Vaccine rush

There are at least 48 Covid-19 vaccine candidates in clinical trials.
Here are some of those ahead in the race or cited as front runners in their respective regions.

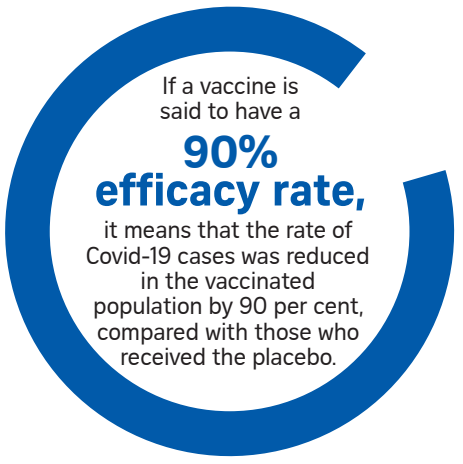
VACCINES

Company	Type	Doses	Days between doses	Efficacy*	Storage temperature	Price/dose US$
Oxford University-AstraZeneca Britain	**Viral vector** (genetically modified virus)		28	62% to 90%	Regular refrigerator temperature	$4
Moderna United States	**RNA** (part of virus genetic code)		28	95%	**-20 deg C** up to 6 months	$25-37
Pfizer-BioNTech United States/Germany	**RNA**		28	95%	**-70 deg C**	$20
Gamaleya (Sputnik V) Russia	**Viral vector**		21	95%	Regular refrigerator temperature	$10
Sinopharm China	**Inactivated virus**		14-21	–	Regular refrigerator temperature	$76
Sinovac China	**Inactivated virus**		14	–	Regular refrigerator temperature	$14-$30

*Based on preliminary trial results; China and Russia have yet to provide solid efficacy data

EFFICACY RATE

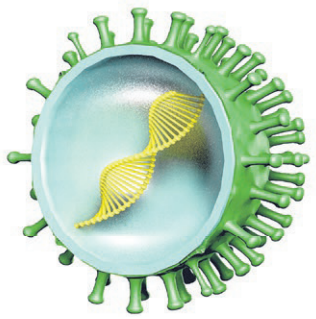
Vaccine efficacy is the extent to which a vaccine achieves its intended effect under ideal circumstances, such as in a randomised clinical trial, while its effectiveness is its performance in real-world conditions.



There is no data yet on whether the illness was milder in those who were vaccinated but nonetheless developed Covid-19.

The three vaccine front runners can stop people from getting sick with Covid-19 but they may still be able to transmit the disease to others.

Viral vector



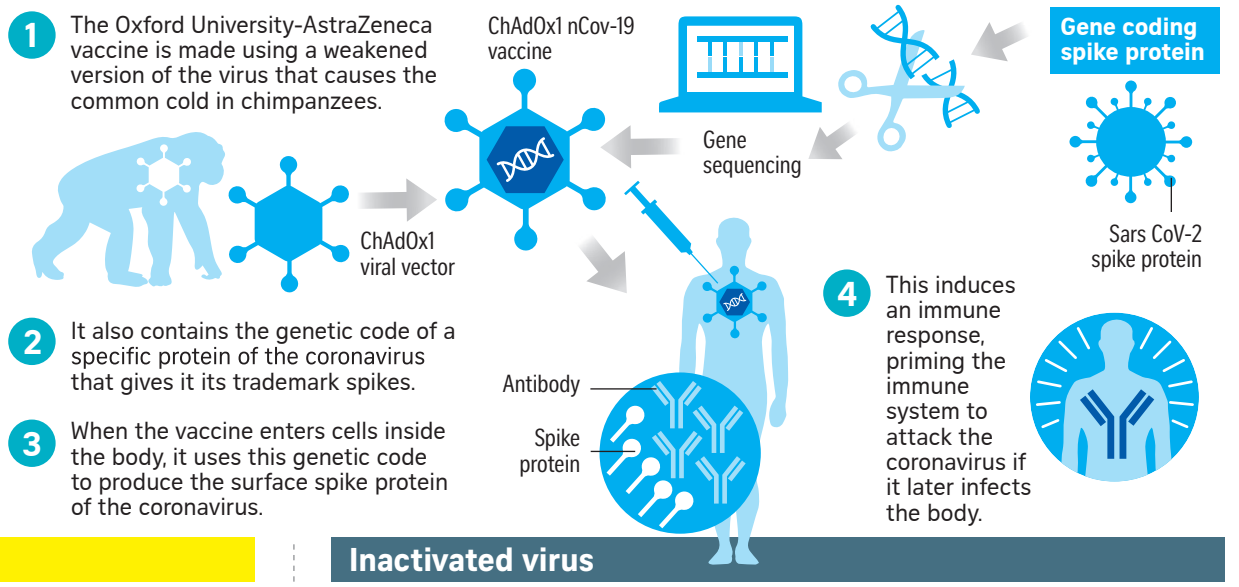
The gene for a pathogen protein is inserted into a different virus (the vector) that can infect someone without causing disease.

Example: Vaccine candidate by University of Oxford and AstraZeneca.

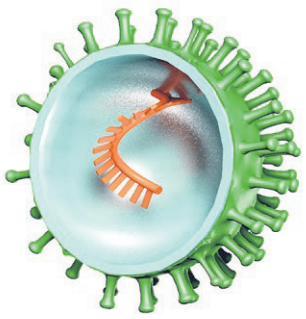
- This vaccine is made using a weakened version of the virus that causes the common cold in chimpanzees, and modified through the infusion of the genetic instructions for the coronavirus' "spike protein".

PROS
- Well-established technology
- Strong immune response

CONS
- Previous exposure to the vector could reduce effectiveness
- Relatively complex to manufacture



RNA



This uses genetic material from the disease-causing virus to stimulate an immune response against it.

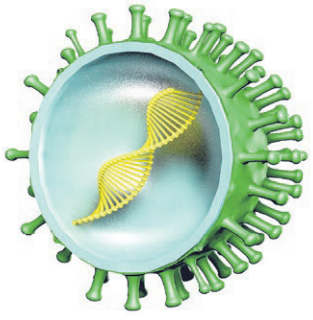
Example: Lunar-Cov19 vaccine co-developed by Duke-NUS Medical School and Arcturus Therapeutics, as well as biotech companies Pfizer and BioNTech, and Moderna.

- Messenger-RNA vaccines involve injecting snippets of the viral genetic code so a patient's body mounts a protective response without being actually exposed to the whole virus.

PROS
- Strong cellular immunity
- Relatively easy to manufacture

CONS
- No RNA vaccines have been registered for commercial use
- Booster shots may be required
- Some require ultra-cold storage

Inactivated virus



The virus is treated with heat, chemicals or radiation to inactivate it and prevent it from replicating, but it can still trigger an immune response.

Example: Vaccine candidates by Chinese biotech firms Sinopharm and Sinovac.

- This tried-and-tested technology uses a weakened form of the virus that, while unable to cause disease, spurs immune cells to make antibodies.

PROS
- A known technology considered safe
- Can be used in people with weakened immune systems

CONS
- Low immunogenicity, thereby requiring multiple boosters

HOW A VACCINE IS TESTED

Vaccine development is a painstaking, methodical process, beginning with in vitro data (so-called test tube experiments) and in vivo data (in living systems, typically animal studies). Only then can vaccine companies conduct Phase 1 to Phase 3 clinical trials in humans.

Phase 1 trials
- **Look at safety and the immune response generated in small numbers of human volunteers, typically several dozen.**

Phase 2 trials
- **Compare different doses and intervals to find the best one to take forward into larger Phase 3 trials.**
- **Phase 2 also collects more data on safety and immune responses with larger groups, typically several hundred.**

Phase 2 and Phase 3 clinical trials
- **Generally also have a placebo control group aspect, and are randomised, which means any participant has an equal chance of being given the vaccine or the placebo.**

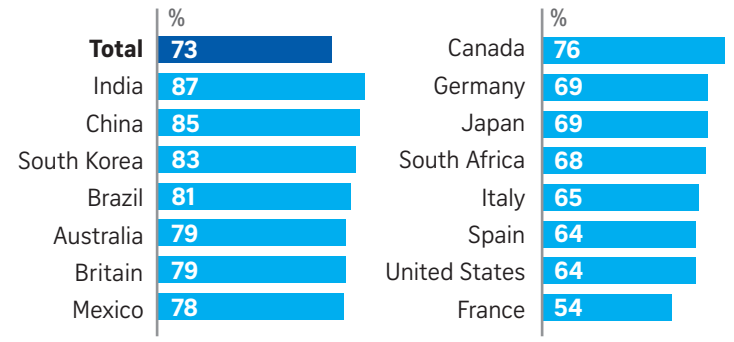
COVID-19 VACCINES SECURED IN ASIA

Country	Type(s) of vaccines secured	Doses secured	Doses needed*	Estimated roll-out
Singapore	**Govt is working to secure a portfolio of vaccines**	**Not available**	**8 million**	**Unknown**
Malaysia	A five-year deal for Chinese vaccines	At least 12.8 million	46 million	Q1, 2021
Indonesia	AstraZeneca, Sinopharm, Sinovac, a Covax deal	189 million	247 million**	End-Jan
Thailand	AstraZeneca	26 million	93 million	Mid-2021
Japan	AstraZeneca, Pfizer, Novavax, Moderna, Shionogi	Over 540 million	177 million	H1, 2021
South Korea	Covax deal to secure vaccines for 10 million people	20 million	60 million	Q2, 2021
China	Private deals with AstraZeneca, Pfizer, Gamaleya. Vaccines from state-owned firms Sinopharm, Sinovac	Not available	1.96 billion	End-2020
India	AstraZeneca, Sputnik V	Not available	1.9 billion	Feb/March
Australia	AstraZeneca, Pfizer, Novavax, CSL	135 million	36 million	Jan/Feb

NOTES: *Assuming plan to cover 70 per cent of population in a two-dose regimen.
**Indonesia plans to cover only two-thirds of its target vaccination group and cater for an extra 15% of spare supply.

IF A COVID-19 VACCINE WERE AVAILABLE, I'D GET IT

Totally agree (Oct 2020)



NOTE: Survey polled 18,526 adults aged 16-74 across 15 countries.

Sources: LIM POH LIAN, BBC, GAVI, MOH, NYTIMES, WHO, IPSOS, WORLD BANK, COMPANIES, GOVERNMENTS, NEWS REPORTS PHOTOS: REUTERS STRAITS TIMES GRAPHICS: LEE HUP KHENG, LIM KAILI