

# **Self-replicating mRNA Covid-19 Vaccines**

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## **Self-replicating mRNA Covid-19 Vaccines**

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

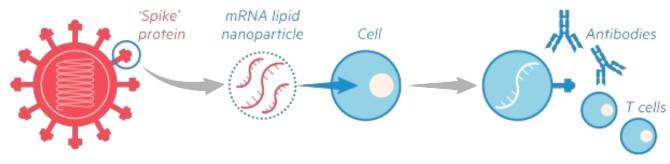
- It is a type of vaccine that uses a copy of a molecule called mRNA to produce an immune response.
- It **delivers molecules** of antigen-encoding mRNA into immune cells, which use the designed mRNA as a blueprint to build foreign protein.

#### How does the mRNA vaccine work?



### How mRNA vaccines work

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



Scientists focus on the genetic sequence for the virus's 'spike' protein. This is used to synthesise an mRNA sequence – instructions that cells can use to make the 'spike' protein

The synthetic mRNA is packaged in a lipid nanoparticle that delivers the instructions to a cell Once inside the cell, its cellular machinery follows the mRNA instructions to produce the viral protein. This is displayed on the surface of the cell and stimulates an immune system response

Source: Pfizer © FT

#### [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.