

# The race for a Covid-19 vaccine

Research groups worldwide are in a race to develop a vaccine. The Straits Times outlines the progress so far.

## HOW MANY?

- Almost 200 vaccine candidates are being studied by scientists around the world.
- Of these, 44 are already in clinical trials, which means they are being tested on humans. The Lunar-Cov19 vaccine co-developed by researchers here is among them.
- 154 others are at a pre-clinical phase.

## TYPES OF VACCINES BEING DEVELOPED

Not all the vaccines being developed work the same way. There are many different types of vaccine technologies being trialled. They include:



### RNA vaccines

- Example: Lunar-Cov19 vaccine co-developed by Duke-NUS Medical School and Arcturus Therapeutics, as well as vaccines in late-stage testing by 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.



### Non-replicating viral vector

- 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".



### Protein sub-unit vaccine

- Example: Vaccine candidate by Sanofi Pasteur and GSK.
- This vaccine contains just a part of the virus, such as the spike proteins – the part of the virus that helps it latch on to a human host cell – instead of the whole virus.

The development cycle of a vaccine typically has multiple phases.

**Exploratory stage** → **Pre-clinical stage** → **Clinical development**  
→ **Regulatory review and approval** → **Manufacturing**

- **Phase 1:** Small groups of people receive the trial vaccine. 21 are at this stage.
- **Phase 2:** The clinical study is expanded. 13 are in Phase 2 or in Phase 1/2 trials.
- **Phase 3:** The vaccine is given to thousands of people and tested for efficacy and safety. 10 are at this stage.

## How the Singapore co-developed vaccine works

In Singapore, late-stage human trials for the Lunar-Cov19 vaccine developed by Singapore's Duke-NUS Medical School and pharmaceutical company Arcturus Therapeutics could begin by the end of the year.

