

Self-replicating mRNA Covid-19 Vaccines

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A self-amplifying mRNA vaccine has shown promising results against Covid-19 in ongoing phase 1/2/3 trials.



[Ref-Pharmaceutical Technology]

mRNA

- mRNA is the **set of instructions** by which cells **make all proteins** and **send them to various parts** of the body.
- It is a **single-stranded molecule** that carries genetic code from DNA in a cell's nucleus to ribosomes, the **cell's protein-making machinery**.

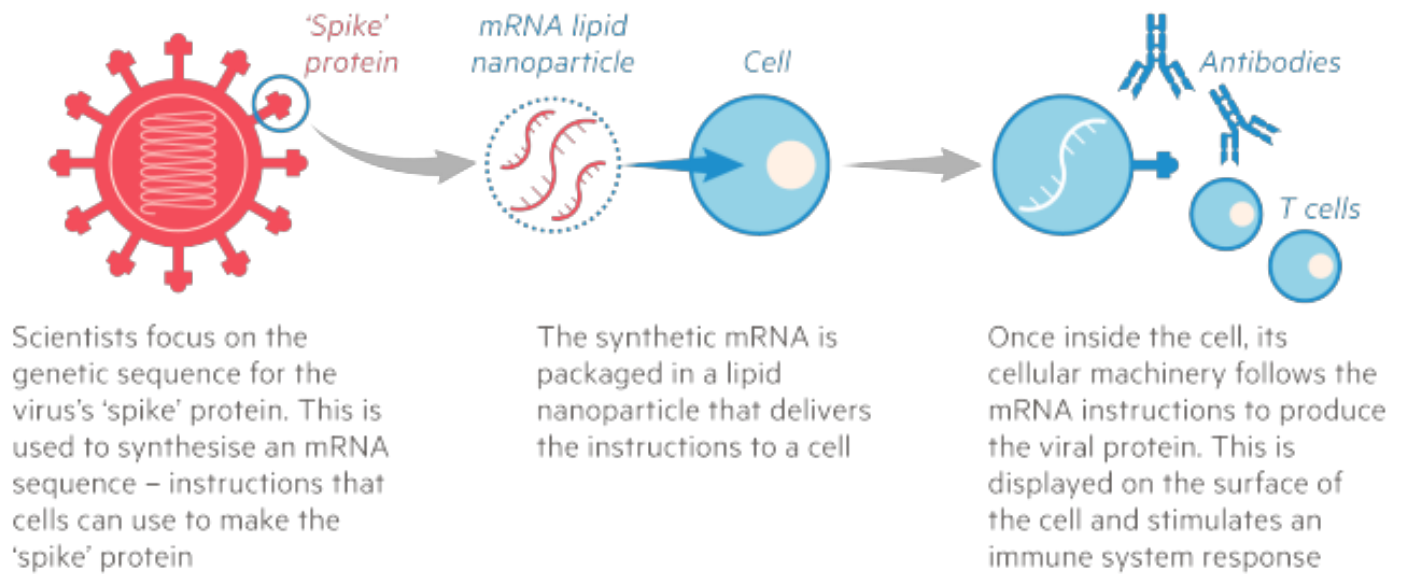
mRNA vaccine

- It is a type of vaccine that **uses a copy of a molecule called mRNA** to produce an immune response.
- It **delivers molecules** of antigen-encoding mRNA into immune cells, which use the designed mRNA as a blueprint to build foreign protein.

How does the mRNA vaccine work?

How mRNA vaccines work

Genetic instructions are given to the immune system to recognise the virus



Source: Pfizer

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[Ref-Financial times]

- It works by **introducing a piece of mRNA** that corresponds to a viral protein.
- Using this mRNA blueprint, **cells produce the viral protein**.
- The immune system recognizes that the **protein is foreign and** produces specialized proteins called **antibodies**.
- Antibodies help **protect the body against infection** by recognizing individual viruses or other pathogens, attaching to them, and **marking the pathogens for destruction**.
- Once produced, **antibodies remain in the body**, even after the body has rid itself of the pathogen, so that the immune system can quickly respond if exposed again.

Self-amplifying mRNA vaccine

- It is an **improvement** on the traditional RNA platform.
- It encodes **four extra proteins** in addition to the vaccine antigen, and these enable amplification of the original strand of RNA once inside the cell.
- The basic advantage is that it **requires a smaller dose**.