

Vaccine race

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Vaccine race - Phase trials

Briefly:

- In pre-clinical/Phase 1 trials, vaccine candidates are tested in animals and then small numbers of people to test safety and dosage.
- In Phase 2 trials, vaccines are given to larger groups of people to check immune stimulation and whether different groups (e.g. defined by sex, ethnicity or age) show different responses.
- In Phase 3 trials, vaccines are given to tens of thousands of people in an epidemic situation, with one large group getting the real thing and another a placebo. If the vaccine works, those given the placebo will be the only ones getting infected.
- Ten vaccines in phase 3 clinical trials

Pfizer/BioNTech

Data released on 18 November, 2020.

mRNA-based vaccine is **at least 95% effective** in preventing infection

Uses messenger RNA to get human cells to produce COVID viral proteins in the body to trigger an immune

An initial shot followed by a booster.

Study monitors have not reported any serious safety concerns.

Easy and quick to tweak should the virus mutate significantly.

Pfizer vaccine

Must be shipped and stored at -70 degrees Celsius (minus 94°F),

Significantly below the standard for vaccines of $2-8$ degrees Celsius ($36-46^{\circ}\text{F}$).

Doses: 2, 28 Days Apart

Likely EUA Date: December 10, 2020

Doses by Year End: ~50 Million

Price: \$19.50 per dose for first 100 million doses

Moderna/NIAID

On 16 November Moderna **also reported** preliminary Phase III data
Efficacy rate of around 95% in preventing COVID-19.

Also mRNA based

No significant safety concerns were reported.

20 million doses of mRNA-1273 ready to ship by the end of 2020

Shipped and stored at typical vaccines temp. of 2-8 degrees Celsius
(36-46°F).

Moderna/ NIAID

Doses: 2, 28 Days Apart

Likely EUA Date: December 10, 2020

Doses by Year End: 50 Million

Price: \$25-\$37 per dose

CureVac

Another mRNA player

Still in phase I trial

Claims to have produced **a better immune response**

Company says they will be well-positioned to deliver large numbers of lower-dose vaccines in the second quarter of 2021.

Oxford/ AstraZeneca

On 16 November the Oxford team **announced results** of a Phase 2 trial

Uses a weakened form of a common cold virus (called an adenovirus).

It is genetically altered to carry some of the code for key proteins in the SARS-CoV-2 (COVID) virus.

When injected it elicits a protective immune response in humans.

Study: Held x 2

Data presented so far is confusing: by mistake they injected 1/2 dose which proved more effective than intended higher dose

Averaged over two dose regimes the efficacy rate was 70%.

Oxford vaccine can be stored, transported and handled at normal refrigerated conditions (2-8 degrees Celsius/ 36-46 degrees Fahrenheit)

Oxford/ AstraZeneca

Doses: 2, 28 Days Apart

Likely EUA Date: Possibly January 2021, but unclear in the U.S.

Doses by Year End: Potentially 30 Million

Price: \$3-4 per dose, potentially, but variable by market

Johnson & Johnson

Like the Oxford vaccine, J&J's vaccine also uses genetically-engineered adenovirus as a vector

The first single-dose COVID-19 candidate to enter Phase III trials.

The study held x 1 because of illness. Study resumed Nov. 2020

Johnson & Johnson

Doses: 1

Likely EUA Date: Possibly March or April 2021

Doses by Year End: Projects 1 billion by end of 2021

Price: \$10 per dose

Sinovac and Sinopharm

Chinese COVID vaccine candidates.

Use the tried-and-tested method of inactivated viruses as a vaccine.

This trial **was halted on 10 November** due to the death of a participant;

However when this was found to have been a suicide the trial was restarted the following day.

Waiting for efficacy data

Chinese COVID 19 Vaccine

Type: Inactivated virus-based

Doses: 2

Likely EUA Date: Not applicable in the U.S.

Doses by Year End: Projects 500 million by end of
2021

Price: \$60 per dose

Russia's Sputnik - 5

Russia, of course, already **claims to have won** the vaccine race.

The vaccine is another adenovirus vector approach.

Already in use in Russia.

Waiting for peer review.

Russia's Sputnik 5

Type: Adenovirus-based

Doses: 2

Likely EUA Date: Not applicable in the U.S. No interest.

Doses by Year End: Projects 500 million by end of 2021

Price: \$10 per dose