Clinical Study Results

This summary reports the results of only one study. Researchers must look at the results of many types of studies to understand if a study vaccine works, how it works, and if it is safe to prescribe to patients. The results of this study might be different than the results of other studies that the researchers review.

Sponsor:	BioNTech SE
Sponsor Agent:	Pfizer Inc.
Vaccine Studied:	Comirnaty® (Pfizer-BioNTech RNA-based COVID-19 Vaccine), also known as BNT162b2 or PF-07302048
Protocol Number:	C4591031 Substudy C
Dates of Study:	20 December 2021 to 02 December 2022
Title of this Study:	A Study of BNT162b2 COVID-19 Vaccine Given as a Booster Shot in Healthy Young People 12 to 17 Years Old Who Had Already Received BNT162b2 COVID-19 Vaccine Before [Substudy C Final Report: A Phase 3 Master Protocol to Evaluate Additional Dose(s) of BNT162b2 in Healthy Individuals Previously Vaccinated With BNT162b2]
Date of this Report:	02 February 2024

– Thank You –

If you or your child participated in this study, Pfizer, the Sponsor agent, would like to thank you for your participation.

This summary will describe the study results. If you or your child has any questions about the study or the results, please contact the doctor or staff at your or your child's study site.

Why was this study done?

What is COVID-19?

Coronavirus disease 2019 (or COVID-19) is caused by a virus called **s**evere **a**cute **r**espiratory **s**yndrome **co**rona**v**irus **2** (SARS-CoV-2).

COVID-19 spreads easily from person to person and can cause mild to severe illness. People with COVID-19 can have fever, chills, cough, loss of taste or smell, or trouble breathing.

All viruses, including the COVID-19 virus, are expected to change over time. These changes or mutations from the original virus are called different strains or **variants**. Compared to the original COVID-19 virus, the **Delta** and **Omicron** strains spread more easily between people.

What is BNT162b2 vaccine (BNT)?

BNT162b2 (also known as Comirnaty®) is called **BNT** in this summary. It is an injectable vaccine that may help the body's immune system to defend against COVID-19.

BNT is the original monovalent COVID-19 vaccine that was designed to target the original strain of the COVID-19 virus.

- It does not contain a whole virus or any part of the virus that can cause COVID-19.
- It is made up of a part of the virus's genetic code, surrounded by fatty particles called lipids. It uses the body's own cells to produce a spike protein, which may help the body produce antibodies to fight against COVID-19.

A **monovalent** COVID-19 vaccine can target 1 strain of the COVID-19 virus.

At the time of this study, BNT had been widely approved around the world. In July 2022, before this study ended, the United States (US) health agency approved **BNT 30 micrograms** (also called **mcg**) for people 12 years of age and older in the US.

What was the purpose of this study?

The main purpose of this study was to learn if a booster shot of BNT at 2 different strengths works well and is safe in healthy young people (teenagers) from 12 to 17 years old.

When a person first gets a vaccine, a protective **immune response** is triggered in the body. This means that the body's immune system is activated to make **antibodies**.

- **Antibodies** are proteins that can fight off infections and help prevent disease.
- An **immune response** is the body's ability to find and fight off germs that cause disease.

A person's immune protection from a disease can fade over time.

- A **booster shot** is the extra dose of a vaccine after receiving the first (primary) dose or series of doses.
- A booster shot can help the immune system maintain or **boost** the level of protection against a disease.

Researchers wanted to know:

- **Did participants have an immune response to the original strain of the COVID-19 virus after they got a BNT booster shot?**
- **How many participants had redness, swelling, or pain at the injection site within 7 days after the BNT booster shot?**
- **How many participants had fever, tiredness, headache, chills, vomiting, diarrhea, muscle pain, or joint pain within 7 days after the BNT booster shot?**
- **What medical problems did participants have during the study?**

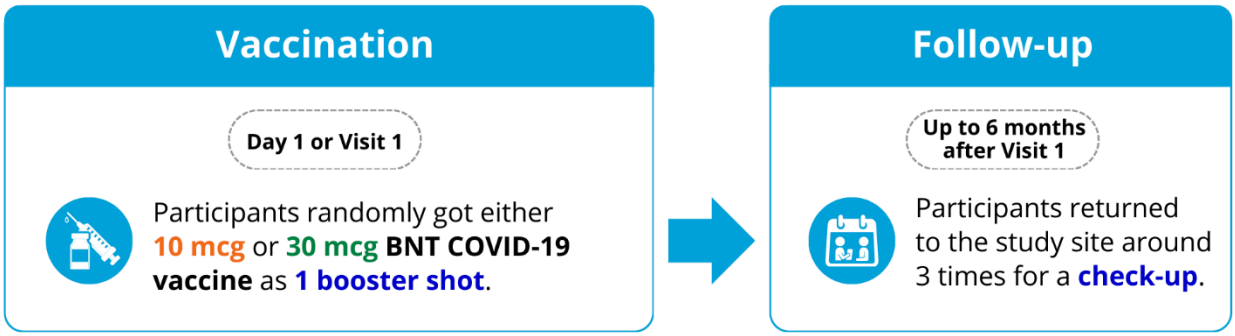
What happened during the study?

How was the study done?

Participants were assigned at random (or by chance) to get either **10 mcg or 30 mcg BNT** as **1 booster shot**.

Figure 1 below shows what happened during the study.

Figure 1. What happened in this study?



Throughout the study, participants had blood samples taken and had health checks done.

Type of study:

The study was **observer-blinded**. This means that only the healthcare staff who gave the injections knew which BNT dose the participants got. During the earlier part of the study, participants and researchers did not know which BNT dose was given.

Then, 3 months after the BNT booster shot, participants and researchers could have been told which dose was given.

At first, it was planned to sign up adult participants after the study doctors checked the safety and immune responses of the teenage participants. But, signing up adult participants did not happen because of a change in the study plan. This change in the study plan was not because of any safety concerns with the BNT vaccine. The reasons for the change were:

- The US health agency recommended that people of all ages get a COVID-19 booster shot, making the booster shot available outside of this study.
- There was no need to look into a lower dose of BNT anymore because earlier studies have shown that 30 mcg BNT was well tolerated.

When the study plan changed, participants who were already part of this study were allowed to continue until the study ended.

Where did this study take place?

This study ran at 15 locations in the US.

When did this study take place?

It began on 20 December 2021 and ended on 02 December 2022.

Who participated in this study?

The study included participants 12 to 17 years old who had already gotten 2 primary doses of BNT before the start of this study.

- A total of 70 boys and 70 girls participated.
- All participants were from 12 to 17 years of age.

Of the 140 participants who started the study:

- 75 received **10 mcg BNT** and 65 received **30 mcg BNT** in this study.
- 127 finished the study and 13 did not finish the study. The most common reason for not finishing the study was participants or their caregivers could not be contacted for follow-up.

How long did the study last?

Study participants were in the study for around 6 months. The entire study took around 1 year to complete.

When the study ended in December 2022, the Sponsor agent began reviewing the information collected. The Sponsor agent then created a report of the results. This is a summary of that report.

What were the results of the study?

Did participants have an immune response against the original strain of the COVID-19 virus after they got a BNT booster shot?

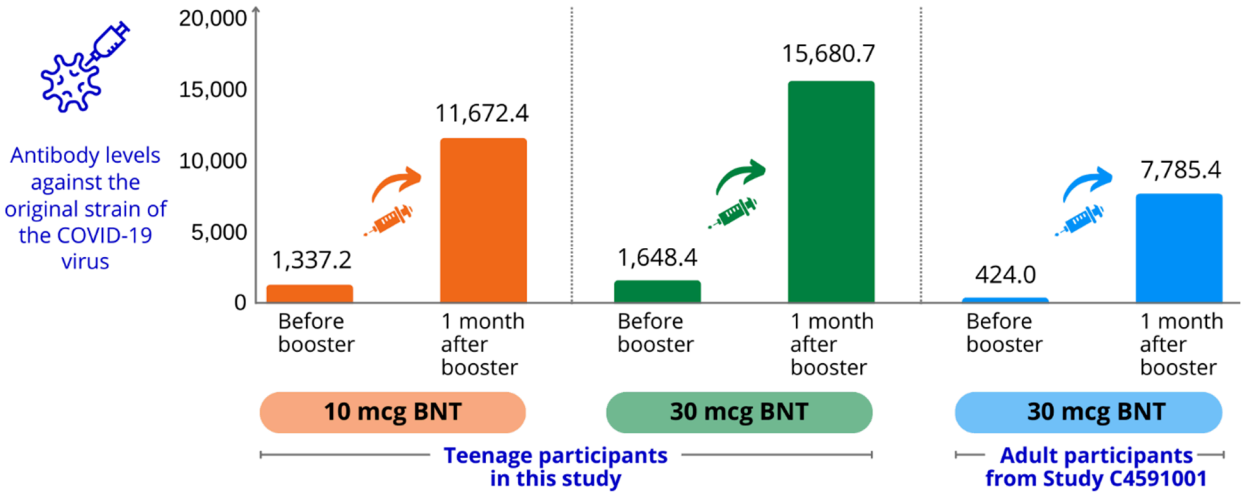
To answer this question, researchers checked the participants' **antibodies against the original strain of the COVID-19 virus**. Antibody levels were measured before and after participants got their BNT booster shot.

The orange and green bars in Figure 2 below show the results.

In this study, participants had strong immune responses against the original strain of the COVID-19 virus 1 month after getting either 10 mcg or 30 mcg BNT booster shot.

The study results mean that, among healthy teenagers 12 to 17 years old who had already gotten 2 primary doses of BNT before, a booster shot of **10 mcg or 30 mcg BNT** may offer protection against the original strain of the COVID-19 virus.

Figure 2. What happened to the antibody levels against the original strain of the COVID-19 virus after the BNT booster shot?



Researchers compared the results of participants in this study to the results of a randomly selected group of participants from another study called **C4591001**. The participants from Study C4591001 were healthy adults 18 to 55 years old. Participants from both studies got a BNT booster shot after 2 primary doses of BNT.

Figure 2 above shows the results of **teenage participants** in this study (orange and green bars) and **adult participants** from Study C4591001 (blue bars). The chart shows their **antibody levels against the original strain of the COVID-19 virus**.

- **Before the BNT booster shot,** the teenagers had higher antibody levels than the adults. This suggests that, after their primary doses of BNT, the teenagers had stronger immune responses than the adults.
- **1 month after the BNT booster shot,** the antibody levels increased in teenagers who got 10 mcg or 30 mcg BNT booster and in adults who got 30 mcg BNT booster. The teenagers had higher antibody levels than the adults after their BNT booster.

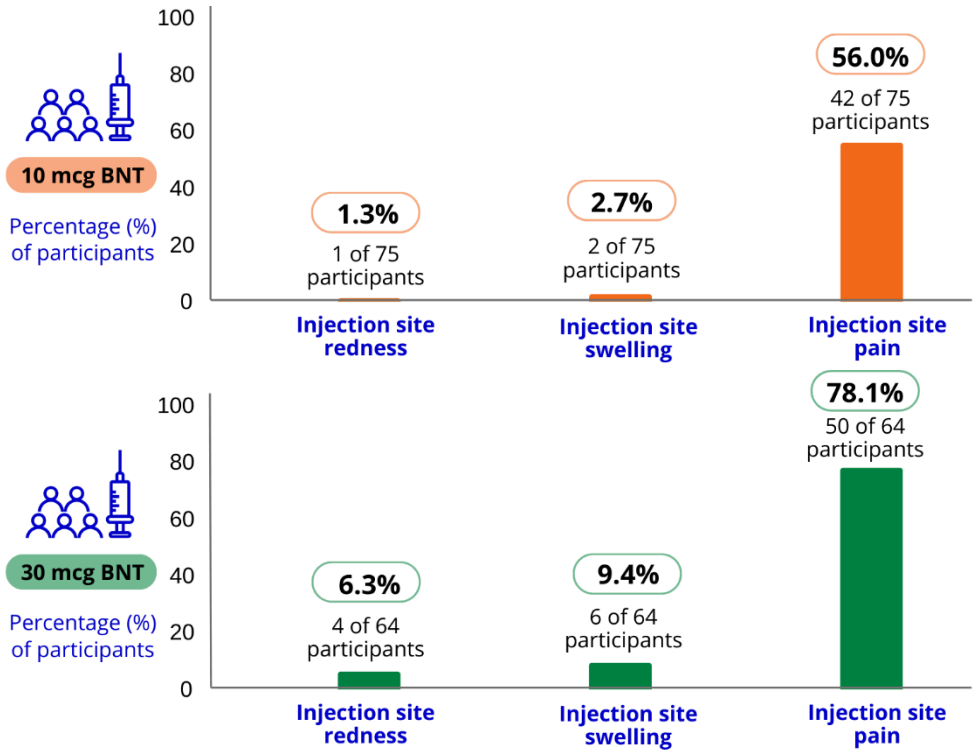
How many participants had redness, swelling, or pain at the injection site within 7 days after the BNT booster shot?

To answer this question, researchers checked the electronic diary records of participants in this study.

Figure 3 shows that, within 7 days after the BNT booster shot, more participants in the **30 mcg BNT** group (**6.3%** to **78.1%**) had injection site reactions of redness, swelling, or pain compared to those in the **10 mcg BNT** group (**1.3%** to **56.0%**).

All of these injection site reactions were mild or moderate in severity and lasted about 1 to 3 days. The most common injection site reaction was pain.

Figure 3. How many participants had redness, swelling, or pain at the injection site within 7 days after the BNT booster shot?



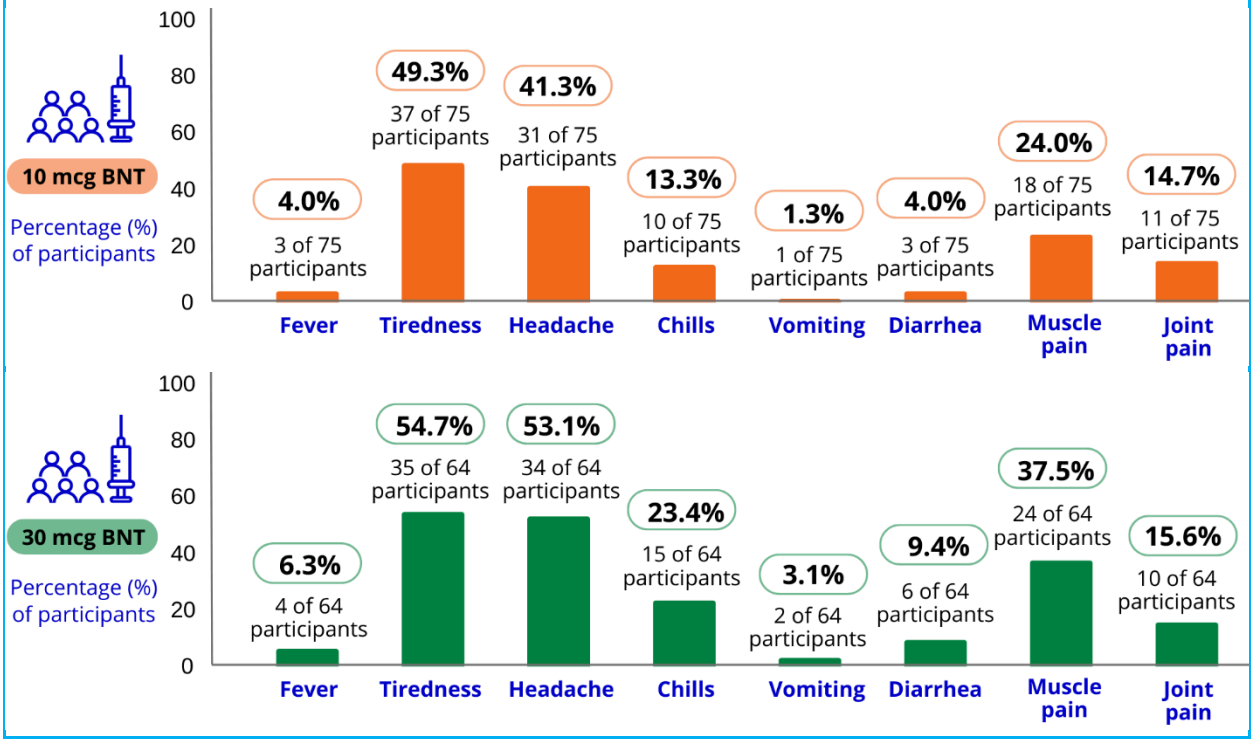
How many participants had fever, tiredness, headache, chills, vomiting, diarrhea, muscle pain, or joint pain within 7 days after the BNT booster shot?

To answer this question, researchers checked the electronic diary records of participants in this study.

Figure 4 shows that, within 7 days after the BNT booster shot, more participants in the **30 mcg BNT** group (**3.1%** to **54.7%**) had symptoms of fever, tiredness, headache, chills, vomiting, diarrhea, muscle pain, or joint pain compared to those in the **10 mcg BNT** group (**1.3%** to **49.3%**).

Most of these symptoms were mild or moderate in severity and lasted about 1 day. The most common symptoms were tiredness and headache.

Figure 4. How many participants had fever, tiredness, headache, chills, vomiting, diarrhea, muscle pain, or joint pain within 7 days after the BNT booster shot?



This does not mean that everyone in this study had these results. This is a summary of just some of the main results of this study. Other studies may have different results.

What medical problems did participants have during the study?

The researchers recorded any medical problems the participants had during the study. Participants could have had medical problems for reasons not related to the study (for example, caused by an underlying disease or by chance). Or, medical problems could also have been caused by a study vaccine or by another medicine the participant was taking. Sometimes the cause of a medical problem is unknown. By comparing medical problems across many vaccine groups in many studies, doctors try to understand what effects a study vaccine might have on a participant.

Overall, no participant left the study early because of a medical problem they had during the study.

How many participants had a medical problem within 1 month after the BNT booster shot?

Within 1 month after the BNT booster shot, **4.0%** of participants in the **10 mcg BNT** group and **7.7%** of participants in the **30 mcg BNT** group had at least 1 medical problem.

Most of the medical problems reported by participants are those that can often be seen in teenagers. Table 1 describes these medical problems.

Below are instructions on how to read Table 1.

Instructions for Understanding Table 1.

- The **1st** column of Table 1 lists all medical problems reported within 1 month after the BNT booster shot.
- The **2nd** column tells how many of the 75 participants in the 10 mcg BNT group reported each medical problem. Next to this number is the percentage of the 75 participants in this group who reported the medical problem.
- The **3rd** column tells how many of the 65 participants in the 30 mcg BNT group reported each medical problem. Next to this number is the percentage of the 65 participants in this group who reported the medical problem.
- For example, using these instructions, you can see how many participants were reported with attention deficit hyperactivity disorder (ADHD):
    - 0 out of 75 participants (0%) in the 10 mcg BNT group.
    - 2 out of 65 participants (3.1%) in the 30 mcg BNT group.

Table 1. Medical problems reported within 1 month after the 10 mcg or 30 mcg BNT booster shot		
Medical Problem	**10 mcg BNT (75 Participants)**	**30 mcg BNT (65 Participants)**
Attention deficit hyperactivity disorder (ADHD)	0 out of 75 participants (0%)	2 out of 65 participants (3.1%)
Nosebleed	1 out of 75 participants (1.3%)	0 out of 65 participants (0%)
Hay fever (or allergic rhinitis)	0 out of 75 participants (0%)	1 out of 65 participants (1.5%)
Allergies	0 out of 75 participants (0%)	1 out of 65 participants (1.5%)
Ear infection	1 out of 75 participants (1.3%)	0 out of 65 participants (0%)
Joint pain	1 out of 75 participants (1.3%)	0 out of 65 participants (0%)
Fainting or temporary loss of consciousness	0 out of 75 participants (0%)	1 out of 65 participants (1.5%)
Menstrual or period cramps	0 out of 75 participants (0%)	1 out of 65 participants (1.5%)

Did study participants have any serious medical problems?

A medical problem is considered “serious” when it is life-threatening, needs hospital care, or causes lasting problems.

How many participants had a serious medical problem within 6 months after the BNT booster shot?

Within 6 months after the BNT booster shot, no participant (**0%**) in the **10 mcg BNT** group and 1 out of 65 participants (**1.5%**) in the **30 mcg BNT** group had a serious medical problem.

- The participant in the 30 mcg BNT group had constipation (hard stools or fewer than usual bowel movements).
- Researchers do not believe that this serious medical problem was related to the 30 mcg BNT booster shot.

No participant died during the study.

Where can I learn more about this study?

If you or your child have questions about the results of your or your child's study, please speak with the doctor or staff at your study site.

For more details on your study protocol, please visit:

www.pfizer.com/research/research_clinical_trials/trial_results	Use the protocol number **C4591031 Substudy C**

The full scientific report of this study is available online at:

www.clinicaltrials.gov	Use the study identifier **NCT04955626**
www.clinicaltrialsregister.eu	Use the study identifier **2021-005197-25**

Please remember that researchers look at the results of many studies to find out which vaccines can work and are safe for patients.

Again, if you or your child participated in this study, **thank you** for volunteering. We do research to try to find the best ways to help patients, and you helped us to do that!