

Crushing the Curve With mRNA

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COVID-19 was first discovered back in late December of 2019 and about a year and half later, we have vaccines being produced and administered to thousands of people around the globe. However, these vaccines are a little different from the typical ones you get every now and then. These vaccines contain *mRNA*, otherwise known as messenger RNA. To understand an mRNA vaccine, we need to first look at how your typical vaccine works. Traditional vaccines inject a weakened version of a disease or virus into a person's body, which then acts as a training dummy, per se, for our cells to prepare for the real thing. The mRNA vaccines, on the other hand, don't use this type of technology, instead using exactly what it's called - "mRNA."

mRNA is essentially a set of instructions that a virus's DNA or RNA make to produce spike protein, or a piece of protein on a virus cell that is basically the key to infecting the human body. To make it a little easier to understand, think of it this way - a cook uses a recipe to make something to eat. mRNA acts as a cell's "recipe," or the instructions it needs to produce a piece of protein.

The way mRNA is being used in the COVID-19 vaccine is that once it's injected into the body, it tells your immune cells the instructions to make a replica of a COVID-19 spike protein. Once the cells have made the protein piece, the mRNA is broken down and disposed of. From there, "the cell displays the protein piece on its surface. Our immune systems recognize that the protein doesn't belong there and begin building an immune response and making antibodies" (Centers for Disease Control and Prevention).

With the short time period that the development of the COVID-19 vaccine took place, many have expressed concerns over how safe it is. Although the COVID-19 vaccine

took only a year to make, the idea of mRNA in vaccines has been around for longer than most people understand.

Dating back to the 1990s, researchers explored the idea of mRNA technology as an alternative to traditional vaccines of the time. The theory behind it was based on the idea that mRNA would tell a cell to replicate a virus's protein, which would then trigger the body's immune system to build a defense against it. Studies to test this theory showed great potential in lab experiments and animal studies, which lead many to view it as a potentially effective therapeutic against the spread of cancer, as well as examining its use in vaccines to fight viral diseases like Ebola and SARS. Since scientists had already started working on mRNA vaccines against other coronavirus strains around the beginning of the COVID-19 pandemic, they were able to build off of previous research that already showed "these new [vaccination] platforms [were]...highly adaptable to emerging pathogens, and their safety profiles [had] already been well examined in recent influenza, Ebola and Zika outbreaks" (Li et al.). And because the stages of the clinical drug trials for this new vaccine were conducted at the same time rather than in separate steps, scientists were successful in quickly creating the FDA-approved mRNA-based vaccine that is now in use.

As we've seen over the past couple months with the vaccine being administered, it has already had a significant effect. Back in January, right when the vaccine was starting to be used, daily cases were at their all-time high, with 300,000 new cases on January 8th. Now in May - just four months later - we're down to only 22,000 new cases. This clearly shows the impact the vaccine has had on decreasing new cases and provides hope that society can get back to normal quicker than anyone ever imagined possible, thanks to the science behind mRNA.

Works Cited

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