BNT162b2 Vaccine Candidate Against COVID-19

Vaccines and Related Biological Products Advisory Committee

December 10, 2020
Introduction

Kathrin Jansen, PhD
Senior Vice President & Head of Vaccine R&D
Pfizer
Presentation Agenda

Introduction

- Kathrin Jansen, PhD
  Senior Vice President and Head of Vaccine R&D

BNT162b2 Development Program

- William Gruber, MD, FAAP, FIDSA
  Senior Vice President Vaccine Clinical R&D

  • Non-Clinical Data
  • Clinical Safety
  • Clinical Efficacy

Benefit- Risk & Conclusions

- Kathrin Jansen, PhD
  Senior Vice President and Head of Vaccine R&D
# BNT162b2 Vaccine

## Proposed Indication:
Prevention of Coronavirus Disease 2019 (COVID-19) caused by SARS-CoV-2

<table>
<thead>
<tr>
<th>DOSE LEVEL and REGIMEN</th>
<th>PRESENTATION</th>
<th>STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 30 µg</td>
<td>• 5 dose multidose vial</td>
<td>• -80°C to -60°C</td>
</tr>
<tr>
<td>• 2 doses given greater than or equal to 21 days apart</td>
<td></td>
<td>• 5 days at 2°-8°C</td>
</tr>
</tbody>
</table>

- Individuals 16 years of age and older
COVID-19 and the Current Health Crisis

• First case of COVID 19 identified in Wuhan, China in December 2019
• Worldwide Pandemic declared in March ’20
• ~65 million reported cases globally; ~1.5 million deaths (12/3/20)¹
  – Severity and case fatality rate highest in elderly and those with hypertension, diabetes, cardiovascular disease, obesity, men, Native Americans, blacks and latinx²
  – Groups at high risk for acquisition include healthcare workers, nursing home patients, meat processing plants, correctional facilities, military
• Recent dramatic increases globally including the United States²
• Serologic studies indicate we are nowhere near herd immunity thresholds in the US³
• Treatments are being identified but have limitations
  – Antivirals, steroids, monoclonal cocktails and hyperimmune plasma

The only way to return to normal lives may be with safe and efficacious vaccines

¹. JHU COVID19 site https://coronavirus.jhu.edu/map.html;
Importance of SARS-COV-2 Spike Protein

1. Wrapp et al., 2020, Science.

SARS-COV-2 (3D Model)

Spike Protein

SARS-COV-2 Spike Protein 3D Structure¹
Advantages of mRNA Vaccine Platform

**Safety**
- Non-infectious, chemically defined, no viral foreign proteins

**Efficacy**
- Broad immune responses, minimal risk of anti-vector immunity, and permits frequent boosting

**Rapid Response**
- Technology enables rapid development and quick production scaling
Mode of Action of the BNT162 Vaccine Candidates

1. **modRNA formulated in LNP enters cell**
   - Cap
   - 5'UTR
   - Spike
   - 3'UTR
   - AAAAAA

2. **mRNA is released**
   - Spike protein is made and processed

3. **APCs present S protein fragments**
   - CD4+ Helper T Cell
   - Activates T and B cells

4. **Virus Neutralizing Antibodies**
   - Bind Spike proteins and prevent virus infection of human cells

   - CD8+ Cytotoxic T Cell
   - Eliminates virus infected cells; potentially increases length of protection

   - Memory T and B cells
   - Provide immune memory to ensure longer-term protection against SARS-CoV-2
Selection of Pfizer/BioNTech COVID-19 Vaccine BNT162b2

Initially Four Vaccine Candidates

<table>
<thead>
<tr>
<th>Variant</th>
<th>Target</th>
<th>RNA Construct</th>
<th>Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>162a1 RBD subunit</td>
<td>uRNA</td>
<td>Prime/boost</td>
</tr>
<tr>
<td>2</td>
<td>162b1 RBD subunit</td>
<td>modRNA</td>
<td>Prime/boost</td>
</tr>
<tr>
<td>3</td>
<td>162b2 P2-mutated full spike protein</td>
<td>modRNA</td>
<td>Prime/boost</td>
</tr>
<tr>
<td>4</td>
<td>162c2 P2-mutated full spike protein</td>
<td>saRNA</td>
<td>Single injection</td>
</tr>
</tbody>
</table>

uRNA: unmodified mRNA  
modRNA: nucleoside modified mRNA  
saRNA: self-amplifying mRNA  
Top Priorities for Vaccine Development

- COVID-19 Vaccine development has followed normal vaccine development principles:
  1. The vaccine must be proven effective, meaning it can help prevent COVID-19 in at least a majority of vaccinated people
  2. The vaccine must be proven safe, with robust safety data generated from thousands of people
  3. The vaccine must be consistently manufactured at the highest quality standards

- In response to global health crisis we progressed our program swiftly while ensuring highest compliance and quality standards and ensuring safety
Responding to the Global Health Crisis with the BNT162b2 Vaccine

ADVANCED MANUFACTURING

Process Dev  Scale-up  Validate  Large Scale Production

DISCOVERY & PRECLINICAL DEVELOPMENT
SARS-CoV-2 Genetic Sequence  Animal Studies

CLINICAL GLOBAL PHASE 1/2/3 TRIAL
Phase 1  Pivotal Phase 2 / 3
In addition, Phase 1 in Germany
~44,000 people above 12 years of age

Weekly Data Monitoring Committee Reviews

JAN 2020  MAR  APR  JUL
Pfizer/BioNTech Letter of Intent
Signed March 17, 2020

Candidate/Dose Selection
BNT162b2
July 24, 2020

EUA Submission
November 20, 2020
Potential BLA Submission
Goal: Q2 2021

Note: All future dates represented in graphic reflect anticipated timelines and are subject to clinical, technical, and regulatory success
BNT162b2 – Meets EUA Guidance for COVID-19

Clear and Compelling Data Demonstrating Vaccine’s Safety and Efficacy

- Nonclinical data supports vaccine effectiveness and safety
- Phase 1 and 2 data support safety and efficacy and duration of protection
- Meets all safety data expectations for follow up durations and subject number
- Vaccine Safety / COVID-19 outcomes in individuals with prior SARS-CoV-2
- Sufficient cases of severe COVID-19 to support low risk for vaccine-induced ERD
- Final Analysis with a point estimate over 50% (95% efficacy)
- Vaccine’s benefits outweigh its risks based on well-designed Phase 3 clinical trial
- Consistent Manufacturing data with appropriate controls
- Plans for active follow up of safety under EUA
BNT162b2 Development Program

William Gruber, MD, FAAP, FIDSA
Senior Vice President Vaccine Clinical R&D
Pfizer
Non-Clinical Data
# Key Nonclinical Studies with BNT162b2

<table>
<thead>
<tr>
<th>Study No.</th>
<th>Study Description</th>
<th>Key Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>38166</td>
<td>17-Day, 2 or 3 Dose (1 Dose/Week) IM Toxicity in Rats With a 3 Week Recovery Period</td>
<td>Completed with no safety concerns</td>
</tr>
<tr>
<td>20GR142</td>
<td>17-Day IM Toxicity Study of BNT162b2 and BNT162b3c in Wistar Han Rats with a 3-Week Recovery</td>
<td>Completed with no safety concerns</td>
</tr>
<tr>
<td>20256434</td>
<td>A Combined Fertility and Developmental Study (Including Teratogenicity and Postnatal Investigations) of BNT162b1, BNT162b2 and BNT162b3 by the Intramuscular Route in the Wistar Rat</td>
<td>Ongoing with preliminary results mid-December 2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pharmacology Studies</th>
<th>Study No.</th>
<th>Study Description</th>
<th>Key Message</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VR-VTR-10671</td>
<td>BNT162b2 Immunogenicity and Evaluation of Protection against SARS-CoV-2 Challenge in Rhesus Macaques</td>
<td>Completed and showed that BNT162b2 protects against SARS-CoV 2</td>
</tr>
</tbody>
</table>
Efficacy & Safety Topics

- Phase 1 German and US studies
  - Safety
  - Immunogenicity

- Phase 2/3 global study
  - Study design
  - Primary/secondary objectives
  - COVID-19 definitions
  - Safety
  - Efficacy
# BNT162b2 Phase 1 Studies

## German Study
**BNT162-01**

- **18-55 years of age**
- **12 active vaccine/cohort**
- **Safety, immunogenicity**
- **Cell Mediated Responses**

## US Study
**C4591001**

- **18-55 and 65-85 years of age**
- **12 active vaccine, 3 placebo/cohort**
- **Safety, immunogenicity**
- **Reactogenicity by e-diary**
Reactogenicity in Phase 1

- Mild-moderate injection site pain observed frequently
- Fever and chills observed, generally mild-moderate
- Reactogenicity was generally higher after Dose 2 than Dose 1
- Reactogenicity events after each dose of BNT162b2 in older adults were milder and less frequent than those observed in younger adults

Two 30 µg Doses of BNT162b2 Induce Neutralizing Antibody Titers Comparable or Higher than Natural Infection

BNT162b2 Elicits Strong Th1-biased CD4⁺ and CD8⁺ T Cell Responses (German Trial)

CD4⁺ Cells

Percent IFNy⁺ of CD4⁺ T Cells

CD4⁺ Cell Response

Percent of Cytokine⁺ S-specific CD4⁺ T Cells

CD8⁺ Cells

Percent IFNy⁺ of CD8⁺ T Cells

Sahin et al., manuscript in preparation
Planned Subjects in Pivotal Study

• 44,000 healthy subjects enrollment target
  – Stable chronic disease allowed
  – Stable HIV, HBV, HCV

• At least 40% ages 56 years or older

• Balanced racial and ethnicity profile
  – Black/African American
  – Asian
  – Hispanic/Latinx

• Immunocompromised excluded

Limited number of 12-15 yo not part of EUA application
## Demographic Characteristics

### Phase 2/3 (N=43,448)

<table>
<thead>
<tr>
<th></th>
<th>BNT162b2 (30 μg) N=21,720</th>
<th>Placebo N=21,728</th>
<th>Total N=43,448</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>11,183 (51.5)</td>
<td>10,942 (50.4)</td>
<td>22,125 (50.9)</td>
</tr>
<tr>
<td>Female</td>
<td>10,537 (48.5)</td>
<td>10,786 (49.6)</td>
<td>21,323 (49.1)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>17,839 (82.1)</td>
<td>17,857 (82.2)</td>
<td>35,696 (82.2)</td>
</tr>
<tr>
<td>Black or African American</td>
<td>2,091 (9.6)</td>
<td>2,107 (9.7)</td>
<td>4,198 (9.7)</td>
</tr>
<tr>
<td>All others</td>
<td>1,790 (8.2)</td>
<td>1,764 (8.1)</td>
<td>3,554 (8.2)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>5,672 (26.1)</td>
<td>5,668 (26.1)</td>
<td>11,340 (26.1)</td>
</tr>
<tr>
<td>Non-Hispanic/non-Latino</td>
<td>15,928 (73.3)</td>
<td>15,940 (73.4)</td>
<td>31,868 (73.3)</td>
</tr>
<tr>
<td>Not reported</td>
<td>120 (0.6)</td>
<td>120 (0.6)</td>
<td>240 (0.6)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-55 Years</td>
<td>12,780 (58.8)</td>
<td>12,822 (59.0)</td>
<td>25,602 (58.9)</td>
</tr>
<tr>
<td>&gt;55 Years</td>
<td>8,940 (41.2)</td>
<td>8,906 (41.0)</td>
<td>17,846 (41.1)</td>
</tr>
<tr>
<td>16-64 Years</td>
<td>17,176 (79.1)</td>
<td>17,190 (79.1)</td>
<td>34,366 (79.1)</td>
</tr>
<tr>
<td>65-74 Years</td>
<td>3,620 (16.7)</td>
<td>3,646 (16.8)</td>
<td>7,266 (16.7)</td>
</tr>
<tr>
<td>≥75 Years</td>
<td>924 (4.3)</td>
<td>892 (4.1)</td>
<td>1,816 (4.2)</td>
</tr>
</tbody>
</table>

**Total Greater than 9000**: 7,266 (16.7%)
Safety
Safety Review by Independent Data Monitoring Committee

• DMC consists of 4 adult/pediatric infectious diseases experts, and one statistician all with expertise in assessing vaccine safety, immune response, and efficacy

• DMC meets weekly to review unblinded safety data

• DMC has identified no safety concerns during the duration of the clinical trial and recommended that study continues as planned at all safety reviews
Summary of Safety Data

1. All subjects who have at least 2 months of safety follow-up post dose 2
2. 91.6% (34,532) had at least 1 month of safety follow-up post dose 2
Phase 2/3 Safety – Study Start 27 July, 2020

Vaccination period: 21 days apart

Follow-up period:
- Unsolicited AE: all subjects
  - 1-MONTH Post Dose 2
- Serious AE (SAE): all subjects
  - 6-MONTHS Post Dose 2
- Deaths and related SAEs: all subjects
  - 2-YEARS Post Dose 2

Active surveillance begins after 1st dose
Potential COVID-19 symptoms TRIGGER telehealth or in-person visit and nasal swab

Reactogenicity:
at least 6,000 subjects, at least 500 in each country
Redness and swelling severity definition: Mild = >2-5 cm, Moderate = >5-10 cm; Severe = >10 cm; Grade 4 = necrosis

Pain at injection site severity definition: Mild = no interference; Moderate = some interference; Severe = prevents daily activity; Grade 4 = ER visit or hospitalization

Dose 1: 16-55 yrs N=4589; >55 yrs N=3594   Dose 2: 16-55 yrs N=4201 >55 yrs N=3306
eDiary: Systemic Events Within 7 Days From Dose 1 in 16-55 and >55 Year Olds (N=8,183)

Systemic events: 
- Mild=no interference
- Moderate=some interference
- Severe=prevents daily activity
- Grade 4=ER visit or hospitalization

Fever severity definition: Mild=1-2 times in 24h; Moderate=>2 times in 24h; Severe=Requires IV hydration; Grade 4=ER visit or hospitalization

Diarrhea severity definition: Mild=2-3 times in 24h; Moderate=4-5 times in 24h; Severe=6 or more times in 24h; Grade 4=ER visit or hospitalization

Dose 1: 16-55 yrs N=4589; >55 yrs N=3594  Dose 2: 16-55 yrs N=4201 >55 yrs N=3306
eDiary: Systemic Events Within 7 Days From Dose 2 in 16-55 and >55 Year Olds (N=8,183)

<table>
<thead>
<tr>
<th>Systemic events:</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.0 °C-38.4 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.4 °C-38.9 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.9 °C-40.0 °C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;40.0 °C</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Fatigue, headache, chills, muscle pain, joint pain severity definition: Mild=no interference; Moderate=some interference; Severe=prevents daily activity; Grade 4=ER visit or hospitalization

Vomiting severity definition: Mild=1-2 times in 24h; Moderate=>2times in 24h; Severe=Requires IV hydration; Grade 4=ER visit or hospitalization

Diarrhea severity definition: Mild=2-3 times in 24h; Moderate=4-5 times in 24h; Severe=6 or more times in 24h; Grade 4=ER visit or hospitalization

Dose 1: 16-55 yrs N=4589; >55 yrs N=3594  Dose 2: 16-55 yrs N=4201 >55 yrs N=3306
eDiary: Systemic Events Each Day From Dose 2 in 16-55 and >55 Year Olds (N=8,183) BNT162b2

[Bar chart showing systemic events for 16-55 Year Olds and >55 Year Olds across days 1 to 7, with events such as Fever, Fatigue, Headache, Chills, Muscle Pain, and Joint Pain.]
Adverse Events ≥1.0% by System Organ Class
~50% of Subjects with Mean of 2 Months Post Dose 2 (N=37,706)

- Predominantly reflect local reactions at the injection site and systemic reactions of fatigue and chills
- Predominantly reflect myalgias and arthralgia's as part of systemic events
- Predominantly reflects Headache
- Predominantly reflects diarrhea and vomiting

1. General disorders and administration site conditions
2. Musculoskeletal and connective tissue disorders
3. Nervous system disorders
4. Gastrointestinal disorders

BNT162b2 (N=18860) Placebo (N=18846)
Adverse Events ≥1.0% by System Organ Class
~50% of Subjects with Mean of 2 Months Post Dose 2 (N=37,706)

BNT162b2 (N=18860)  Placebo (N=18846)

General disorders and administration site conditions

Musculoskeletal and connective tissue disorders

Nervous system disorders

Gastrointestinal disorders

Infections and infestations

Skin and subcutaneous tissue disorders

Injury, poisoning and procedural complications

Exclusion of common terms reflecting local reactions and systemic events occurring within 7 days of vaccination

1. Predominantly reflect local reactions at the injection site and systemic reactions of fatigue and chills
2. Predominantly reflect myalgias and arthralgia's as part of systemic events
3. Predominantly reflects Headache
4. Predominantly reflects diarrhea and vomiting
### Serious Adverse Events by System Organ Class ≥0.1% 
All Enrolled Subjects (N=43,448)

<table>
<thead>
<tr>
<th>Event</th>
<th>BNT162b2 (30 μg)</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=21,720 n (%)</td>
<td>N=21,728 n (%)</td>
</tr>
<tr>
<td>Any event</td>
<td>126 (0.6)</td>
<td>111 (0.5)</td>
</tr>
<tr>
<td>Infections and infestations</td>
<td>27 (0.1)</td>
<td>17 (0.1)</td>
</tr>
<tr>
<td>Cardiac disorders</td>
<td>18 (0.1)</td>
<td>18 (0.1)</td>
</tr>
<tr>
<td>Nervous system disorders</td>
<td>18 (0.1)</td>
<td>16 (0.1)</td>
</tr>
<tr>
<td>Neoplasms benign, malignant and unspecified (incl cysts and polyps)</td>
<td>11 (0.1)</td>
<td>8 (0.0)</td>
</tr>
<tr>
<td>Injury, poisoning and procedural complications</td>
<td>8 (0.0)</td>
<td>12 (0.1)</td>
</tr>
</tbody>
</table>
## Deaths

**All Enrolled Subjects (N=43,448)**

<table>
<thead>
<tr>
<th></th>
<th>BNT162b2 (30 μg)</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=21,720 n (%)</td>
<td>N=21,728 n (%)</td>
</tr>
<tr>
<td>Deaths</td>
<td>2 (0.0)</td>
<td>4 (0.0)</td>
</tr>
</tbody>
</table>
Safety Conclusions

- Tolerability and safety profile of BNT162b2 at 30 µg administered as a 2-dose regimen 21 days apart is favorable

- No clinically significant safety findings other than mild or moderate reactogenicity were identified
Efficacy
Phase 2/3 Efficacy Analysis

Vaccination period

21 days apart

Prior infection status
Before each dose
- Swab for SARS-CoV-2 PCR
- Blood for N-antigen antibodies

Follow-up period

2-YEARS
Post Dose 2

Active surveillance begins after 1st dose
Potential COVID-19 symptoms TRIGGER telehealth or in-person visit and nasal swab

*Only primary and secondary endpoints after dose 2
COVID-19 First Primary Endpoint Case Definition

1 or more of these symptoms

- Fever
- New or increased cough
- New or increased shortness of breath
- Chills
- New or increased muscle pain
- New loss of taste/smell
- Sore throat
- Diarrhea
- Vomiting

Positive validated PCR in central laboratory

CDC definition also includes fatigue, headache, nasal congestion or runny nose, and nausea
First COVID-19 Occurrence From 7 Days After Dose 2
Phase 2/3 Efficacy – Final Analysis

Subjects WITHOUT Evidence of Infection Prior to 7 days after Dose 2

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>BNT162b2 (30 µg) N=18,198</th>
<th>Placebo N=18,325</th>
<th>VE (%) (95% CI)</th>
<th>Pr (VE &gt;30%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First COVID-19 occurrence &gt;7 days after Dose 2</td>
<td>n=8 Surveillance Time (n) 2.214 (17,411)</td>
<td>n=162 Surveillance Time (n) 2.222 (17,511)</td>
<td>95.0 (90.3, 97.6)</td>
<td>&gt;0.9999</td>
</tr>
</tbody>
</table>

Total surveillance time: 1000 person-years for all subjects within each group at risk for the endpoint.
Pr=Posterior probability
# First COVID-19 Occurrence From 7 Days After Dose 2

Phase 2/3 Efficacy – Final Analysis: Subgroups

## Subjects WITHOUT Evidence of Infection Prior to 7 days after Dose 2

<table>
<thead>
<tr>
<th></th>
<th>BNT162b2 N=18,198</th>
<th>Placebo N=18,325</th>
<th>VE (%)</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=18,198</td>
<td>8</td>
<td>162</td>
<td>95.0</td>
<td>(90.0, 97.9)</td>
</tr>
<tr>
<td>N=18,325</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-64 years</td>
<td>7</td>
<td>143</td>
<td>95.1</td>
<td>(89.6, 98.1)</td>
</tr>
<tr>
<td>65-74 years</td>
<td>1</td>
<td>14</td>
<td>92.9</td>
<td>(53.1, 99.8)</td>
</tr>
<tr>
<td>≥75 years</td>
<td>0</td>
<td>5</td>
<td>100.0</td>
<td>(-13.1, 100.0)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
<td>81</td>
<td>96.4</td>
<td>(88.9, 99.3)</td>
</tr>
<tr>
<td>Female</td>
<td>5</td>
<td>81</td>
<td>93.7</td>
<td>(84.7, 98.0)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>7</td>
<td>146</td>
<td>95.2</td>
<td>(89.8, 98.1)</td>
</tr>
<tr>
<td>Black or African American</td>
<td>0</td>
<td>7</td>
<td>100.0</td>
<td>(31.2, 100.0)</td>
</tr>
<tr>
<td>All Others</td>
<td>1</td>
<td>9</td>
<td>89.3</td>
<td>(22.6, 99.8)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>3</td>
<td>53</td>
<td>94.4</td>
<td>(82.7, 98.9)</td>
</tr>
<tr>
<td>Non-Hispanic/Non-Latino</td>
<td>5</td>
<td>109</td>
<td>95.4</td>
<td>(88.9, 98.5)</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>1</td>
<td>35</td>
<td>97.2</td>
<td>(83.3, 99.9)</td>
</tr>
<tr>
<td>Brazil</td>
<td>1</td>
<td>8</td>
<td>87.7</td>
<td>(8.1, 99.7)</td>
</tr>
<tr>
<td>USA</td>
<td>6</td>
<td>119</td>
<td>94.9</td>
<td>(88.6, 98.2)</td>
</tr>
</tbody>
</table>
First COVID-19 Occurrence From 7 Days After Dose 2
Phase 2/3 Efficacy – Final Analysis: Risk Factor Subgroups

Subjects WITHOUT Evidence of Infection Prior to 7 days after Dose 2

<table>
<thead>
<tr>
<th></th>
<th>BNT162b2 N=18,198</th>
<th>Placebo N=18,325</th>
<th>VE (%)</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At risk¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>86</td>
<td>95.3</td>
<td>(87.7, 98.8)</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>76</td>
<td>94.7</td>
<td>(85.9, 98.6)</td>
</tr>
<tr>
<td>Age group at risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-64 and not at risk</td>
<td>4</td>
<td>69</td>
<td>94.2</td>
<td>(84.4, 98.5)</td>
</tr>
<tr>
<td>16-64 and at risk</td>
<td>3</td>
<td>74</td>
<td>95.9</td>
<td>(87.6, 99.2)</td>
</tr>
<tr>
<td>≥65 and not at risk</td>
<td>0</td>
<td>7</td>
<td>100.0</td>
<td>(29.0, 100.0)</td>
</tr>
<tr>
<td>≥65 and at risk</td>
<td>1</td>
<td>12</td>
<td>91.7</td>
<td>(44.2, 99.8)</td>
</tr>
<tr>
<td>Obese²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>67</td>
<td>95.4</td>
<td>(86.0, 99.1)</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>95</td>
<td>94.8</td>
<td>(87.4, 98.3)</td>
</tr>
<tr>
<td>Age group and obese</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-64 and not obese</td>
<td>4</td>
<td>83</td>
<td>95.2</td>
<td>(87.3, 98.7)</td>
</tr>
<tr>
<td>16-64 and obese</td>
<td>3</td>
<td>60</td>
<td>94.9</td>
<td>(84.4, 99.0)</td>
</tr>
<tr>
<td>≥65 and not at obese</td>
<td>1</td>
<td>12</td>
<td>91.8</td>
<td>(44.5, 99.8)</td>
</tr>
<tr>
<td>≥65 and obese</td>
<td>0</td>
<td>7</td>
<td>100.0</td>
<td>(27.1, 100.0)</td>
</tr>
</tbody>
</table>

¹ At least one of Charlson Comorbidity index or obesity
² Obesity: BMI ≥ 30 kg/m²
First COVID-19 Occurrence From 7 Days After Dose 2 by Comorbidity Status – Evaluable Efficacy (7 Days) Population

Subjects WITHOUT Evidence of Infection Prior to 7 days after Dose 2

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>BNT162b2 (30 μg) N=18,198</th>
<th>Placebo N=18,325</th>
<th>VE (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>8</td>
<td>162</td>
<td>95.0 (90.0, 97.9)</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No comorbidity</td>
<td>4</td>
<td>76</td>
<td>94.7 (85.9, 98.6)</td>
</tr>
<tr>
<td>Any comorbidity</td>
<td>4</td>
<td>86</td>
<td>95.3 (87.7, 98.8)</td>
</tr>
<tr>
<td>Any malignancy</td>
<td>1</td>
<td>4</td>
<td>75.7 (-145.8, 99.5)</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>0</td>
<td>5</td>
<td>100.0 (-0.8, 100.0)</td>
</tr>
<tr>
<td>Chronic pulmonary disease</td>
<td>1</td>
<td>14</td>
<td>93.0 (54.1, 99.8)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
<td>19</td>
<td>94.7 (66.8, 99.9)</td>
</tr>
<tr>
<td>Obese (≥30.0 kg/m²)</td>
<td>3</td>
<td>67</td>
<td>95.4 (86.0, 99.1)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2</td>
<td>44</td>
<td>95.4 (82.6, 99.5)</td>
</tr>
<tr>
<td>Diabetes (including gestational diabetes)</td>
<td>1</td>
<td>20</td>
<td>95.0 (68.7, 99.9)</td>
</tr>
</tbody>
</table>
# First COVID-19 Occurrence From 7 Days After Dose 2

## Phase 2/3 Efficacy – Final Analysis

### Subjects WITH or WITHOUT Evidence of Infection Prior to 7 days after Dose 2

**Vaccine Group (as Randomized)**

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>BNT162b2 (30 µg)</th>
<th>Placebo</th>
<th>VE (%) (95% CI)</th>
<th>Pr (VE &gt;30%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First COVID-19 occurrence &gt;7 days after Dose 2</td>
<td>N=19,965</td>
<td>N=20,172</td>
<td>94.6 (89.9, 97.3)</td>
<td>&gt;0.9999</td>
</tr>
<tr>
<td>n</td>
<td>Surveillance Time (n)</td>
<td>n</td>
<td>Surveillance Time (n)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>2.332 (18,559)</td>
<td>169</td>
<td>2.345 (18,708)</td>
<td></td>
</tr>
</tbody>
</table>

Total surveillance time: 1000 person-years for all subjects within each group at risk for the endpoint.

Pr=Posterior probability
Definition of Severe COVID-19 Case Per FDA Guidance

• Any of the following:
  – Admission to ICU
  – Clinical signs at rest indicative of severe systemic illness
    (RR ≥30 breaths per minute, HR ≥125 beats per minute, SpO2 ≤93% on room air at sea level, or PaO2/FiO2 <300 mm Hg)
  – Evidence of shock (SBP <90 mm Hg, DBP <60 mm Hg, or requiring vasopressors)
  – Significant acute renal, hepatic, or neurologic dysfunction
  – Respiratory failure (defined as needing high-flow oxygen, non-invasive ventilation, mechanical ventilation, or ECMO)
  – Death
## BNT162b2 Protects Against Severe Disease
### Phase 2/3 Efficacy – Final Analysis (FDA Definition)

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>BNT162b2 (30 µg) N=18,198</th>
<th>Placebo N=18,325</th>
<th>VE (%) (95% CI)</th>
<th>Pr (VE &gt;30%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Severe COVID-19 occurrence ≥7 days after Dose 2</td>
<td>1</td>
<td>3</td>
<td>66.4 (-124.8, 96.3)</td>
<td>0.7429</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>BNT162b2 (30 µg) N=21,669</th>
<th>Placebo N=21,686</th>
<th>VE (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Severe COVID-19 occurrence after Dose 1</td>
<td>1</td>
<td>9</td>
<td>88.9 (20.1, 99.7)</td>
</tr>
</tbody>
</table>

Total surveillance time: 1000 person-years for all subjects within each group at risk for the endpoint.

Pr=Posterior probability
# BNT162b2 Protects Against Severe Disease

## Phase 2/3 Efficacy – Post-Hoc Analysis (CDC Definition)

Severe illness – CDC Definition: hospitalization, admission to ICU, intubation or mechanical ventilation or death

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>Surveillance Time (n)</th>
<th>Surveillance Time (n)</th>
<th>VE (%)</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Severe COVID-19 occurrence ≥7 days after Dose 2</td>
<td>0 2.213 (17,399)</td>
<td>5 2.229 (17,495)</td>
<td>100.0</td>
<td>(-9.9, 100.0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficacy Endpoint</th>
<th>Surveillance Time (n)</th>
<th>Surveillance Time (n)</th>
<th>VE (%)</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Severe COVID-19 occurrence after Dose 1</td>
<td>1 4.018 (21,299)</td>
<td>14 4.001 (21,238)</td>
<td>92.9</td>
<td>(53.2, 99.8)</td>
</tr>
</tbody>
</table>

Total surveillance time: 1000 person-years for all subjects within each group at risk for the endpoint.

"Severe illness from COVID-19 is defined as hospitalization, admission to the ICU, intubation or mechanical ventilation, or death"

Cumulative Incidence of COVID-19 After Dose 1

0.000 0.004 0.008 0.012 0.016 0.020 0.024

Days After Dose 1

0 7 14 21 28 35 42 49 56 63 70 77 84 91 98 105 112

BNT162b2 (30 μg)
Placebo

Solid fill marker indicates subjects with severe COVID-19 per FDA definition
Cumulative Incidence of COVID-19 After Dose 1

Solid fill marker indicates subjects with severe COVID-19 per FDA definition
<table>
<thead>
<tr>
<th>Event</th>
<th>BNT162b2 (30 μg) N=21,669</th>
<th>Placebo N=21,686</th>
<th>VE (%)</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19 occurrence after Dose 1</td>
<td>50</td>
<td>275</td>
<td>82.0</td>
<td>(75.6, 86.9)</td>
</tr>
<tr>
<td>After Dose 1 and before Dose 2</td>
<td>39</td>
<td>82</td>
<td>52.4</td>
<td>(29.5, 68.4)</td>
</tr>
<tr>
<td>Dose 2 to 7 days after Dose 2</td>
<td>2</td>
<td>21</td>
<td>90.5</td>
<td>(61.0, 98.9)</td>
</tr>
<tr>
<td>≥7 days after Dose 2</td>
<td>9</td>
<td>172</td>
<td>94.8</td>
<td>(89.8, 97.6)</td>
</tr>
</tbody>
</table>
Efficacy Conclusions

• Both primary objectives met success criteria

• In individuals without prior SARS-CoV-2 infection, observed Vaccine efficacy against COVID-19 occurring at least 7 days after Dose 2 was 95%, with high probability (97.5%) that the true vaccine efficacy is at least 90%

• Observed Vaccine Efficacy was >93% for the first primary endpoint across age, race, ethnicity, and at-risk subgroups
Efficacy Conclusions (Continued)

- Per FDA definition, 9 severe COVID-19 cases were observed in the placebo group and 1 in the BNT162b2 group after dose 1

- Early onset of protection is apparent from the cumulative incidence curve, with divergence by 14 days after Dose 1

- Overall, the efficacy results show that BNT162b2 at 30 µg provides protection against COVID-19 in participants who had or did not have prior SARS-CoV-2 infection
Summary of Safety Analyses Available

**EUA**

Reactogenicity in ~8,000 total

AE/SAE assessed in 37,706 total with median 2 month follow-up post dose 2

AE/SAE in 43,448 total in age 16 years and above

**BLA**

Reactogenicity >8,000 total

AE/SAE assessed in ~44,000 total with at least 6000 participants with 6 month or more post dose 2

Reactogenicity and AE/SAE in 12-15 year old cohort

Note: Active vaccination in half of the subjects
## Summary of Efficacy Analyses Available

<table>
<thead>
<tr>
<th>Efficacy on 164+ cases</th>
<th>EUA</th>
<th>BLA</th>
</tr>
</thead>
<tbody>
<tr>
<td>With and With/Without prior infection</td>
<td>✓</td>
<td>EUA data</td>
</tr>
<tr>
<td>Cases after 7 days post-dose 2</td>
<td>✓</td>
<td>EUA data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cases after 14 days post-dose 2</th>
<th>EUA</th>
<th>EUA data</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Severe cases after 7 &amp; 14 days post-dose 2</th>
<th>EUA</th>
<th>EUA data</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Efficacy by subsets</th>
<th>EUA</th>
<th>EUA data</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Phase 1 Immunogenicity 1m PD2 in 18-55 and 65-85 years of age</th>
<th>EUA</th>
<th>EUA data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 2 Immunogenicity 1m PD2 in 18-55 and 56-85 years of age</td>
<td>EUA</td>
<td>EUA data</td>
</tr>
</tbody>
</table>

### Additional Planned Analyses
- Efficacy against asymptomatic infection
- Persistence of protection
- 12-15 yo immunobridging

Note: Active vaccination in half of the subjects
Management of Placebo Recipients

• Ethical responsibility to inform study participants of COVID-19 vaccine availability under EUA

• Eligible participants in the placebo group will have the option to receive the vaccine
  – Participants who meet the EUA and current recommendation guidelines eligibility criteria
  – Vaccination of other participants will expand over time

• Participants have the option to remain blinded through study completion

• The study will continue for the planned 24 months
Pharmacovigilance & Pharmacoepidemiology Plan

Pharmacovigilance

- Expanded intake capability with AE portal
- Active follow-up of safety reports
- Frequent signal detection and evaluation
- Post-approval safety monitoring
- Clinical studies in vulnerable populations

Proactive Risk minimization

- Labeling & Educational Materials
- Real-time product quality monitoring (cold-chain)

Pharmacoepidemiology Studies

- Safety event background rates (contextualization)
- Extended follow up (30 months) for high-severity low-incidence events in large populations
- Vaccine effectiveness

Collaborate with Vaccine Safety Stakeholders

- Interface with CDC (VAERS, V-SAFE, VSD, CISA) to optimize pharmacovigilance activities
- Collaborate with international groups to ensure consistent approach to PV
Real-world, Test-negative Design (TND) Vaccine Effectiveness Studies

Against severe, important endpoints like:
- Hospitalization
- Emergency Dept. (ED) visits

In specific populations:
- Race/ethnicity
- Elderly
- Nursing home residents
- Healthcare workers

Understand VE:
- When vaccine is used in “real-world” conditions outside controlled trial
- In broader populations

Studies will complement CDC planned effectiveness studies
Plans for BNT162b2 Clinical Studies Beyond C4591001

- Boostability
- Dose ranging and studies in pediatrics
- Use in pregnancy
- Use in Immunocompromised
- Refrigerator stable second-generation formulation
- Co-administration of influenza vaccine being considered
Benefit-Risk & Conclusions

Kathrin Jansen, PhD
Senior Vice President & Head of Vaccine R&D
Pfizer
Clear and Compelling Data Demonstrating Vaccine’s Safety and Efficacy

- Nonclinical data supports vaccine effectiveness and safety
- Phase 1 and 2 data support safety and efficacy and longer duration of protection
- Meets all safety data expectations for follow up durations and subject number
- Vaccine Safety / COVID-19 outcomes in individuals with prior SARS-CoV-2
- Sufficient cases of severe COVID-19 to support low risk for vaccine-induced ERD
- Final Analysis with a point estimate over 50% (95% efficacy)
- Vaccine’s benefits outweigh its risks based on well-designed Phase 3 clinical trial
- Consistent Manufacturing data with appropriate controls
- Plans for active follow up of safety under EUA

BNT162b2 – Meets EUA Guidance for COVID-19
Positive Benefit-Risk of BNT162b2 Vaccine

• Effective for the proposed indication:
  – Prevention of Coronavirus Disease 2019 (COVID-19) caused by SARS-CoV-2 in individuals 16 years of age and older

• No safety concerns identified in 43,448 subjects analyzed
  – No evidence of enhanced disease in vaccine recipients

• Observed overall efficacy was 95%
  – Efficacious in younger and older adults
  – Efficacious across diverse demographics and at-risk individuals
  – Efficacious against severe disease
Why an EUA for BNT162b2?

THE VACCINE IS TOLERABLE AND HIGHLY EFFICACIOUS

- Vaccine efficacy of 95%
- Similar efficacy for key high-risk subgroups including the elderly and racial/ethnic minorities
- Reactogenicity profile and SAEs comparable to other licensed vaccines
- Extensive post-approval pharmacovigilance in place

TIMING IS IMPORTANT TO IMPACT THE PANDEMIC

- 55,000 US deaths per month could occur over the next few months
- A COVID-19 vaccine can prevent many deaths
- A pandemic vaccine must be introduced before the peak of cases to have maximal impact
- A highly effective vaccine may be able to induce herd immunity

---

2. Biggerstaff M. Oct 2020 ACIP meeting. Up to 20–35% of cases and deaths can be averted with a vaccine if it is introduced before COVID-19 incidence starts falling. Based on vaccination of persons during Phase 1A and 1B of likely COVID-19 vaccine allocation plan with an infection-blocking vaccine. Assumes 200M total vaccine courses (ie, 2 dose regimens) during this allocation period. https://www.cdc.gov/vaccines/acip/meetings/slides-2020-10.html
Acknowledgements

• Pfizer and BioNTech wish to thank:
  – The clinical trial participants and their families
  – Sites, investigators and their dedicated staff
  – Our clinical trial CRO and other partners
  – The CDC and FDA
  – Operation Warp Speed for knowledge exchange
  – Colleagues at BioNTech, and Pfizer