Does AstraZeneca's COVID vaccine give longer-lasting protection than mRNA shots?

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Last week, AstraZeneca's chief executive officer said the company's COVID vaccine may provide longer-lasting protection than mRNA vaccines like Pfizer's, especially in older people.

CEO Pascal Soriot said this might explain the United Kingdom's more

stable hospitalization rate compared to the escalating COVID situation in continental Europe.

The UK used the AstraZeneca vaccine a lot more widely than other European countries, many of which restricted its use to older age groups or abandoned using it altogether after reports of very rare blood clots.

The theory behind this is the AstraZeneca vaccine may provide more durable "T cell protection." T cells are a crucial part of our immune system, and differ from antibodies.

There's not enough evidence yet to support the CEO's claim. But we do know a lot more about adenovirus vector vaccines, such as AstraZeneca's, as they've been around for decades, while mRNA vaccines are relatively newer.

Theoretically, it is possible adenovirus vector vaccines do give more durable protection against COVID via T cells.

Let me explain.

What is AstraZeneca's vaccine again?

AstraZeneca's COVID vaccine is an adenovirus vector vaccine.

This means it uses an adenovirus—a common type of virus that affects humans and many other animals. The adenovirus is genetically modified so it doesn't replicate.

It's used as a way to deliver the vaccine's information into our cells.

In this case, the information packaged in the adenovirus tells our body how to make the coronavirus spike protein. This teaches our immune

system how to deal with the coronavirus if we're exposed.

Adenovirus vectors have been used in medicine for a few decades in other vaccines and also cancer therapy. They're very good at stimulating both antibody production and T cell responses.

What are T cells?

Antibodies bind tightly to a specific target, locking onto invading viruses and preventing them from entering our cells.

But the immune system is more than just antibodies.

T cells are also really important for our immune response, and have different roles. One type, known as "killer T cells," attack and destroy virus-infected cells.

Another type, known as "helper T cells," interpret the nature of the infection and help the immune system respond appropriately. This includes activating killer T cells to destroy virus-infected cells, and also helping B cells make antibodies.

> What are T cells and why do they matter in the fight against COVID? https://t.co/OH73Vx7aY7
>
> — Evening Standard (@standardnews) November 23, 2021

Antibodies wane over time, which can lead to more breakthrough infections in fully vaccinated people.

When viruses are not stopped by antibodies, we rely on killer T cells to eradicate the virus. And T cells almost certainly help prevent severe outcomes if you get COVID.

It's a lot harder for a virus to escape a T cell-based immune response. So a vaccine that generates strong T cell immunity should help retain effectiveness over time against variants including Delta and Omicron.

All COVID vaccines stimulate our bodies to produce both antibodies and T cells.

So the key questions are: does AstraZeneca's vaccine produce a longer-lasting T cell response than the mRNA vaccines? And might this be one reason why the UK, which relied heavily on the AstraZeneca vaccine, has a more stable hospitalization rate than other parts of Europe?

Unfortunately, there are not enough data yet to answer these conclusively.

There are many reasons why hospitalization rates can vary between countries, so it's difficult to know how much of a factor the use of AstraZeneca's vaccine would be.

But we can lean on what we know about adenovirus vector vaccines to break down this theory.

It's plausible

Adenovirus vector vaccines are very good at stimulating immune responses, particularly T cell responses.

Current wisdom tells us the mRNA vaccines provide a stronger antibody response than the viral vector vaccines like AstraZeneca's.

But this antibody protection seems to wane relatively quickly over 4-6 months.

It's possible immune memory with the mRNA vaccines isn't as strong, and the AstraZeneca vaccine may produce a longer-lasting T cell response that supports more durable immune memory.

This could slow the loss of antibodies and generate a better killer T cell response.

Why might AstraZeneca produce a longer-lasting response?

One reason might be because the RNA in Pfizer's and Moderna's vaccines doesn't last very long in the body, only a week or so, because RNA is very fragile.

But the DNA delivered by adenovirus vector vaccines will likely hang around in the body for a bit longer.

DNA is more stable than RNA, and might allow for a more prolonged, low-level activation of our immune system that provides longer-lasting protection.

This might explain longer-lasting T cell responses with the AstraZeneca vaccine.

But this is only speculative for now as such direct tests haven't been done yet.

If true, we can learn from this

This isn't about which vaccine is "better," or picking and choosing which vaccine to get.

Both are excellent vaccines that have saved many, many lives already. We shouldn't play a tribal game where we say we're only going to get one type of vaccine.

It's important to learn from both types of vaccine, while we continue to learn about immunity to COVID, so we can incorporate the best characteristics of both into next-generation vaccines that help us better fight COVID and future pandemics.

I'm sure mRNA vaccine producers will learn from this and develop new formulas to give a longer-lasting response.

It's worth remembering Pfizer and Moderna's vaccines are the first mRNA vaccines ever approved for use in humans.

There was an immediate need to get antibodies against COVID in our bodies as soon as possible, and they've done a fantastic job doing that.

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