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BioRegio STERN

StartUP Stories

StartUp Stories – Dr. Teresa Wagner and team, founders of immuneAdvice GmbH

ICE-Ts with exceptional capabilities

(Stuttgart/Reutlingen) – immuneAdvice is a biotechnology start-up in Reutlingen that was set up in 2024 by four young scientists, supported by three experienced advisors, at the NMI Natural and Medical Sciences Institute at the University of Tübingen. The company's mission is to develop solutions to provide doctors with an innovative diagnostic tool that will facilitate and optimise targeted use of immunotherapies. Using this tool does not change the efficacy of the therapeutic agent, but it can save lives by showing – after just a few days or weeks – whether the immunotherapy in question is working and by helping doctors decide which patient should be given which therapy. The story of Dr. Teresa Wagner, Dr. Philipp Kaiser, Dr. Björn Tränkle and Dr. Dominik Sonanini is one of the many successful StartUp Stories in the STERN BioRegion.

Although immunotherapies represent a major opportunity in the fight against cancer, there is no certainty – despite the huge costs involved – that the selected therapy will work as desired in any given patient. To ascertain as early as possible how well a therapy is working, immuneAdvice GmbH has identified and modified ICE-T molecules (ICE-T stands for immune cell tracer) that are capable of identifying immune cells in the body that are relevant to immunotherapies. These molecules can be radioactively labelled and visualised as tracers in PET scans. For the first time, this gives doctors a complete spatial image of what is happening in the patient's body during the immunotherapy and enables them to assess at an early stage whether the immunotherapy is actually working.

The idea – how did the start-up come about?

Nanobodies are special antibody fragments that have a very low molecular mass and specific physicochemical properties. To date, they have only been used as approved drugs for therapeutic purposes. However, four young scientists were convinced that it

would also be possible to use nanobodies in certain molecular classes as tracers (radioactively labelled substances that are inserted into the body) for diagnostic purposes. Their research work in institutes and hospitals in the STERN BioRegion marked the birth of a start-up. Dr. Teresa Wagner, CEO of immuneAdvice, studied molecular medicine and pharmaceutical sciences and technologies in Tübingen and started focusing on nanobodies while doing her PhD at NMI. Dr. Philipp Kaiser, CTO, who studied biochemistry in Jena, has been working on the production and screening of nanobodies or antibody fragments for over ten years at NMI. Dr. Björn Tränkle, COO, who studied biochemistry in Tübingen, initially conducted research into biomarker testing for carcinomas, before switching to research into nanobodies. Dr. Dominik Sonanini, CCO, is a doctor who is currently training to be a specialist in internal medicine, with a particular focus on oncology, at Tübingen University Hospital.

A few years ago, these research scientists experienced a real “eureka” moment. “When we discovered in animal models what tracer elements can actually do, it was clear to everyone involved that this is not the kind of thing you stumble across every day,” Dr. Wagner explains. “The results were so compelling that we wanted to put them into practice. We don’t just want to publish another paper – we want patients to benefit from this discovery,” she continues. The idea for the start-up had been born, but there was still important groundwork to be laid before it could finally be established in July 2024. “We weren’t anywhere close to ‘founder mode’ at that stage, but then we took part in the 4C Accelerator support programme, which really welded us together. The next step was the EXIST Transfer of Research phase 1 application,” Dr. Wagner reports. “Once that application had been approved, we all agreed that it was a risk, but it was also an adventure that we wanted to embark upon,” she continues. Dr. Tränkle adds: “When we launched the project in 2020, we certainly weren’t planning to start up a company. But we then became aware of the huge potential offered by these molecules and knew that these research results have to be turned into practical applications. However, we were also aware that nothing was likely to happen unless we made it happen ourselves.”

The four founders now make up the operational team of immuneAdvice GmbH, while three distinguished experts of international renown supplement the team’s expertise. These experts are Prof. Ulrich Rothbauer, Head of Pharmaceutical Biotechnology at

NMI, Dr. Manfred Kneilling, Senior Physician and Head of Allergology in the Department of Preclinical Imaging and Radiopharmacy at Tübingen University Dermatology Clinic, and Prof. Bernd Pichler, specialist in PET imaging and Head of Preclinical Imaging and Radiopharmacy at Tübingen University Hospital.

The need – who benefits from the idea?

Immunotherapies have revolutionised cancer treatment because, for the first time, patients really can be cured. However, as the statistics show, only one in every five patients genuinely responds well to the therapies, depending on the type and stage of tumour, etc. This figure of 20 percent is low, especially given the huge costs that can be involved – between 100,000 and 400,000 euros per patient. “Although these therapies are highly effective for some patients, they don’t work at all for others,” Dr. Sonanini explains. “And stimulating the immune system means the patient’s own body often attacks not only the tumour, but its own cells, too, which can cause severe side effects,” he continues. As a general rule, clinical imaging is used to monitor whether the tumour is shrinking, but this parameter is often misleading, especially in the case of an early response to the immunotherapy, resulting in misinterpretation. The information provided by blood tests is also limited, because the results do not provide enough spatial detail about the tumour. Biopsies, meanwhile, are an invasive procedure and cannot be performed at all on some tumours. “A patient usually has to wait for months before it is possible or practical to check how they are responding to the treatment. This means valuable time is lost, during which the patient may be receiving the wrong treatment, because they are not responding to it at all and actually urgently need a different life-saving therapy,” Dr. Sonanini explains.

In the future, the ICE-T molecules from immuneAdvice ought to spare patients from being treated “on spec”. Patients will be given an injection of a small dose of radioactively labelled tracer molecules. It will then be possible to visualise the immune cells during a subsequent non-invasive PET scan (positron emission tomography is a special imaging test in nuclear medicine), providing answers to a number of questions. Are the immune cells migrating to the tumour? What are they doing there? Are the metastases responding? For the first time, doctors will have a complete spatial image of what is happening in the patient’s body during the immunotherapy. “Using our tool won’t change the efficacy of the therapeutic agent, but it will help doctors decide which

patient should be given which therapy. Up until now, tests to check a patient's response are usually performed three to six months after the start of treatment. With our tool, these tests can be performed after just a few days. For a patient who may have a remaining life expectancy of only six months, this is of the utmost importance," Dr. Tränkle explains.

The immunotherapies in use today were the first ones to be developed, but there are many new ones in the pipeline. "These therapies must be specifically selected for the patients who are expected to benefit from them. It's all about precision medicine – the right medical care for the right patient at the right time," Dr. Wagner explains. Separately from clinical use – which will take a number of years to be approved – immuneAdvice is therefore also planning collaboration with pharmaceutical and biotech partners, who will use the tool to generate in vivo data during the clinical development stage. "This will enable them to see live whether and how their therapy is working. It will also provide them with more data, reduce their costs and save them time," says Dr. Wagner with conviction.

The USP – what is the innovation?

The team comprising Dr. Wagner, Dr. Kaiser, Dr. Tränkle and Dr. Sonanini has succeeded in developing novel tracer molecules (ICE-Ts), based on nanobodies, for the non-invasive detection of immune cells in the body. This makes it possible to better predict the success of immunotherapies in treating tumours, because the ICE-Ts visualise the dynamic distribution of immune cells and their activation state and allow for individualised assessment of the response to the immunotherapy. "With our molecules, we have the best class of tracers and we've modified the molecules in such a way that the cells are particularly visible during imaging. This makes them unique," Dr. Tränkle emphasises. The research scientists have no doubt about the exceptional capabilities of "their" ICE-Ts – and they can see many possible uses for them. With cell therapies, the patient's own immune cells are reprogrammed to target and attack cancer cells. This therapy is manufactured individually for each patient, so the costs are enormous. Before manufacturing it, it is therefore crucial to know whether it will be effective. For example, there are immune cells that can create an environment in the tumour that prevents the "active" immune cells from penetrating the tumour. "Our diagnostic tool can visualise exactly this," Dr. Wagner explains. Another area of

application is checkpoint inhibitors, which are the same for all patients. With this treatment, patients are given antibodies that activate their immune cells. This type of therapy is also expensive. However, thanks to the ICE-Ts, a patient's response can be checked after just a few days instead of having to wait for six months – thereby improving patients' overall survival, while also reducing costs.

Milestones – what happens next?

immuneAdvice is currently receiving funding from EXIST – a German support programme for scientific start-ups – to complete its preclinical development of the first ICE-T. An initial clinical trial is due to start in 2025 – but that is also when the public funding will come to an end. The start-up is therefore seeking investors. "Our diagnostic agent is administered in vivo – in other words, it is injected into the patient – so the requirements are similar to those associated with a therapeutic agent. However, it is used as a diagnostic agent. This is certainly an unusual case, which is new to many investors. The reimbursement of costs by health insurance providers is often more generous for treatment than it is for a diagnostic agent. Equally, though, our diagnostic agent can be used for very high numbers of patients, so it has huge market potential. Although relatively expensive compared to other methods in the first instance, our diagnostic tool will ultimately save patients a lot of suffering and cut costs significantly for the healthcare system by reducing unsuccessful therapies," Dr. Wagner explains. immuneAdvice is therefore undoubtedly attractive to the right investor. Preclinically, the company has already produced proof of concept, and GMP production has already started. "It's fantastic that we've already come so far with government funding and by our own efforts," Dr. Wagner emphasises. "Based on our plans, we'll be able to complete clinical phase 1 during the first round of funding – and that's definitely exceptional in the pharmaceutical development sector," she continues.

The next step is set to involve collaboration with developers of immunotherapies. However, making molecules in the lab and pharmaceutical-quality production are two very different things. The four founders of immuneAdvice are therefore very appreciative of the fact that they expect to reach that point within around a year. However, the team is realistic about the clinical trial. "We need between three and five million euros to carry out clinical phase I. For the entire clinical trial, we reckon we're looking at seven to eight years – and that calls for a lot of staying power for a start-up,"

says Dr. Tränkle. “That doesn’t change our major aim, though, which is to help patients.”

Initially, the company is going to stay on in the NMI building and rent further rooms there. “We have a good network here, and research and clinical reality are close together, for example. Our molecules need to be radioactively labelled, which requires radiopharmacy – and that’s a just-in-time production operation that must take place close to the patient. However, we can carry out production in Tübingen and then distribute and use the product throughout Europe,” says Dr. Kaiser. The team is therefore quite sure that, by being located in the STERN BioRegion, it is in the right place to successfully overcome the huge challenges involved.

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Link to the technology transfer page
https://www.bioregio-stern.de/en/projects/technology-transfer

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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 and plant engineering.

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