

How can a vaccine prevent COVID-19?

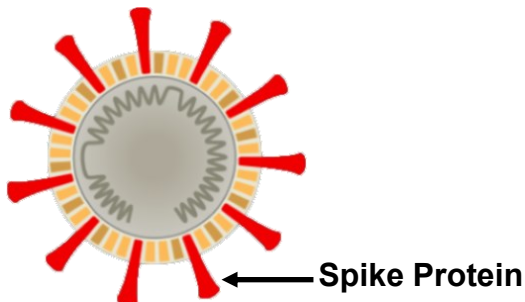
Vaccine Development Introduction

- The goal of a vaccine is to stimulate an immune response that will prevent a disease.
- Viruses and other pathogens consist of specific structures and substances that are called antigens.
- These specific structures and substances (antigens) are capable of stimulating an immune response.
- One component of vaccine development involves the determination of a specific antigen called the protective antigen.
- A protective antigen is the specific antigen of a pathogen that will stimulate a protective immune response.
- This protective immune response is what prevents disease.

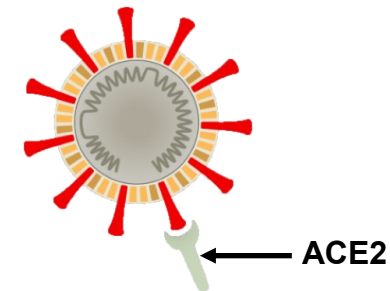
COVID-19 Vaccine Development

Now that we understand the basics of a vaccine, we can learn about the research and development of the COVID-19 vaccine.

- The crownlike spike proteins (shown in red) that surround a coronavirus are antigens. All coronaviruses have spike proteins, but the spike proteins are not necessarily exactly the same when comparing two or more viruses.



- From other coronavirus outbreaks, such as SARS and MERS, it was determined that the spike proteins attach to angiotensin converting enzyme 2 (ACE2) receptors found on the outside of many human cells (including lung cells).
- This attachment is the first step in which the virus enters and infects the cell. Therefore, the spike proteins have been labeled as the protective antigen for a coronavirus because if there is no attachment, there is no infection.



Researchers have found that vaccines developed for SARS and MERS will not work for the coronavirus that causes COVID-19 (SARS-CoV-2). This is because the structure of the spike proteins are slightly different. In fact, SARS-CoV-2 has shown a stronger attachment to ACE2 than the SARS coronavirus, which could be one reason why it is very infectious.

Since scientists now know the structure of the SARS-CoV-2 spike proteins, an effective vaccine that will stimulate a protective immune response can be developed.

References

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