Interview with Ingmar Hoerr, CureVac Founder and holder of the first patents associated with mRNA

About Ingmar Hoerr

Ingmar Hoerr is a German biologist. He pioneered vaccinology research into the use of mRNA and is a founder of the German biotechnology company CureVac. He created the initial technology used in mRNA vaccines and submitted some of the first patents linked to its use, underpinning the role we see for it in current vaccine development. . EuropaBio grabbed 5 minutes of his time as part of its webinar on December 13 'mRNA: a voyage of discovery and celebration'.

©Matthias Baus

1) Could you introduce yourself and share your early work during your doctorate on mRNA?

Hello, I'm Ingmar Hoer. After my PhD at Tübingen University, where I focused on RNA research, I founded CureVac company. The RNA research was something new and special, and nobody else was doing this kind of research at that time. Hello, I'm Ingmar Hoer. After my PhD at Tübingen University, where I focused on RNA research, I founded the CureVac company. The mRNA research was something new and special, and nobody else was doing this kind of research at that time.

2) COVID -19 was not even the glint in the eye of virologists back in 2000. Where were you looking for the potential of mRNA applications?

Well, cancer was a hot topic at that time and we were really dedicated to searching for treatment. I thought that RNA is a perfect tool to cure it as it can be adapted to different concepts, and cancer simply cannot escape from the treatment. And that was the reason why we initially started with cancer.

3) That's a really interesting insight and as you developed the patterns linked to mRNA, what were you looking at key points to enable further exploitation?

One of the reasons why RNA was still not applied, was the assumption that it is completely unstable and many scientists hated to work with it. For example, if RNA goes directly into the mouse, when into the air, you breathe it out, there are a lot of so-called RNA enzymes which can easily destroy the RNA. But chemically, RNA is very stable. You can heat RNA to 100 centigrade with no effect on it. For this early presumption, nobody was really working with RNA and we were the first who discovered that RNA is stable and can be applied in different ways. One of the reasons why mRNA was still not applied, was the assumption that

it is completely unstable and many scientists hated working with it. For example, if mRNA is inhaled directly by a mouth, there are a lot of RNase enzymes which can easily destroy the mRNA. But chemically, its very stable. You can heat mRNA to 100 centigrade with no effects. Because of this early presumption, nobody was really working with it and we were the first who discovered that mRNA is stable and can be applied in different ways.

4) This was a really new technology to bring to investors as you started to try and develop it further. What were their reception and enthusiasm?

Investors didn't know anything about mRNA. What they knew is that it is unstable and useless. I was talking with a lot of professional investors who were directly telling me Sorry guys, I don't believe you, it's crap. I was young, nobody knew my name and didn't believe that somebody in a small town like Tübingen could have achieved this kind of invention. I had data and my PhD work proving that mRNA is completely stable, but the doubt was still there.

Also, it was more interesting to talk about technology at that time because we were doing it the natural way. We looked to nature and the body stabilises RNA and found out there are some sequence elements which can stabilise it. We didn't use any chemical modification and this allowed us to go forward and attract the interest of some scientists to follow our pathway.

5) Today the headlines are dominated by the current pandemic, but we already hear about other RNA applications which are starting to benefit patients. Where do you see the biggest impact in the future, particularly in unmet medical needs worldwide?

I think in the COVID scenario with a lot of mutations coming up, it's quite easy and suitable to follow up these mutations with mRNA technology. Today, within less than half a year it is possible to adapt a vaccine that the virus cannot escape from.

The same applies to cancer. It is a very deadly disease as the cancer cells are very intelligent-they can hide from the immune system, which is the major weapon that we have in our bodies. What we can do with mRNA is to teach the immune system to detect cancer cells. Cancer mutates every day more or less, and we can teach the body to detect it and adapt the treatments to suit.

I believe that cancer will always be there, but our immune system will be able to combat it. I really hope that in the future we can live with cancer like with a chronic disease which is not going to grow and destroy organs. I think this is the mission we have.

6) What advice would you give to researchers to help to deliver the maximum impact from their own promising advances in technology? What did you learn from the process with mRNA?

I think it's very important to trust your own research. Also, try to understand what's going on in experiments, use the right controls, but do it and go your own way. This is how I did it with mRNA. Furthermore, try to get other people interested in this, build teams with a lot of believers and interesting people around and collect as much data as possible. Publications and patterns are important as well, but inspiration and persistence is the answer.

Thank you.