

Racing towards a cure

Scientists around the world are looking to develop a cure for Covid-19, the disease with pneumonia-like symptoms caused by a novel coronavirus originating from Wuhan, China.

Audrey Tan speaks to Singapore scientists to learn more about therapeutics – the branch of medicine that looks at treatment methods used to alleviate or prevent a particular disease.

To tackle the current outbreak, scientists are looking to develop three broad categories of therapeutics.

TREATMENT

1 Antiviral drugs

How they work:

- These drugs work by preventing the development of the virus inside the human body.
- Just like a guided missile, these drugs target viruses at different stages of their life cycles in order to disable and block their development.
- By doing so, these drugs ultimately reduce the number of virus particles in the body, and prevent them from spreading.
- This could help shorten the length of symptoms and give the body's immune system time to fight off existing virus particles in the body.

Current status:

- Most antiviral drugs are specific to one or, at most, a handful of similar

viruses. A few are "broad-spectrum" and are able to target a wide range of viruses.

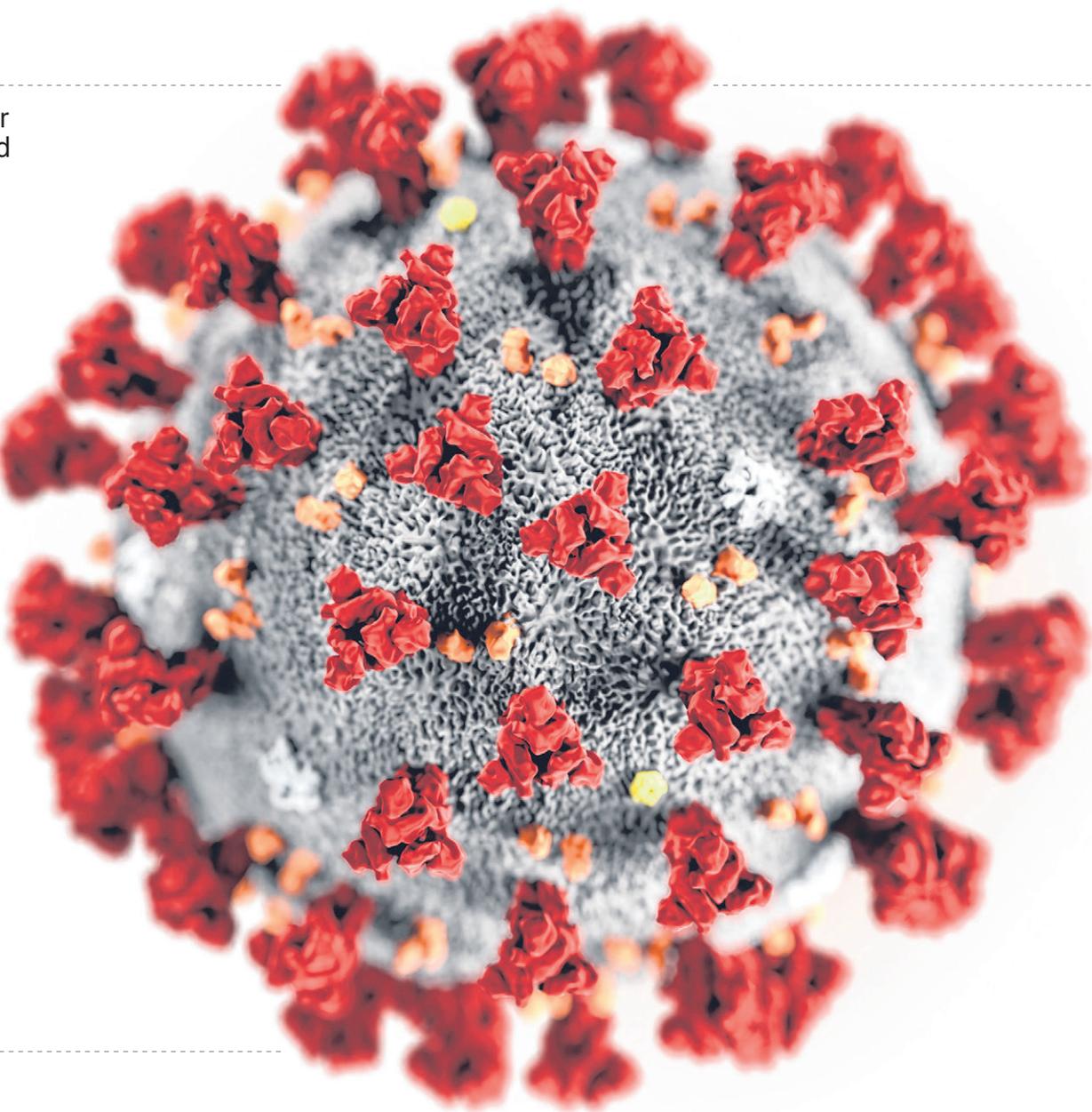
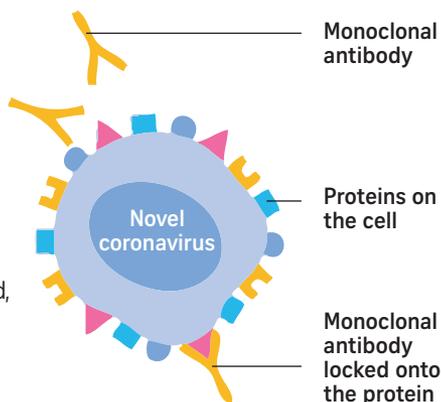
- As the novel coronavirus at the centre of the current outbreak comprises a single strand of genetic material known as RNA, antiviral drugs that work against similar RNA viruses are currently being tested.
- Singapore, for example, will likely be participating in a multi-country clinical trial testing a variety of antiviral drugs, including the combination pill lopinavir/ritonavir, which is used to treat the human immunodeficiency virus, which is also an RNA virus, said Associate Professor Hsu Li Yang from the National University of Singapore's Saw Swee Hock School of Public Health and programme leader for infectious diseases.

2 Monoclonal antibody therapy

How they work:

- Monoclonal antibody therapy essentially works by flagging the presence of the virus in the body, so that the immune system can work to get rid of it.
- The immune system comprises many different elements which all work together to rid the body of bacteria or viruses. An important component of this system is antibodies, which are found in the blood.
- When antibodies detect the presence of a virus, they latch on to the infected cell. By doing so, the presence of the problem cell is flagged, and other elements of the immune system can kick in to destroy it.
- In such therapy, laboratory-produced antibodies, known as monoclonal antibodies, are injected into the patient's bloodstream.

- They serve as substitute antibodies that mimic the immune system's attack on infected cells.



Current status:

- Monoclonal antibody therapy is a more specific type of treatment compared with antiviral medication.
- This is because scientists need to find out how exactly antibodies in an infected patient latch on to the virus cells. This latching on is usually done via a lock-and-key approach – the antibodies usually have to take on a certain "shape" before they can bind with the virus.
- As the virus is so new, research is still under way to understand this mechanism, before monoclonal antibodies can be generated in a laboratory, said Professor Lisa Ng, senior principal investigator from the Agency for Science, Technology and Research's Singapore Immunology Network.

PREVENTIVE

3 Vaccines

How they work:

- Vaccines are a preventive strategy that could inoculate the vast majority of the population before they get infected.
- There are two main types of vaccines – live vaccines and inactivated vaccines.
- Both types essentially involve injecting a tiny amount of a less- or non-infectious strain of the virus into the patient, to kick-start the body's protective response to it.

- That way, if the patient later gets infected by the virus, he would already have sufficient levels of antibodies in his blood to get rid of the virus before symptoms develop.

Current status:

- Scientists are now trying to understand more about the virus and how the human immune system responds to it. Such information will help in the development of a vaccine.