

# Covid-19 mRNA Vaccines

## How do mRNA vaccines work?

Both the Pfizer BioNTech and Moderna vaccines are based on ground-breaking technology that has been in development for over 30 years. In fact, messenger RNA (mRNA) was first discovered nearly 60 years ago. Messenger RNA is a set of genetic instructions that tell ribosomes (factories within a cell) how to make a protein. Covid-19 mRNA vaccines provide instructions for our cells to make a harmless piece of what is called the "spike protein". The spike protein is found on the surface of the virus that causes Covid-19.

Covid-19 vaccines do not use the live virus that causes Covid-19 and therefore they cannot *give* someone Covid-19. mRNA vaccines do not affect or interact with our DNA in any way, as mRNA never enters the nucleus of the cell, which is where our DNA (our genetic material) is kept.

Covid-19 mRNA vaccines are given in the upper arm muscle. Once the instructions (mRNA) are inside the muscle cells, the cells follow the instructions and make the protein piece. After the protein piece is made, the cell breaks down the mRNA and gets rid of them. Next, the cell displays the piece of protein on its surface. Our immune system recognises that the protein does not belong there and starts to make antibodies which fight infection. After developing antibodies, our immune system has learned how to protect against future infection quickly.

The benefits of mRNA vaccines, like other vaccines, is that those vaccinated gain this protection without ever having to risk the serious consequences of getting sick with Covid-19.

## So why have mRNA vaccines emerged now?

mRNA was discovered in 1961 and has been studied for vaccine use ever since, so it is not an overnight sensation - a lot of detailed science has gone into the development of these vaccines. Scientists have been working on coronavirus vaccines since the SARS and MERS outbreaks, but funding dried up probably because it was a limited outbreak, and it didn't affect us in the western world! However, early-stage trials had already been carried out using mRNA vaccines against Zika virus, influenza, cytomegalovirus, and rabies.

Recent technological advances in RNA biology and chemistry, as well as improved



delivery systems, have reduced the challenges presented by mRNA technology and this has improved the stability, safety and efficacy of the mRNA vaccines.

## Other than mRNA what else is in the vaccine?

There is complete transparency about ingredients as anyone can look them up on the company's datasheets. In addition to the mRNA the vaccine contains:  
Lipids (a fat carrier for the mRNA)  
Potassium chloride (buffer)  
Monobasic potassium phosphate (buffer)  
Sodium chloride (salt – a tiny amount so it does not affect blood pressure.)  
Dibasic sodium phosphate dehydrate (buffer)  
Sucrose (sugar – a tiny amount so it does not affect diabetes).

There are no aluminium, mercury or food allergens which is reassuring for those that have concerns about vaccine allergies.

## What side-effects can the vaccine cause?

Some, but generally mild, side-effects have been reported. The most common are: injection site reaction (your skin may be red or slightly swollen), fatigue, headache, chills, muscle pain, joint pain, fever. These are all typical of an "immune response" and are a good thing as this is the body responding to Covid-19 without any infection. It should be emphasised that these side-effects are short-lived and easily managed and significantly less risky than taking your chances with Covid-19 infection. These vaccines are safe – the Pfizer and Moderna trials included more than 70,000 people!

## Why should I get vaccinated if I am not in an at-risk category?

If you get infected with Covid-19 and survive (which the majority of people do) the symptoms can persist for many, many months. The virus can damage the lungs, the heart and the brain. This increases the risk of long-term health problems. Even young, healthy people can feel very unwell for weeks or months after the infection. We are yet to determine

what the possible life-long effects of Covid-19 are, what is being termed "Long Covid".

## How can Covid-19 affect my long-term health?

We are learning that Covid-19 infection can cause long-term damage to the body and the life-long implications of this are as yet unknown. Currently, we know the following:

**Heart:** Imaging tests taken months after recovery from Covid-19 have shown lasting damage to the heart muscle, even in people who experience only mild Covid-9 symptoms. In the future this may increase the risk of heart failure or heart complications.

**Lungs:** The type of pneumonia often associated with Covid-19 can cause long-standing damage to the alveoli (tiny air sacs) in the lung. The resulting scar tissue can lead to long-term breathing problems.

**Brain:** Even in young people Covid-19 can cause strokes, seizures and Guillain-Barre syndrome (a condition that causes temporary paralysis). It has been suggested that Covid-19 may also increase the risk of developing Parkinson's disease and Alzheimer's disease.

So, when you balance the benefits to risks, the short-term side effects of a 95% effective Covid-19 mRNA vaccine against the long-term health damage from Covid-19 infections it is a no-brainer. For your own sake, please get vaccinated.

## Conclusion

As the vaccine benefits far outweigh any minor (short-lived) risks please get vaccinated. If you have the choice, go for the best vaccine available i.e. the mRNA from Pfizer/BioNTech or Moderna. The sooner we are all vaccinated the sooner we can really establish "herd immunity" which means we can stop wearing masks and get back to a normal way of living. So getting vaccinated is important for your good, the good of your family, friends, neighbours and everyone in Ireland.

It is so vital that the government is even *paying* for you to be vaccinated!

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