

## BioGrafie – Prof. Hans-Georg Rammensee

### “If I think something is right, then I do it”

**(Stuttgart/Tübingen) – Prof. Hans-Georg Rammensee has spent decades researching immunology and was recently elected a member of Leopoldina, the German National Academy of Sciences, for his work. He is studying the possibility of immunising the body against all types of cancer, is a pioneer in mRNA vaccines and garnered a great deal of attention three years ago when he tested a COVID-19 vaccine that he had developed – on himself. Companies such as CureVac, Immatix, Prime Vector, Atriva and Synimmune regard him as a guiding light. His Department of Immunology in the Interfaculty Institute of Cell Biology at the University of Tübingen is a unique talent factory that has produced numerous start-ups. The latest company co-founded by him is the recently launched ViferaXS GmbH. All the same, the 70-year-old is far from satisfied.**

Clad in safety gear, he wields his chainsaw so confidently that you would never expect this man ever has anything to do with the much more delicate instruments found in high-tech laboratories. However, when he is in the lab, Prof. Hans-Georg Rammensee is fighting malignant diseases. “When I’ve had enough of the committee-type work that is another side to what I do, but not one that appeals to me, I come out to the woods to decompress,” explains the researcher. He likes people to be succinct and get straight to the point – just like he does. His aim in life can also be summed up pretty neatly: Prof. Rammensee is developing a vaccine against cancer – *every* cancer.

His mission began half a century ago, when he was undertaking his non-military national service at Tübingen University Hospital as a 20-year-old. “I saw cancer patients die, including young people, and I got a sense of the helplessness that the doctors felt.” Instead of studying mechanical engineering, as he had planned, he decided to go into cancer research. “I saw that medicine was unable to do much and that is why I wanted to research the scientific basis on which cancer develops.” One way he financed his biology studies was by working night shifts on the cancer ward, and he learned about something as a student that has stayed with him all his life – killer cells. “I found out that there are these T cells in the immune system that can kill cells that are infected with a virus,” recalls Prof. Rammensee. “That was something very new at the time. Rolf Zinkernagel and Peter Doherty, who would go on to win the Nobel Prize in Medicine, had only just discovered how the immune system identifies virus-ridden cells. If these T cells can kill virus-infected cells, I thought, perhaps they can do the same to cancer cells?”

From that moment on, Prof. Rammensee dedicated himself entirely to immunology and spent the decades that followed developing his innovative approach of

immunotherapy as a treatment for cancer. “In 1976, the idea was considered completely absurd and I was an oddity. Not even my doctoral supervisor, the immunogeneticist Jan Klein, believed it could work.” Nonetheless, Klein allowed “pig-headed” Rammensee to test out his hypotheses in his department at the Max Planck Institute for Biology in Tübingen. Rammensee and his team biochemically isolated peptides from HLA molecules because there was a suspicion that these included peptides that are recognised by T cells. His theory was that these peptides could be from normal cellular structures – or from cancer-specific antigens. The T cells recognise changes in the peptides that are caused by tumour diseases, for example. Over the years that followed, Prof. Rammensee and his team developed a procedure that can be used to precisely determine the virus and tumour cell peptide antigens recognised by the T cells. This can be used as a basis for developing personalised immunotherapy for cancer patients that activates the immune system and destroys the tumour cells.

Back in the 19th century, the noted physician and co-developer of chemotherapy Paul Ehrlich posited that the immune system may be able to do something to attack cancer, but was unable to make a real breakthrough with this hypothesis. That meant that up until the late 1980s there was barely anyone in the established scientific community willing to support Prof. Rammensee’s approach. “However, I felt it could work, and if nobody was doing it and I thought it was right, I’d do it myself.” This self-confidence is still helping him stick to his aims today, even though they have not been as “easy” to achieve as he had hoped: “At the time, I estimated it would take 20 to 30 years and then we’d have the vaccine. However, it has been much more complex than I thought and, unfortunately, there have been a lot of setbacks, too.”

It shows great stamina – and a high tolerance for frustration – that he nevertheless went on riding his bicycle to Morgenstelle every morning to manage the Immunology department at the University of Tübingen’s Interfaculty Institute of Cell Biology, teach young scientists and also set up a string of companies. “My goal is the same as it has been for many years. I am trying to make personalised cancer vaccines work. But I’m still not where I’d like to be.” There are two clinical studies currently underway that are making Prof. Rammensee cautiously optimistic. “We are seeing very strong immune responses, triggered very quickly, but further studies are needed before we can say whether these are now effective against cancer.”

Prof. Rammensee and his team have carried out internationally recognised and pioneering work on clarifying the detection mechanisms of T cells in the human immune system. The exceptional scientist has received many accolades in recognition of this work, the most recent being his election as a member of Leopoldina, the German National Academy of Sciences. Prof. Rammensee is one of the people who paved the way for mRNA vaccination and generated headlines during the pandemic when he tested a vaccine on himself. “Once the sequences of the new coronavirus were known, I felt it was an obvious step for me to use our methods to investigate which peptides were involved that would be recognised by the immune system, that is, by the T cells.” The result was a vaccine that he injected into himself – and he still can’t quite understand what all the fuss was about. “If I think something is right, then I do it. And if you know what you’re doing, then you also know it’s not some kind of death-defying act. It wasn’t the first time, either. I’d vaccinated myself with other virus peptides before – and it worked out fine then, too.” All the same, he didn’t allow his colleagues to test it out on themselves. The vaccine that he injected into his

abdomen in March 2020 was one that the scientist had developed himself in normal laboratory quality. The Tübingen-based institute is a major exception in Germany's research landscape in that it is authorised to manufacture active pharmaceutical agents that can be used in clinical studies. "It took us years to get the necessary authorisation. However, we are now permitted to manufacture the active agent peptides for our clinical studies ourselves – much faster and at a much lower cost than the pharmaceutical industry."

His highly publicised self-experiment led to an official study that did not ultimately deliver the vaccine the world wanted so badly, but did produce other important findings. In scientific circles, Prof. Rammensee is considered one of *the* pioneers of the RNA vaccine. All the same, he is quick to talk down his role in the success of Biontech: "It was others who saved the world." He admires the fact that a number of researchers took it upon themselves during the pandemic to make regular public appearances. "Science has to explain what it's doing. And, as far as possible, do that in a way that is readily understandable. That is one of its most important jobs." Prof. Rammensee is also far from being an academic sitting in an ivory tower. From the outset, the immunologist has considered it important for his scientific discoveries to be translated into successful commercial ventures. His institute is something of a talent factory, producing skilled scientists such as Dr. Harpreet Singh, co-founder of Immatics, and Dr. Ingmar Hörr, co-founder of Curevac. Prime Vector, Atriva, BamOmaB and Synimmune can also trace their origins back to the institute. Rammensee doesn't see himself as a mentor though: "I always encourage the young people to do what they think is right, and to push through resistance – even when the boss, i.e. me, is against it. I can offer my advice and they either listen or they don't." He has recently founded another company, ViferaXS, which aims to develop a successful personalised peptide vaccination against cancer. Naturally, it is also based in Tübingen. "I've had various offers, but I don't want to leave here. Tübingen is a really good place to pursue science. It is growing all the time. Here in the STERN BioRegion, we have everything we need in terms of infrastructure for life sciences."

There is just one thing bothering Prof. Rammensee: "None of the companies I've co-founded has a proper product as yet. I'm not satisfied with the partial successes that have been achieved so far." That is why he is still a long way from considering retirement, even though he does try to stay at home sometimes, at least at the weekends. "I neglected my family at the start of my career. I'm trying to make up for that now. Science and a family life don't go together well. I've spent a lot of time in the lab – even at four on a Sunday morning or at Christmas, if the experiments required it." He can well imagine that future researchers might have it a little easier thanks to lab robots that can take care of routine work and artificial intelligence that can help analyse data. "However, the creative work and decisions about which experiments need to be done next and which problems need to be solved next are all things we can't give up." And what if the Nobel Committee call? After all, Rammensee's name has been mentioned repeatedly over the years. "There are people who have done a lot more than me. I'm not waiting for the phone to ring." But what if it does? "Then I'll go and cut some wood first."

**About BioRegio STERN Management GmbH:**

BioRegio STERN Management GmbH promotes economic development in the life sciences industry, helping to strengthen the region as a business location by supporting innovations and start-up companies in the public interest. It is the main point of contact for company founders and entrepreneurs in the Stuttgart and Neckar-Alb regions, including the cities of Tübingen and Reutlingen.

The STERN BioRegion is one of the largest and most successful bioregions in Germany. Its unique selling points include a mix of biotech and medtech companies that is outstanding in Germany and regional clusters in the fields of automation technology and mechanical engineering.

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