

## Which is worse, the vaccine or the virus?

There seems to be some major misunderstanding or misconception about the COVID-19 vaccines.

To better understand these it may be worthwhile to first recognize that there are two ways to become immune to COVID-19:

1. by administration of a vaccine
2. by infection with the SARS-CoV-2 virus

Currently the vast majority of people in the United States are becoming immune to COVID-19 by one of these routes. Given the incredibly high transmissibility of the Omicron variant and its extremely high prevalence in the last few weeks, those who are not vaccinated have a very high probability that they will be infected with the virus.

Both of these ways of developing immunity can cause some "side effects" meaning undesirable health effects. Let's compare those.

Common side effects of the vaccine:

1. some pain at the injection site
2. fatigue
3. body ache
4. fever

Usual duration: 24-48 hours but sometimes a few days; for most people these symptoms are relatively mild, but for a few they can last for up to a week and reduce your ability to function.

Common side effects of infection by the virus

1. fatigue
2. body ache
3. fever
4. diarrhea and/or vomiting
5. heart inflammation and other cardiovascular damage
6. loss of taste and smell
7. cognitive impairment
8. death

Usual duration: (except for #8) minimum 5 days up to a year or longer, some effects may be permanent (e.g., #8). For some people these symptoms are relatively mild but for most they are at least as severe as what is usually experienced with influenza which is rather unpleasant, and for a number of people, the effects are so severe they must be given extreme medical care that can be extremely unpleasant and traumatic such as breathing assistance with a ventilator.

So it seems clear that the side effects are most likely worse for infection with the virus for most people. Let's dig a little deeper to see why that is so.

Let's consider the components of the vaccine and how they work. Keep in mind that both the vaccine and the virus trigger the immune system to develop the ability to destroy the virus and protect us from its damaging effects.

The vaccines have been designed by scientists using the best available scientific knowledge to optimize the ability of the vaccine to stimulate the immune system. The vaccine does this by mimicking just enough of the virus to trigger a strong immune response. The vaccine is designed to use as little of the components of the virus as possible so that the side effects are minimized. Indeed, the Moderna and Pfizer-Biontech vaccines use only one part of the virus function - it's called messenger-RNA. The shorter name is mRNA. When the virus infects a cell it makes mRNA and it forces the cells to use that mRNA to make new parts of the virus. The complete virus consists of RNA, proteins, and lipids and is a much more complex structure than the vaccine. And, of course, it causes much more "side effects" than the vaccine and those are much more severe and longer lasting, even fatal. The vaccine has been pared down to one functional component and designed to have maximum effectiveness for giving you immunity, with the smallest chance that it will cause serious side effects. That's due, in part, to the fact that it has only one component of the virus, mRNA. This vaccine, as are all vaccines, is based on the virus. It is an not entirely different type of agent. So, if you are afraid of the vaccine, you should be MUCH more afraid of the virus.

One could ask whether there may be long-term side effects of the vaccine. The only way to know for sure is to wait and see. But let's think about how the vaccine works and how the virus works. Notice that the vaccine is working more or less the same way that part of the virus works and contains some of the same types of components. So, if there are long-term side effects of the vaccine, there will likely be long-term side effects of the virus. However, there is a much greater chance that the virus will cause worse long-term side effects than the vaccine because the vaccine has been designed using the best available scientific knowledge to minimize the chance of such effects.

So, given all of this, you may not be surprised to know that I have had three doses of the Moderna vaccine: the two doses required for the standard full vaccination regimen, and the booster. I much preferred getting the majority of my immunity that way because it is much more likely to give me less severe, shorter duration side effects.

Yes, I was infected with Omicron and developed symptoms on Sunday. However, I only felt badly for the first three days and now, five days later I am 99% back to normal. At 69 years of age, I think it's likely I would have had a worse experience if I had not been vaccinated. And I believe that because I was vaccinated last spring I was fairly well protected from the previous variants that caused more severe disease than Omicron.