<table>
<thead>
<tr>
<th>Vaccine Name</th>
<th>Manufacturer</th>
<th>MOA</th>
<th>Dates</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comirnaty</td>
<td>Pfizer-BioNTech</td>
<td>mRNA vaccine</td>
<td>Feb 27, 2020</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 95% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>SpikeVax</td>
<td>Moderna</td>
<td>mRNA vaccine</td>
<td>Jan 8, 2021</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 88% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>Janssen</td>
<td>Adenovirus vector vaccine</td>
<td>Mar 12, 2021</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 85% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>NVX-CoV2373</td>
<td>Novavax</td>
<td>Protein-based vaccine</td>
<td>Dec 17, 2020</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 85% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>Vazzevria</td>
<td>Oxford-AstraZeneca</td>
<td>Adenovirus vector vaccine</td>
<td>Feb 3, 2022</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 95% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>Sputnik V</td>
<td>Gamaleya</td>
<td>Adenovirus vector vaccine</td>
<td>May 28, 2021</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 85% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>BBIBP-CorV</td>
<td>Sinopharm</td>
<td>Inactivated coronavirus</td>
<td>Jan 8, 2021</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 85% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
<tr>
<td>CoronaVac</td>
<td>Sinovac Biotech</td>
<td>Inactivated coronavirus</td>
<td>Jan 8, 2021</td>
<td>Vaccine demonstrated 100% protection against moderate and severe disease, 85% efficacy overall, and met the primary endpoint in its PREVENT-19 pivotal Phase 3 trial.</td>
</tr>
</tbody>
</table>

**Dosages**
- Comirnaty: 2 doses, 21 days apart
- SpikeVax: 2 doses, 28 days apart
- Johnson & Johnson: 1 dose
- NVX-CoV2373: 2 doses, 1 month apart
- Vazzevria: 2 doses, 3 months apart
- Sputnik V: 2 doses, 1 month apart
- BBIBP-CorV: 2 doses, 1 month apart
- CoronaVac: 2 doses, 1 month apart

**W.H.O. Approval Dates**
- Comirnaty: Mar 11, 2021
- SpikeVax: Jan 18, 2021
- Johnson & Johnson: Dec 16, 2020
- NVX-CoV2373: Feb 27, 2021
- Vazzevria: Mar 12, 2021
- Sputnik V: May 28, 2021
- BBIBP-CorV: June 1, 2021
- CoronaVac: June 1, 2021

**U.S. FDA Approval Dates**
- Comirnaty: Feb 27, 2021
- SpikeVax: Feb 27, 2021
- Johnson & Johnson: Feb 27, 2021
- NVX-CoV2373: Feb 27, 2021
- Vazzevria: Mar 12, 2021
- Sputnik V: May 28, 2021
- BBIBP-CorV: June 1, 2021
- CoronaVac: June 1, 2021

**U.S. Amendments**
- Comirnaty: June 1, 2021
- SpikeVax: June 1, 2021
- Johnson & Johnson: June 1, 2021
- NVX-CoV2373: June 1, 2021
- Vazzevria: June 1, 2021
- Sputnik V: June 1, 2021
- BBIBP-CorV: June 1, 2021
- CoronaVac: June 1, 2021

**Russia Approval Dates**
- Comirnaty: Feb 4, 2022
- SpikeVax: Feb 4, 2022
- Johnson & Johnson: Feb 4, 2022
- NVX-CoV2373: Feb 4, 2022
- Vazzevria: Feb 4, 2022
- Sputnik V: Feb 4, 2022
- BBIBP-CorV: Feb 4, 2022
- CoronaVac: Feb 4, 2022

**Adenovirus vector vaccine**
- Comirnaty: May 28, 2021
- SpikeVax: June 1, 2021
- Johnson & Johnson: June 1, 2021
- NVX-CoV2373: June 1, 2021
- Vazzevria: June 1, 2021
- Sputnik V: June 1, 2021
- BBIBP-CorV: June 1, 2021
- CoronaVac: June 1, 2021

**mRNA vaccine**
- Comirnaty: Feb 27, 2021
- SpikeVax: Feb 27, 2021
- Johnson & Johnson: Feb 27, 2021
- NVX-CoV2373: Feb 27, 2021
- Vazzevria: Feb 27, 2021
- Sputnik V: Feb 27, 2021
- BBIBP-CorV: Feb 27, 2021
- CoronaVac: Feb 27, 2021

**Suspended as of Sept 16, 2021 due to manufacturing concerns**
- Comirnaty: May 7, 2021
- SpikeVax: June 1, 2021
- Johnson & Johnson: June 1, 2021
- NVX-CoV2373: June 1, 2021
- Vazzevria: June 1, 2021
- Sputnik V: June 1, 2021
- BBIBP-CorV: June 1, 2021
- CoronaVac: June 1, 2021
### COVID-19 Vaccine Comparison Chart - Updated August 26, 2022

<table>
<thead>
<tr>
<th>Vaccine Name</th>
<th>Community</th>
<th>SpikeVax</th>
<th>Johnson &amp; Johnson</th>
<th>NVX-CoV2373</th>
<th>Vaxzevria</th>
<th>Sputnik V</th>
<th>BBIBP-CorV</th>
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<tr>
<td>Manufacturer</td>
<td>Pfizer-BioNTech</td>
<td>Moderna</td>
<td>Janssen Pharmaceuticals</td>
<td>Novavax</td>
<td>Oxford-AstraZeneca</td>
<td>Gamaleya</td>
<td>Sinopharm</td>
<td>Sinovac Biotech</td>
</tr>
</tbody>
</table>

#### Prior International Amendments

- **12/21/20**: FDA authorizes vaccine for 16+. 8/19/21: Authorized for ages 12-15 by the FDA. 8/12/21: FDA amends EUA allowing for additional dose in certain immunocompromised individuals 18+. 9/3/21: FDA recommends booster dose in those 65+; those 18+ at high risk for severe COVID-19; and those 18+ with high risk of exposure due to their occupation, which put them at high risk of serious COVID-19. The booster EUA only applies to the Pfizer vaccine. 10/29/21: FDA authorizes vaccine for children 5-11 years of age. 11/19/21: FDA amends EUA to allow boosters for those 18+. 12/20/21: FDA amends EUA to allow boosters for 16-17 year olds.

- **3/12/22**: European Medicines Agency (EMA) recommends booster shots for those 12+. 3/21/22: UK begins second booster doses for those 75+ or residing in a nursing home, as well as those 12+ who have a suppressed immune system. The second booster should be administered 6 months after the first booster. 7/11/22: EMA recommends those 60+ receive a second booster.

- **3/22/22**: EMA authorizes vaccine for children 5-11 years of age. 3/21/22: UK begins second booster doses for those 75+ or residing in a nursing home, as well as those 12+ who have a suppressed immune system. The second booster should be administered 6 months after the first booster. 7/11/22: EMA recommends those 60+ receive a second booster.

- **7/11/22**: EMA recommends those 60+ receive a second booster.

- **9/13/21**: FDA authorizes vaccine for 18+. 9/3/21: FDA amends EUA allowing for additional dose in certain immunocompromised individuals 18+. 9/1/2021: Moderna submits data for booster to FDA. 9/13/2021: Moderna submits data for booster to EMA. FDA authorizes use of a third dose of the Moderna vaccine at 100 micrograms. This is the same dose as the first two of the primary series. 10/20/21: FDA amends EUA, adding that "the use of a single booster dose of the Moderna COVID-19 Vaccine may be administered at least 6 months after completion of the primary series" to certain population groups in individuals 18+. 11/16/21: FDA amends EUA to allow boosters for those 18+.

- **12/27/21**: FDA authorizes vaccine for 18+. 4/13/21: FDA and CDC pause vaccine due to blood clot concerns. 4/24/21: FDA and CDC end pause to resume J&J vaccinations. 8/18/21: FDA entrapupates booster shots "will likely be needed for people who received the J&J vaccine. Administration of the J&J vaccine did not begin in the U.S. until March 2021, and we expect more data on J&J in the next few weeks. 10/21: J&J requests EUA of a second dose of their vaccine. 1/10/21: FDA amends EUA authorizing use of a single booster dose of the J&J vaccine at least two months after completion of the primary-dose series. 12/16/21: CDC recommends those who received J&J for their primary series receive an mRNA vaccine for their booster. Those who have received two doses of J&J are not recommended to receive a third dose of an mRNA vaccine.

- **12/21/20**: FDA authorizes vaccine for 16+. 12/21/20: FDA authorizes vaccine for 16+. 5/5/21: Authorized by Health Canada for those 12-15 years of age. 5/26/21: Authorized for 12+ by the EMA. 6/4/21: Approved for 12+ by the MHRA in the UK. 1/24/21: EMA recommends booster shots for those 18+ using the Pfizer vaccine, regardless of the manufacturer used for the primary series. 11/19/21: Health Canada authorizes boosters for those 18+ using the Pfizer vaccine. 12/21/20: Health Canada approves vaccine for children 5-11 years of age. 11/26/21: UK recommends booster dose for adults 18-39 years of age at least three months after their primary series. Immunocompromised may receive a 4th dose at least 3 months after their 3rd dose. 12-15 years of age are now allowed to receive a 2nd dose.

- **12/29/21**: MHRA authorizes Pfizer vaccine for 5-11 year olds.


- **8/11/20**: Approved for ages 18+. 11/24/21: A lower dose of Sputnik V, named Sputnik M, was approved for use in children 12-17 years of age.

- **5/7/21**: Granted EUA for ages 18+.

- **6/1/21**: Granted EUA for ages 18+. 1/21/21: WHO recommends those 60+ vaccinated with Sinovac for their primary series receive a booster dose.
COVID-19 Vaccine Comparison Chart - Updated August 26, 2022

<table>
<thead>
<tr>
<th>Vaccine Name</th>
<th>Comimatry</th>
<th>SpikeVax</th>
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<th>NVX-CoV2373</th>
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<td>Janssen Pharmaceuticals</td>
<td>Novavax</td>
<td>Oxford-AstraZeneca</td>
<td>Gamaleya</td>
<td>Sinopharm</td>
<td>Sinovac Biotech</td>
</tr>
</tbody>
</table>

### Research & Development Highlights

**Q1 & Q2 2020**
- **4/29/20**: Human trials begin in Germany. 5/5/20: Pfizer and BioNTech Dose 1st U.S. Participants.
- **5/16/20**: Moderna begins Phase 1 human clinical trial for its mRNA COVID-19 vaccine in the U.S.
- **5/12/20**: Moderna receives Fast Track designation from the FDA to proceed with a Phase 2 study of their vaccine.
- **5/18/20**: Moderna releases interim data from their Phase 1 clinical trial, stating plans for a Phase 3 trial to begin in July. 5/29/20: Moderna announces purpose and enrollment of Phase 2 clinical trial. Enrollment was completed July 8.
- **6/2/20**: Researchers begin Phase 1 trial with phase 1 starting in Australia and Phase 2 to be conducted in multiple countries following the results of Phase 1.
- **6/20/20**: The Gamaleya Research Institute begins clinical trials for a combination adenovirus vaccine.
- **6/29/20**: Researchers confirm promising results from trial in monkeys, stating the vaccine is generally stable and seems to be safe in animals.

**Q3 2020**
- **7/12/20**: Peer-Reviewed Phase 1/2 Data Published in Nature Magazine.
- **7/14/20**: Moderna publishes interim results of their Phase 1 trial in The New England Journal of Medicine.
- **7/27/20**: Moderna begins Phase 3 clinical trial, enrolling 30,000 adults across the U.S.
- **7/30/20**: Single dose of J&J vaccine candidate demonstrates robust protection in pre-clinical studies.
- **8/3/20**: Vaccine prevents severe clinical disease in pre-clinical studies.
- **9/23/20**: Global Phase 3 Ensemble Clinical Trials begin. 9/25/20: Interim results from Phase 1/2a clinical trial support further clinical development of vaccine, but Phase 3 PAUSED after a serious medical event occurred by 1 study participant.
- **9/4/20**: The Gamaleya Research Institute publishes the results of their Phase 1/2 clinical trial, announcing their Sputnik V vaccine yielded antibodies with only mild side effects.
- **7/18/20**: Phase 3 trial begins in the UAE, with subsequent Phase 3 trials in Peru and Morocco.

**Q4 2020**
- **11/19/20**: Moderna releases preliminary data from Phase 3 clinical trial, stating their vaccine is 94.5% effective. The data is released in full on November 30. 12/22/20: Moderna files to test their vaccine in adolescents 12-15 years of age. Moderna announces the clinical trial on March 10, 2021. 12/31/20: Moderna publishes results of Phase 3 trial in The New England Journal of Medicine.
- **10/23/20**: Phase 3 Ensemble Trial resumes. 11/16/20: Announcement of second Phase 3 clinical trial to observe the use of two doses versus one.
- **12/28/20**: Novavax announces initiation of Phase 3 efficacy trial in U.S. and Mexico.
- **11/23/20**: AstraZeneca and the University of Oxford announce the initial results of the Phase 3 clinical trials in the U.K., Brazil, and South Africa. The study showed the vaccine was safe and effective. Data from the study was published 11/19 in The Lancet.
- **12/29/20**: Novavax announces initiation of Phase 3 efficacy trial in U.S. and Mexico.
- **10/17/20**: Phase 2/3 trial launches in India. 11/11/20: The Russian Direct Investment Fund announces that Sputnik’s Phase 3 clinical trial demonstrated high efficacy rates, determining a 91% efficacy rate for the Sputnik V vaccine. Dec 2020: The Gamaleya Research Institute and AstraZeneca decide to combine vaccines in an effort to increase the efficacy of the AstraZeneca vaccine, with clinical trials beginning in February 2021.
- **10/17/20**: Research published in The Lancet shares the results of a Phase 1/2 trial, showing the vaccine stimulates the production of antibodies and does not cause serious adverse effects. Nov 2020: Sinopharm reports that over 1 million doses have been administered to the public. 12/30/20: Sinopharm states their vaccine has an efficacy rate of 79%.
- **10/19/20**: Officials in Brazil quote Sinovac’s vaccine as being the safest of five being tested in Phase 3 trials. 11/17/20: Sinovac publishes the results of their Phase 2/3 trial in The Lancet. 12/23/20: Brazil announces that Coronavirus has an efficacy rate of over 50%. 12/24/20: Turkey announces that the vaccine has an efficacy rate of over 91%.

**Q1 2021**
- **2/25/21**: Pfizer and BioNTech initiate a study as part of Broad Development Plan to evaluate COVID-19 booster and New Vaccine Variants. 3/3/21: Pfizer announces positive topline results of their clinical trial in adolescents ages 12-15, in which the vaccine demonstrated 100% efficacy and produced a robust antibody response. The vaccine was also well tolerated.
- **3/5/21**: Moderna announces Phase 1 clinical trial testing their vaccine against the B.1.351 variant. 3/5/21: Moderna announces Phase 1 trial of refrigerator-stable vaccine. 3/6/21: Moderna Phase 2/3 study in adolescents begins.
- **11/13/21**: Interim Phase 1/2a data published in New England Journal of Medicine. 12/21/21: Johnson & Johnson announce that their Phase 3 trial show their vaccine to be safe and effective; the results of the trial are published in The New England Journal of Medicine April 29, 2021. 2/21/21: Johnson & Johnson announce upcoming clinical trial with pregnant women.
- **2/2/21**: The Gamaleya Research Institute, in partnership with Russia’s Ministry of Health, publishes the results of their Phase 3 trial in The Lancet. 3/29/21: Russia announces that “Sputnik Light” will be registered for use after the clinical trial, which began in January. This single-dose version of the Sputnik V vaccine is proposed to provide 4-5 months of protection against the novel coronavirus.
- **1/7/21**: Brazilian researchers track and announce that the coronavac actually has an efficacy rating of just over 50%.

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**July 2020**: China launches vaccine program to distribute Sinovac, Sinopharm and CanSino Covid-19 vaccines within China. Phase 3 testing was not complete at the time. Additional trials launched in Brazil, Indonesia, and Turkey. 8/15/20: Results of a Phase 1/2 trial are published stating no safety concerns were observed among 743 volunteers. Adverse events were mild in severity, and primarily isolated to pain at the injection site. The results have not been peer reviewed.
COVID-19 Vaccine Comparison Chart - Updated August 26, 2022

<table>
<thead>
<tr>
<th>Vaccine Name</th>
<th>Company</th>
<th>SpikeVax</th>
<th>Johnson &amp; Johnson</th>
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<th>Sputnik V</th>
<th>BBIBP-CorV</th>
<th>Sinopharm</th>
<th>CoronaVac</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/21:</td>
<td>Researchers at Pfizer and Israel’s Ministry of Health observe Pfizer vaccine to be over 95% effective against infection, hospitalization and death against the B.1.1.7 variant amongst Israel’s vaccinated population. The results of the study are published in The Lancet.</td>
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<tr>
<td>5/26/21: Pfizer begins Phase 3 trial using their pneumococcal vaccine candidate in conjunction with the Pfizer COVID-19 vaccine as a booster in adults 65+.</td>
<td>6/6/2021: Pfizer announces advancement of Phase 2/3 clinical trials in children ages 5-11. 6/28/2021: A study from Children’s Hospital in Boston shows the Pfizer vaccine is highly effective against variants, including delta.</td>
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<td>Q2 2021</td>
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<tr>
<td>7/8/21: Pfizer announces the development of a new coronavirus vaccine that specifically targets the Delta variant; clinical trials are expected to begin next month.</td>
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<tr>
<td>7/27/21: Pfizer begins recruiting for clinical trial testing a second dose in those who experienced a systemic allergic reaction to the first dose of the Pfizer or Moderna vaccine.</td>
<td>7/28/21: Pfizer releases statement suggesting need for boosters, citing study that shows vaccine’s efficacy wanes to 83.7% by six months after the second dose. The study’s results have not been peer-reviewed. 8/25/21: Pfizer releases data showing antibodies more than tripled in participants who received a booster dose 5-6 months after being fully vaccinated. Details of the study have not been released yet. 9/20/21: Pfizer announces that in participants 5 to 11 years of age, the vaccine was safe, well-tolerated and showed robust neutralizing antibody responses.</td>
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<td>Q3 2021</td>
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<tr>
<td>7/21/21: Pfizer announces that a third dose of the Pfizer vaccine is 96% effective in preventing infection in children 12+. 5/28/21: Moderna begins Phase 2/3 clinical trial on the use of the Moderna vaccine as a booster shot to a range of other vaccine brands. 6/15/21: Moderna begins clinical trial testing their vaccine as a booster shot. 6/29/2021: Moderna publishes a study that a full dose of their vaccine provides protection against the delta, zeta and kapp variants.</td>
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<tr>
<td>5/21/21: Novavax announces its participation in a UK mix-and-match booster trial alongside 6 other vaccine manufacturers. The study will include participants who have previously been vaccinated with 2 doses of an authorized vaccine. 6/14/21: Novavax releases the results of their Phase 3 clinical trial in the US and Mexico, stating their vaccine is 90.4% effective overall, with 100% efficacy against moderate and severe disease. 6/30/21: Novavax publishes the results of their Phase 3 trial in the New England Journal of Medicine. The trial was conducted in the UK and showed an overall vaccine efficacy rate of 89.7%. The vaccine showed 96.4% efficacy against non-B.1.1.7 variants, which parallel strains of the original virus.</td>
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<tr>
<td>4/21/21: Expands Phase 2a Clinical Trial to Include Adolescents.</td>
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<tr>
<td>6/27/21: Astrazeneca starts Phase 2/3 clinical trial on vaccine specially tailored against the beta variant. 6/28/21: Oxford researchers confirm that a third dose of the Astrazeneca vaccine elicited a strong immune response in clinical trial participants. Clinical trial data is still being peer-reviewed.</td>
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<tr>
<td>5/26/21: The Russian government authorizes Sputnik Light for use after their Ministry of Health announces Sputnik’s vaccine is 79.4% effective. Details of the study are not released. 6/23/21: The Russian Direct Investment Fund announces that Sputnik Light demonstrated 78.6-83.7% efficacy amongst the elderly population in Argentina.</td>
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<td>5/21/21:</td>
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<td>7/25/21: A study published in the New England Journal of Medicine shows that two doses of the Astrazeneca vaccine are 67% effective in neutralizing the Delta variant, albeit less than previous strains. 7/15/21: Researchers register a Phase 2/3 trial for 13-17 year olds. 8/11/21: Researchers announce that pre-clinical trials of an intranasal version of the Sputnik V vaccine have been completed. The research has not been peer-reviewed. 8/15/21: The Russian Direct Investment Fund announces that the Sputnik V vaccine demonstrated 97.2% efficacy in Belarus’ vaccination campaign. Sputnik Light goes go-ahead for Phase 3 trial in India.</td>
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<td>7/15/21:</td>
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<tr>
<td>7/19/21: Sinopharm publishes results of study coming out of Sri Lanka, showing their vaccine was effective in neutralizing the Delta variant. The results have not been peer-reviewed. 8/3/21: A Malaysian study shows that the vaccine failed to produce sufficient antibodies in a quarter of elderly participants. 8/13/21: A clinical trial coming out of Peru indicates the vaccine is 50.4% effective in preventing infection. 9/6/21: Announcement of development of mRNA COVID-19 vaccine. 9/7/21: A study published in The Lancet showed that the Sinopharm vaccine was deemed safe in participants 5-19 years of age. 9/17/21: A small study concludes that a booster shot increases antibodies after ~5 months. The findings have not been peer-reviewed.</td>
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<tr>
<td>7/25/21: Coronavac publishes interim results of Phase 2 clinical trial using booster shots 6-8 months after second dose. Booster results in a “remarkable increase in antibody levels” 8/4/21: Sinovac starts recruiting for Phase 4 trial on booster shots in healthy adults ages 18-59. 8/5/21: Sinovac starts Phase 3 trial using vaccine in participants 6 months through 17 years of age. 9/9/21: Chinese media report that in a study of Sinovac prolongs immunity against SARS-CoV-2. The lab study data has not been peer-reviewed.</td>
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COVID-19 Vaccine Comparison Chart - Updated August 26, 2022

**Vaccine Name**
- Sputnik V
- BBIBP-CorV
- Sinovac Biotech

**Manufacturer**
- Pfizer-BioNTech
- Moderna
- Novavax
- Oxford-AstraZeneca
- Gamaleya
- SinoPharm
- Sinovac Biotech

**Research & Development Highlights**

**Q4 2021**

- **10/12/21:** Pfizer releases results of booster study, in which five out of over 5,000 participants developed symptomatic COVID-19, producing a 96.6% efficacy rate. 12/09/21: Pfizer announces that a third dose increases antibody levels by 20x compared to two doses against the Omicron variant.
- 12/17/21: Pfizer releases interim data showing children 6 months to 2 years of age who received a 3 microgram dose of the Pfizer vaccine did not show similar antibody production to 16-25 year olds. Pfizer announced they will test a 30 microgram dose in this age group, as well as 2-5 year olds. Pfizer also announced a study lasting 10 and 30 microgram doses in 12-17 year olds.

**Q1 2022**

- **12/24/21:** Pfizer shares results from two studies that show 3 doses of the vaccine can generate antibodies against the Omicron variant. 12/25/21: Pfizer begins a clinical trial for an Omicron-specific vaccine with approximately 1400 participants.
- 1/26/22: Moderna announces they have begun a clinical trial of an Omicron-specific booster shot with approximately 600 participants. Protection has been observed to wane within six months of a booster dose.
- 2/9/22: The final analysis of the Phase 3 trial was published in the New England Journal of Medicine, stating the J&J vaccine is 55.3% effective against moderate to severe disease, dropping to approximately 52% after 4 weeks.
- 2/3/22: Moderna announces they are developing an Omicron-specific vaccine. 2/28/22: Moderna releases 6-month follow-up results from their Phase 3 trial in the UK, showing efficacy waned to approximately 8% against severe disease.
- 11/21/21: Results of Sputnik Lights Phase 1/2 trial published in The Lancet.
- 11/24/21: An intranasal version of Sputnik V is approved for human trial.
- 12/20/21: Researchers from Shanghai Jiao Tong University and the Institute of Respiratory Diseases found that antibodies from two doses of the Sinopharm vaccine declined significantly by 8 months after the second dose, and provided weak protection against the Omicron variant.
- 12/14/21: A Hong Kong University study found that two doses of the Sinovac vaccine failed to protect against Omicron (last sample was 25 people). A third shot produced antibodies in 94% of participants. That being said, antibody levels were not adequate for neutralizing SARS-CoV-2.

**Q2 2022**

- **4/14/22:** Pfizer releases clinical trial data showing a 10 microgram booster dose in children 5-11 years of age raised antibody levels against the omicron variant. This study was the basis for offering boosters to this age cohort. 5/30/22: Pfizer announces that a third dose of the vaccine in children ages 6 months through 4 years produced a favorable amount of antibodies for regulatory authorization, versus just two doses of the Pfizer vaccine.
- 4/19/22: Moderna announces preliminary results of a redesigned booster which produced over 2x the level of antibodies against the Omicron variant compared to the existing Moderna booster. These antibodies were documented for 6 months after the Omicron variant, but decreased against the Delta variant at the same rate as the existing vaccine.
- 6/12/22: Moderna begins Phase 3 trial to evaluate the safety and immunogenicity of 2 booster doses tailored to the Omicron variant.
- 6/28/22: Moderna releases preliminary data of an Omicron-specific booster, which produced a superior increase in antibodies against the Omicron variant.

**Reported Adverse Reactions**

- Myocarditis and pericarditis
- Guillain-Barré syndrome
- Bell’s Palsy
- Immune thrombocytopenia
- Venous thromboembolism
- Immune thrombocytopenia syndrome
- Thrombosis with thrombocytopenia syndrome
- Thrombophilia

* The adverse events included in this list have been verified by the CDC, FDA and/ or WHO. Official statements regarding these adverse events can be found on the respective websites.