mRNA Vaccine

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In news

Recently, the Scientist behind mRNA vaccine innovation hailed Pfizer breakthrough

What is the mRNA vaccine?

- It is a new type of vaccine for providing acquired immunity through an RNA containing vector, such as lipid nanoparticles
- RNA vaccines can be constructed quickly using only the pathogen's genetic code.
- Unlike several other vaccine candidates, mRNA vaccines are synthetically developed, they don't need the virus to be cultivated and replicated, just the code for the most crucial part that the body's immune system is to target.
- RNA vaccines use a different approach that takes advantage of the process that cells use to make proteins: cells use DNA as the template to make messenger RNA (mRNA) molecules, which are then translated to build proteins.
- An RNA vaccine consists of an mRNA strand that codes for a disease-specific antigen.
- Once the mRNA strand in the vaccine is inside the body's cells, the cells use the genetic information to produce the antigen.
- This antigen is then displayed on the cell surface, where it is recognised by the immune system.

Major difference between Conventional vaccines and RNA Vaccines

Conventional vaccines	RNA Vaccines

Time required: Most vaccines against viral diseases are made from viruses grown in chicken eggs or mammalian cells. The process of collecting the viruses, adapting them to grow in the lab, and shipping them around the world can take months and is complex	**Time required:**The RNA (which encodes an antigen of the infectious agent) is made from a DNA template in the lab. The DNA can be synthesized from an electronic sequence that can be sent across the world in an instant by computer.
Biosafety: Growing large quantities of virus to make each batch of vaccine creates potential hazards	**Biosafety:** No virus is needed to make a batch of an RNA vaccine. Only small quantities of virus are used for gene sequencing and vaccine testing.
Immunity: The antigen is injected into the body. Upon recognizing the antigen, the **immune system produces specific antibodies** in preparation for the next time the body encounters the pathogen.	**Immunity:** The RNA is injected into the body and enters cells, where **it provides instructions to produce antigens. The cell then presents the antigens to the immune system**, prompting T-cell and antibody responses that can fight the disease.
Flexibility: Each new vaccine requires a bespoke production process, including **complex purification and testing.**	**Flexibility: Scientists** anticipate that the production process for RNA vaccines may be able to be scaled and standardized; potentially enabling replacement of the sequence encoding the target protein of interest for a new vaccine, with minimal changes to the vaccine production process.