A vaccine snapshot
Ways to make a vaccine

• Stimulate a non-specific response
• Attenuate the virus
• Inactivate the virus or produce a purified antigen
• Carry the gene for an antigen in a harmless virus
• Carry the gene for an antigen in DNA
• Carry the gene for an antigen in mRNA
Stimulate a non-specific immune response

• BCG vaccine
Attenuate the virus

• None
Inactivate the virus or produce a purified antigen

- NVX-CoV2373 (Novavax) – S protein embedded in nanoparticle
- BBIBP-CoV (Sinopharm) – whole inactivated virus*
- Wuhan (Sinopharm) - whole inactivated virus*
- Coronovac (Sinovac) – whole inactivated virus*

* Approved for distribution in some countries
Carry the gene for an antigen in a harmless virus

- Ad5-nCoV (CanSino) – Adenovirus 5 vector*
- Sputnik 5 (Gamaleya) – Combined Adenovirus 5 and 26 vectors*
- Ad26.COV2.S (J&J) – Adenovirus 26 vector
- AZD1222 (AstraZeneca) – Chimpanzee adenovirus vector**

* Approved for distribution in some countries
** Phase 3 trial completed and reported
Carry the gene for an antigen in DNA

- INO-4800 (Inovio)
Carry the gene for an antigen in mRNA

• mRNA-1273 (Moderna)
• BNT162b2 (Pfizer)***

***EUA granted in UK, Canada and US
BNT162b2

• mRNA encoded prefusion-stabilized version of the SARS-CoV-2 Spike protein
• Two doses - administered on day 0 and day 21
• Must be stored at -70°C
• Five dose vial can be diluted and refrigerated but only for a few hours
• Primary endpoints
  • Efficacy – number of symptomatic infections in placebo and vaccine recipients with no evidence of prior infection starting 7 days after the second vaccine dose
  • Safety
• Participants
  • Ages 16-75

• Exclusions
  • Pregnancy at time of first or second dose
  • History of anaphylaxis to a component of the vaccine
  • History of diagnosed Covid-19
  • Investigator judgement of conditions that might increase risk or otherwise make participant inappropriate
Efficacy
Vaccine or placebo
Day 0  Day 21
Primary efficacy analysis
164 cases

Safety

>18,000 in each group

2 years
Safety analysis
Safety
Safety
## Efficacy

<table>
<thead>
<tr>
<th>Efficacy End Point</th>
<th>BNT162b2</th>
<th>Placebo</th>
<th>Vaccine Efficacy, % (95% Credible Interval)</th>
<th>Posterior Probability (Vaccine Efficacy &gt;30%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Cases</td>
<td>Surveillance Time (n)†</td>
<td>No. of Cases</td>
<td>Surveillance Time (n)†</td>
</tr>
<tr>
<td>Covid-19 occurrence at least 7 days after the second dose in participants without evidence of infection</td>
<td>(N=18,198)</td>
<td>8</td>
<td>162</td>
<td>95.0 (90.3–97.6)</td>
</tr>
</tbody>
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Efficacy
# Efficacy - subgroups

<table>
<thead>
<tr>
<th>Efficacy End-Point Subgroup</th>
<th>BNT162b2 (N=18,198)</th>
<th>Placebo (N=18,325)</th>
<th>Vaccine Efficacy, % (95% CI)†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>8</td>
<td>2.214 (17,411)</td>
<td>162</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>16 to 55 yr</td>
<td>5</td>
<td>1.234 (9,897)</td>
<td>114</td>
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<tr>
<td>&gt;55 yr</td>
<td>3</td>
<td>0.980 (7,500)</td>
<td>48</td>
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<tr>
<td>≥65 yr</td>
<td>1</td>
<td>0.508 (3,848)</td>
<td>19</td>
</tr>
<tr>
<td>≥75 yr</td>
<td>0</td>
<td>0.102 (774)</td>
<td>5</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>3</td>
<td>1.124 (8,875)</td>
<td>81</td>
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<tr>
<td>Female</td>
<td>5</td>
<td>1.090 (8,536)</td>
<td>81</td>
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<tr>
<td>Race or ethnic group‡</td>
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<td></td>
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<tr>
<td>White</td>
<td>7</td>
<td>1.889 (14,504)</td>
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<tr>
<td>Black or African American</td>
<td>0</td>
<td>0.165 (1,302)</td>
<td>7</td>
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<tr>
<td>All others</td>
<td>1</td>
<td>0.160 (1,405)</td>
<td>9</td>
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<tr>
<td>Hispanic or Latinx</td>
<td>3</td>
<td>0.605 (4,764)</td>
<td>53</td>
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<tr>
<td>Non-Hispanic, non-Latinx</td>
<td>5</td>
<td>1.596 (12,548)</td>
<td>109</td>
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<td>Country</td>
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<tr>
<td>Argentina</td>
<td>1</td>
<td>0.351 (2,545)</td>
<td>35</td>
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<tr>
<td>Brazil</td>
<td>1</td>
<td>0.119 (1,129)</td>
<td>8</td>
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<tr>
<td>United States</td>
<td>6</td>
<td>1.732 (13,359)</td>
<td>119</td>
</tr>
</tbody>
</table>
Things we don’t know

• How long will immunity last?
• What happens to people who miss their second dose?
• What will happen when we give it to more people?
• Is it safe in pregnancy?
• Is it safe in children?
• How well will it work in [insert your favorite population]?
F.D.A. Clears Pfizer Vaccine, and Millions of Doses Will Be Shipped Right Away

An initial shipment of about 2.9 million doses of the vaccine will be sent around the United States over the next week.

Pfizer has said it will be able to supply up to 25 million doses before the end of the year, and 100 million total vaccines by March. Justin Tallis/Agence France-Presse — Getty Images