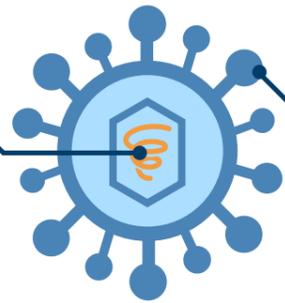


WHAT ARE RNA VACCINES AND HOW DO THEY WORK?

WHAT ARE RNA VACCINES?

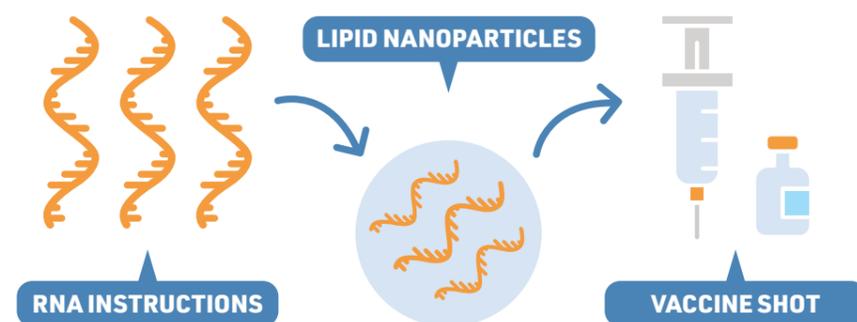
SARS-CoV-2

Viral RNA
The virus's genetic material. Contains instructions for making proteins.



Spike protein
Protein which helps the virus penetrate cells and initiates an infection.

The genetic code of the SARS-CoV-2 virus is made up of RNA. Scientists isolated the part of this genetic code that contains the instructions for making the virus's spike protein.

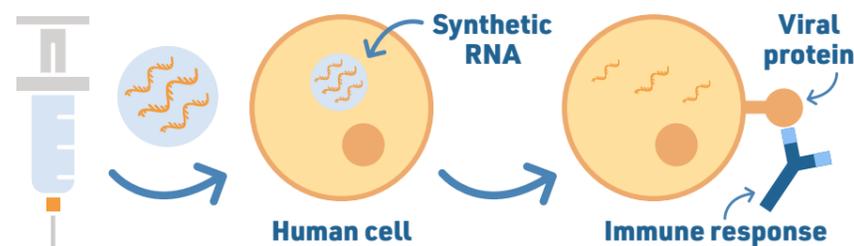


RNA INSTRUCTIONS

LIPID NANOPARTICLES

VACCINE SHOT

Synthetic RNA which codes for the virus spike protein is packed in lipid nanoparticles (very small fat droplets). This stops our bodies' enzymes breaking it down and helps our cells take it in.



Synthetic RNA

Viral protein

Human cell

Immune response

Once the synthetic RNA is inside one of our cells, the cell follows the RNA instructions to produce the virus spike protein. Its production then triggers an immune response in our bodies.



RNA VACCINES: BENEFITS AND CHALLENGES

VACCINE PRODUCTION

RNA is easy to make in a lab, so RNA vaccines can be developed quicker than other vaccines.

SAFETY OF THE VACCINES

RNA can't cause infection and is broken down by normal processes in our cells. An RNA vaccine hasn't been licensed for use in humans before but they've been under development for several years for other viruses, including influenza, HIV, and Zika.

STORAGE AND TRANSPORT

Some RNA vaccines must be stored at low temperatures to remain stable, which makes storage and transport more challenging.

RNA VACCINES FOR COVID-19

Several proposed vaccines for COVID-19 are RNA vaccines. They can be based on two different types of RNA.

mRNA vaccines

Moderna
Pfizer & BioNTech
CureVac

saRNA vaccine

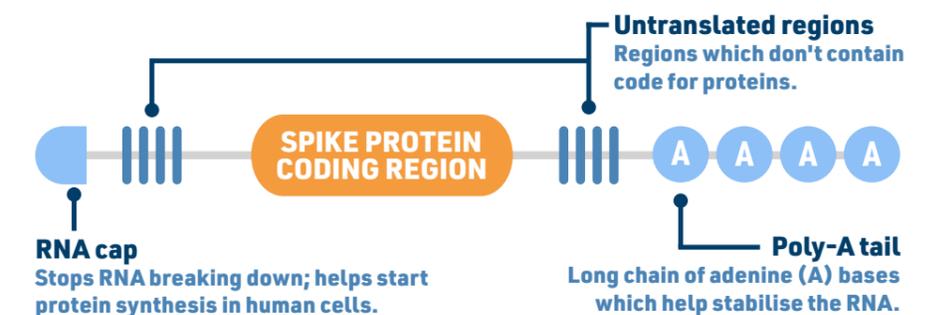
Imperial College
Arcturus

mRNA AND saRNA: WHAT'S THE DIFFERENCE?

The structures of mRNA and saRNA are similar but have a key difference, as the diagrams below show.

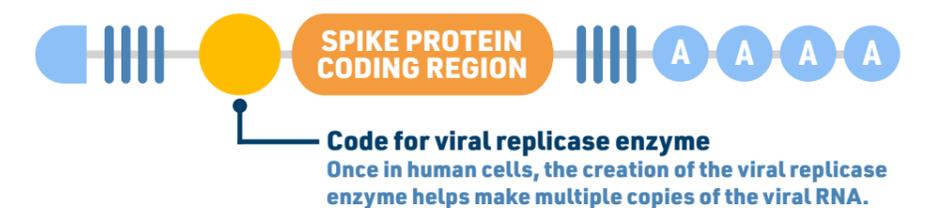
mRNA

mRNA stands for messenger ribonucleic acid



saRNA

saRNA stands for self-amplifying ribonucleic acid



As saRNA produces more copies of itself once it's in a cell, it can be given in smaller doses than mRNA vaccines. This makes the cost per dose lower and means higher numbers of doses can be produced from the same volume of vaccine.