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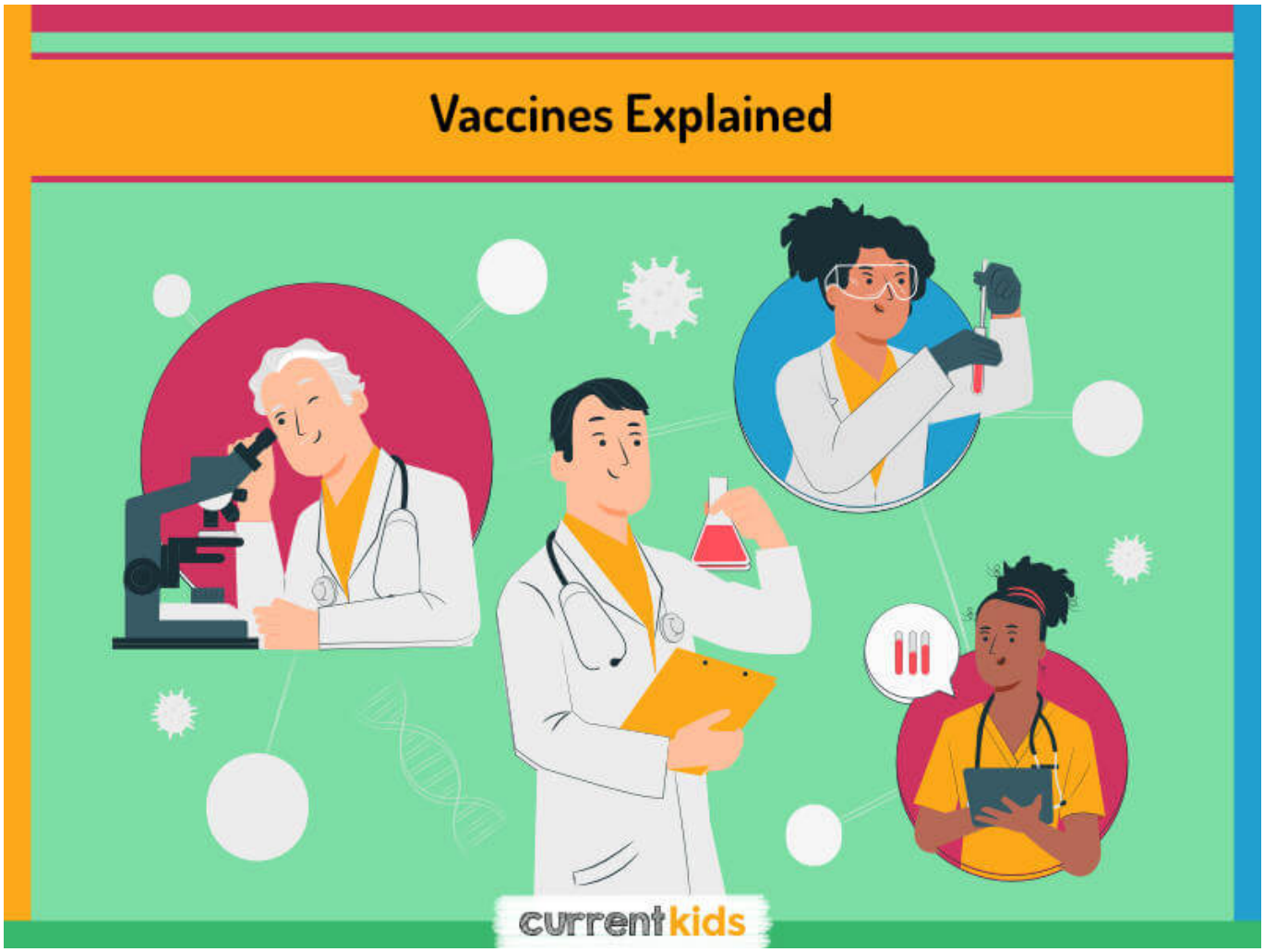
How does a vaccine work, and will we have a vaccine against COVID-19 soon?



There are more than 150 vaccine candidates in various stages of development for the coronavirus we call COVID-19.

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The 4 that are furthest along in development are from the following efforts, and they have all released phase I stage clinical trial data within the last week.

Moderna Therapeutics (USA)

Pfizer and BioNTech (USA and Germany)

Oxford University (England) and AstraZeneca (England)

CanSino Biologics (China)

Phase I clinical trials are conducted in healthy volunteers, and test for safety at different doses. They also look for the body's immune response to receiving the vaccine.

What are vaccines anyway? Vaccines take a part of the virus, and introduce it in a small dose to the human body. Our bodies recognise a foreign substance and launch an immune attack against it, by the generation of B and/or T cells that then neutralise the threat and hopefully remember this foreign substance so that if the actual virus tries to infect that person in the future, the immune system remembers and sends in all the troops to eliminate the threat.

Many of you will have received some vaccines when you were babies, and some boosters or reminders to your immune system when you are older. These are to protect you from things like the whooping cough, tetanus, and chicken pox.

Sounds simple, but vaccine development is a complicated affair. First, you have to design a vaccine with a part of the virus or a killed virus that can't multiply in the human body, or you may end up infecting a healthy person. This is then tested in animals to see if it can stimulate their immune systems against the virus, and that it is safe. It is then tested in healthy human volunteers for safety and efficacy (how well it protects).

How do you design a good vaccine? You need to choose a part of the virus that you think will not mutate over time. Yes, viruses are wily creatures that try to evade or hide from our immune systems, because they want to live. So they mutate. Some mutate faster and more frequently than others. This is why we don't have a long lasting vaccine for the common cold!

What do you need to watch out for in the trials and in the years following the trial and vaccination?

You need to be able to show that vaccinating people with this construct is safe and that any side effects they experience are mild in nature.

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You need to test them in enough people from different geographies to see how it works in them.

You need to show that it is able to stimulate an immune response.

You need to show that it can prevent the person getting infected by that virus. This is tricky, because you have to vaccinate some people with the real vaccine, and some people with a fake vaccine (no one should know what they have received). You pick people in areas where the virus is present so that their immune systems have a chance at being challenged by the virus. Then you have to see if less people who received the vaccine get sick, vs. those who received the fake vaccine.

You need to see how long that immunity lasts – is it one month, one year, forever or something else?

Got it! So when is it likely that we will get a vaccine that works? Well, there is a lot of pressure around the world to get a vaccine against COVID-19. There are many efforts ongoing, and the front runners are all enrolling thousands of people in big clinical trials and hoping to get something approved late this year, although long-term safety data will not be available for a while.

In the meantime, don't forget to keep some distance from others, wear your masks when out and about, and keep washing those hands!

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