injection site redness
- nausea
- vomiting

**Uncommon side effects:** may affect up to 1 in 100 people

- enlarged lymph nodes (more frequently observed after the booster dose)
- feeling unwell
- arm pain
- insomnia
- injection site itching
- allergic reactions such as rash or itching
- feeling weak or lack of energy/sleepy
- decreased appetite
- excessive sweating
- night sweats

**Rare side effects:** may affect up to 1 in 1,000 people

- temporary one sided facial drooping
- allergic reactions such as hives or swelling of the face

**Very rare side effects:** may affect up to 1 in 10,000 people

- inflammation of the heart muscle (myocarditis) or inflammation of the lining outside the heart (pericarditis) which can result in breathlessness, palpitations or chest pain

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

- severe allergic reaction
- extensive swelling of the vaccinated limb
- swelling of the face (swelling of the face may occur in patients who have had facial dermatological fillers)
- a skin reaction that causes red spots or patches on the skin, that may look like a target or “bulls-eye” with a dark red centre surrounded by paler red rings (erythema multiforme)
- unusual feeling in the skin, such as tingling or a crawling feeling (paraesthesia)
- decreased feeling or sensitivity, especially in the skin (hypoaesthesia)

### **Reporting of side effects**

If you get any side effects, talk to your doctor, pharmacist or nurse. This includes any possible side effects not listed in this leaflet. You can also report side effects directly via the national reporting system listed in [Appendix V](#) and include batch/Lot number if available. By reporting side effects you can help provide more information on the safety of this medicine.

## **5. How to store Comirnaty Original/Omicron BA.4-5**

Keep this medicine out of the sight and reach of children.

The following information about storage, expiry and use and handling is intended for healthcare professionals.

Do not use this medicine after the expiry date which is stated on the carton and label after EXP. The expiry date refers to the last day of that month.

Store in freezer at -90 °C to -60 °C.

Store in the original package in order to protect from light.

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 6 hours or individual vials can be thawed at room temperature (up to 30 °C) for 30 minutes.

Once removed from the freezer, the unopened vial may be stored and transported refrigerated at 2 °C to 8 °C for up to 10 weeks; not exceeding the printed expiry date (EXP). The outer carton should be marked with the new discard date at 2 °C to 8 °C. Once thawed, the vaccine cannot be re-frozen.

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

Thawed vials can be handled in room light conditions.

After first puncture, store the vaccine at 2 °C to 30 °C and use within 12 hours, which includes up to 6 hours transportation time. Discard any unused vaccine.

Do not use this vaccine if you notice particulates or discolouration.

Do not throw away any medicines via wastewater or household waste. Ask your pharmacist how to throw away medicines you no longer use. These measures will help protect the environment.



## 6. Contents of the pack and other information

### What Comirnaty Original/Omicron BA.4-5 contains

- The active substance is COVID-19 mRNA Vaccine called tozinameran/famtozinameran. The vial contains 6 doses of 0.3 mL with 15 micrograms of tozinameran and 15 micrograms of famtozinameran (Omicron BA.4-5) per dose.
- The other ingredients are:
  - ((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

### What Comirnaty Original/Omicron BA.4-5 looks like and contents of the pack

The vaccine is a white to off-white dispersion (pH: 6.9 - 7.9) provided in a multidose vial of 6 doses in a 2 mL clear vial (type I glass), with a rubber stopper and a grey flip-off plastic cap with aluminium seal.

Pack sizes: 10 vials or 195 vials

Not all pack sizes may be marketed.

### Marketing Authorisation Holder

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**This leaflet was last revised in {MM/YYYY}**

Scan the code with a mobile device to get the package leaflet in different languages.

URL: [www.comirnatyglobal.com](http://www.comirnatyglobal.com)Detailed information on this medicine is available on the European Medicines Agency website:  
<http://www.ema.europa.eu>.

This package leaflet is available in all EU/EEA languages on the European Medicines Agency website.

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**The following information is intended for healthcare professionals only:**

The dose of Comirnaty Original/Omicron BA.4-5 is 0.3 mL given intramuscularly.

There should be an interval of at least 3 months between administration of Comirnaty Original/Omicron BA.4-5 and the last prior dose of a COVID-19 vaccine.

Comirnaty Original/Omicron BA.4-5 is only indicated for individuals who have previously received at least a primary vaccination course against COVID-19.

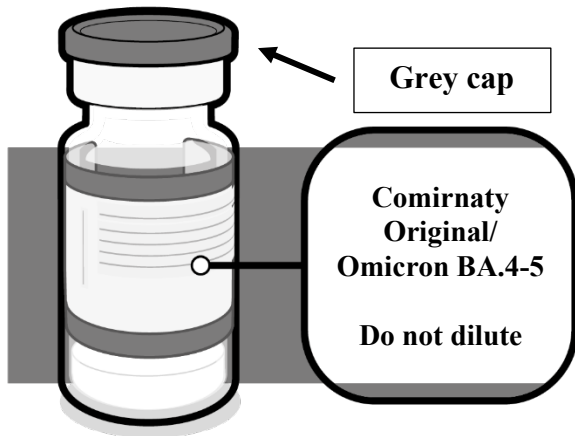
**Traceability**

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

**Handling instructions**

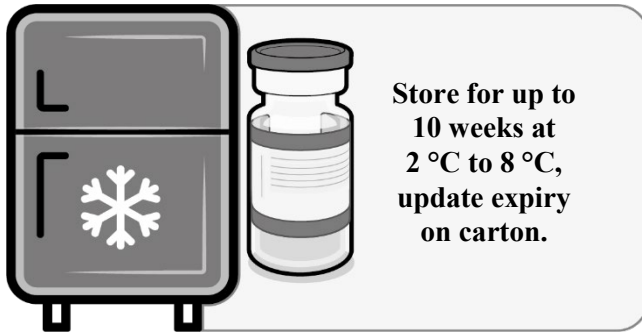
Comirnaty Original/Omicron BA.4-5 should be prepared by a healthcare professional using aseptic technique to ensure the sterility of the prepared dispersion.

**VIAL VERIFICATION OF COMIRNATY ORIGINAL/OMICRON BA.4-5  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



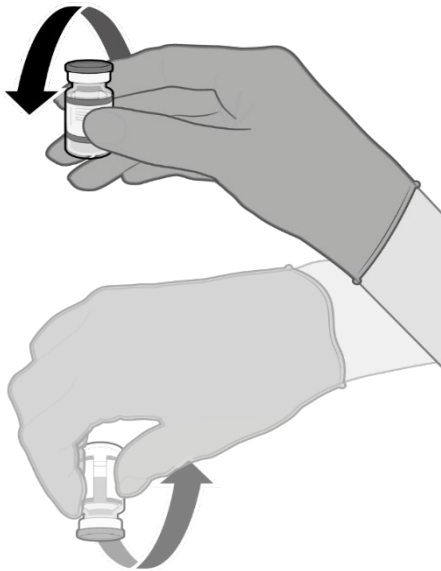
- Verify that the vial has a grey plastic cap and a grey border around the label and the product name is Comirnaty Original/Omicron BA.4-5 (15/15 micrograms)/dose dispersion for injection.
- If the vial has a grey plastic cap and a grey border and the product name is Comirnaty 30 micrograms/dose dispersion for injection or Comirnaty Original/Omicron BA.1 (15/15 micrograms)/dose dispersion for injection, please make reference to the Summary of Product Characteristics for that formulation.
- If the vial has a purple plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 30 micrograms/dose concentrate for dispersion for injection.
- If the vial has an orange plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 10 micrograms/dose concentrate for dispersion for injection.
- If the vial has a maroon plastic cap, please make reference to the Summary of Product Characteristics for Comirnaty 3 micrograms/dose concentrate for dispersion for injection.

**HANDLING PRIOR TO USE OF COMIRNATY ORIGINAL/OMICRON BA.4-5  
(15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



Store for up to  
10 weeks at  
2 °C to 8 °C,  
update expiry  
on carton.

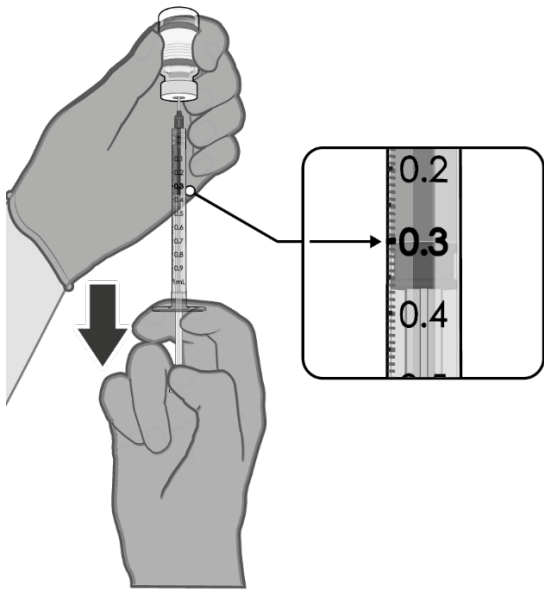
- If the multidose vial is stored frozen it must be thawed prior to use. Frozen vials should be transferred to an environment of 2 °C to 8 °C to thaw; a 10 vial pack may take 6 hours to thaw. Ensure vials are completely thawed prior to use.
- Upon moving vials to 2 °C to 8 °C storage, update the expiry date on the carton.
- Unopened vials can be stored for up to 10 weeks at 2 °C to 8 °C; not exceeding the printed expiry date (EXP).
- Alternatively, individual frozen vials may be thawed for 30 minutes at temperatures up to 30 °C.
- Prior to use, the unopened vial can be stored for up to 12 hours at temperatures up to 30 °C. Thawed vials can be handled in room light conditions.



**Gently × 10**

- Gently mix by inverting vials 10 times prior to use. Do not shake.
- Prior to mixing, the thawed dispersion may contain white to off-white opaque amorphous particles.
- After mixing, the vaccine should present as a white to off-white dispersion with no particulates visible. Do not use the vaccine if particulates or discolouration are present.

**PREPARATION OF INDIVIDUAL 0.3 mL DOSES OF COMIRNATY ORIGINAL/OMICRON BA.4-5 (15/15 MICROGRAMS)/DOSE DISPERSION FOR INJECTION (12 YEARS AND OLDER)**



**0.3 mL vaccine**

- Using aseptic technique, cleanse the vial stopper with a single-use antiseptic swab.
- Withdraw 0.3 mL of Comirnaty Original/Omicron BA.4-5.

Low dead-volume syringes and/or needles should be used in order to extract 6 doses from a single vial. 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 a sixth dose from a single vial.

- Each dose must contain 0.3 mL of vaccine.
- If the amount of vaccine remaining in the vial cannot provide a full dose of 0.3 mL, discard the vial and any excess volume.
- Record the appropriate date/time on the vial. Discard any unused vaccine 12 hours after first puncture.

**Disposal**

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