

Podcast: Inactivated virus vaccines

As of May 2021

My name is Ute Papkalla, I am a member of the health team of the German Institute for Medical Mission, also called Difäm. With me is my colleague, Carina Dinkel. Today we will talk about a specific kind of vaccination for Covid-19: vaccines with an inactivated whole coronavirus to stimulate an immune response.

Very recently, the WHO granted emergency approval to a vaccine from China. Now this can also be included in the global initiative of COVAX to provide vaccinations for the whole of humanity. Can you tell me something about this vaccine?

The vaccine you mention is the first vaccine to get approval that is based on a whole inactivated Coronavirus. It was developed by Sinopharm in China. Development started pretty early already in January 2020. This was a time, when the coronavirus affected only China. So they started finding a way out immediately. There are other whole virus vaccines, that are under development. Maybe you have already heard of the second whole virus vaccine that is pretty close to approval. It is from Sinovac, which is based in Wuhan, the very same city, where the whole pandemic started.

This is why you told me where this vaccination comes from and why it was developed. And it seems very logical that China started to find a vaccination right from the beginning, as they were so strongly affected. But so far you did not tell me much about the vaccine itself. How does it work?

Well, it works pretty straightforward. If you catch the coronavirus, your body produces antibodies that fight the virus. These antibodies protect you later on against being infected again.

Yes, but the body not only produces antibodies. If I catch Covid-19, I might fall very ill and even die. What does this have to do with the vaccination?

This is exactly the point. You want to use the virus to stimulate the body to produce an immune response. However, you do NOT want the virus to multiply and cause the disease. Therefore, you can use the virus but you have to kill it first. The inactivated virus vaccines use exactly a kind of dead complete coronavirus that is then injected as a vaccine. The body starts fighting the dead virus just as it fights a living one – antibodies are produced, killer cells are activated, T-cells are stimulated... and in the end, you have antibodies and immunity.

Okay, it is easy to understand, how this works. But on the other hand: how do you kill a virus without destroying it?

This can be done by heat or by chemical substances. In the WHO approved vaccine, the inactivation is done by a chemical substance named beta-propiolactone. This substance hangs on to the genes of the Coronavirus. Therefore, the genetic substance that is needed for replication is somewhat not usable any more. The virus can neither replicate nor do anything if the genetic information is destroyed. The good thing is that the chemical substance affects only the virus genome. The complete outer virus capsule and especially the spike protein, which is important for stimulating the immune response, are still intact.

Good to know that although a whole virus is used, it cannot replicate or cause any other harm, because all the genetic information is inactivated. All in all this approach with the whole virus seems really a good one and straightforward.

Yes, this is true. It is also a very old and successful approach. The Salk-polio vaccine, which played a big part in eradicating this disease in recent years, is an inactivated virus vaccine as well. The vaccines against Hepatitis A and Rabies are also in the same class. So worldwide there is a lot of experience with inactivated virus vaccines. Moreover, because it's a known technology, there is capacity to produce vaccines at a larger scale.

This all sounds really good! Now, tell me about the efficacy.

Data is a bit sparse, but enough to convince the WHO. Large trials were done in Brazil, Indonesia, Turkey, and Chile. In addition, the vaccine is already widely in use on the Arab peninsula. Overall we talk about an efficacy of around 78%. This has been proven for the Sinopharm vaccine and should not differ much in other inactivated virus vaccines that might get approval. This puts it in the same range of efficacy as the viral vector vaccines.

We do not have any valid data for the efficacy against variants though. There further research is needed.

So it is a known and well-studied technology; it works but what about side effects?

There are the usual ones: possible pain, redness and swelling at the injection arm. Fever, headache and fatigue can occur, just as it can happen with the other vaccines. So all in all it is a pretty good vaccine for people under the age of 60.

Why under the age of 60? Is it different for people over 60?

This we do simply not know yet. Most likely, it will work just as well and as safely in elderly people, but almost all the studies have been conducted with people from 18 to 59 years. So we cannot say anything valid about elderly people. People with comorbidities were excluded from the studies as well. Nevertheless, all around the globe about 65 million doses of inactivated virus vaccine against corona have already been administered. So I am pretty confident, that we get some data soon.

That would be very good. Because we really need vaccination to stop the pandemic. Until I get my shot I will still wash my hands, avoid crowded places, keep a distance and wear my mask.

I hope that you will not only wash your hands until you have your shot! Those measures will still be needed until we overcome the pandemic all over the globe. We have to work together and do everything we can to stop the spreading even if we ourselves are already vaccinated.

Yes, you are right. We have to protect not just ourselves but also the others.

Yes! So be blessed and stay safe

Sources:

<https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines> -> link zu ganz vielen Studien and pre-peer Veröffentlichungen

