Bridge builder with cross-border experience

"BioGrafie" series - Prof. Katja Schenke-Layland from the BioRegion STERN



Success story in the BioRegion STERN: Prof. Katja Schenke-Layland

(Source: Andreas Körner/BioRegio STERN Management GmbH)

(Stuttgart/Reutlingen) - Prof. Katja Schenke-Layland has been the Director of the Natural and Medical Sciences Institute (NMI) at the University of Tübingen in Reutlingen, Germany, for two years. Since 2011, she has held a chair in Medical Technologies and Regenerative Medicine at Eberhard Karls University, Tübingen. This year, she was also appointed acting chair of the German Central Ethics Committee for Stem Cell Research (ZES). The Tissue Engineering & Regenerative Medicine International Society, European Chapter, has presented her with the Young Scientist Award for her outstanding research work in tissue engineering and regenerative medicine. She is also a member of the German National Academy of Science and Engineering (acatech), with Handelsblatt naming her one of Germany's smartest innovators. Together with her husband, Prof. Schenke-Layland (43) is planning to start up a company to drive forward treatments that are designed to help prevent tissue damage following a heart attack. The NMI is currently providing antibody tests for a large-scale, Germany-wide antibody study into SARS-CoV-2 by the Helmholtz Centre for Infection Research.

What is the matrix? In the science fiction film of the same name, the protagonist only finds out the truth about the matrix when he swallows a red pill. Even though the question is just as existential for Prof. Katja Schenke-Layland, she prefers to look for the answer under a microscope. As a biologist, her research is centred on what is known as the extracellular matrix (ECM) - that is to say, the tissue between cells. Among other things, these structures are also partly responsible for cell development. They are hugely important in the development of tissue and organs outside the body, i.e. tissue engineering. "You can only create tissue if you know how it is produced naturally," she explains. Schenke-Layland teaches and carries out research in the field of biomaterials for use in regenerative medicine at the Research Institute for Women's Health at the Medical Faculty of the University of Tübingen (FFG). She encountered this research topic, which is still fairly new, early on, when in 2000 she completed a nursing internship at a hospital in Jena and a consultant in heart surgery offered her a PhD position. That consultant, freshly returned from Harvard in the USA, had brought from

there the idea of manufacturing replacement tissue from the patient's own cells and biomaterials. He encouraged Schenke-Layland to write her PhD on the subject of "cardiovascular tissue engineering" - the production of replacement tissue for the cardiovascular system from patients' own cells and biomaterials. It's a topic she has continued to focus on to this day: "Whether bioengineering or personalised medicine, we'll only make progress in research if we understand the basics. I try to build bridges between cell biologists, doctors and engineers."

Spearheading your own subject area

It isn't just for scientific reasons that she sees herself as a bridge builder and relishes overcoming obstacles. Even as a schoolgirl, she frequently encountered obstacles - back then, they took the form of international borders: "My father opposed the GDR regime. He often had problems, partly because, as a self-employed baker, he ran a private business. He never forgave the regime for splitting up our family by building the wall." Having grown up in a small village in Thuringia, an academic career seemed completely impossible to her. "I had no chance of taking high school leaving examinations. I'd never have gone to an academically oriented high school, because my parents weren't in the party. As my father had a friend at the Wartburg works in Eisenach, I'd have become a car mechanic there - if the Berlin Wall hadn't fallen." Overnight, all options were open to Schenke-Layland from 1989. Now she was allowed to go to an academic high school and at the same time she worked at a veterinary practice. As she was prevented from studying veterinary medicine because of her allergy to cat hair, she opted to do something totally different: "The biology, sociology and psychology course in Jena was an exciting combination of science and humanities subjects, but it required a huge amount of work. 25 other students started with me at the same time, and all of them switched courses at some point." In her master's thesis, Schenke-Layland focused on aggression and its biological causes - and then asked herself the question: "What will I do with this degree?" It was at this point that a close friend of hers died very unexpectedly. "He was young and healthy, yet suddenly he was in intensive care. At that moment I realised I wanted to do something useful and I began the nursing internship at the hospital in Jena." Despite putting in long night shifts in the intensive care unit, she also worked during the day at the Max Planck Institute for Chemical Ecology in Jena. "They were looking for an assistant to wash glassware in the laboratory, and I was able to do my first PCR. That was a light bulb moment," she says, describing this time. When asked today whether her career is the result of a plan, she is dismissive: "I've always simply done what I really wanted, and I've often been lucky to be in the right place at the right time and to have the right people behind me." She would describe herself as "not shy" in her approach. "I've always had the courage to ask." A career always has something to do with assertiveness, in her view, but she also sees herself as a committed team player. She doesn't see any contradiction in that: "In the laboratory, scientists work together, but you have to act as a spearhead in your own subject area - not just contribute but open doors and overcome obstacles." Since 2018, she has been the director of one of the leading non-university research institutes in the health sector in Baden-Württemberg. With around 200 employees and annual sales of 15 million euros, the NMI carries out application-oriented research at the interface between biosciences and material sciences and develops technologies of the future for areas such as personalised medicine. In this context, she really does need to be able to do everything - open doors, build bridges and act as a spearhead.

Alternatives to animal testing

She takes up this role as a spearhead when, for example, something is particularly important to her - such as alternatives to animal testing. In the EU, this is already subject to the ethical 3R principle (Replace, Reduce, Refine). If possible, animal testing should be substituted for alternative methods (Replace), minimised in terms of the numbers involved (Reduce) and moderated in terms of its impact on laboratory animals (Refine). "Major emphasis is placed on replacement, while reduction and refinement would also be a big success. Our approval policy is still based around animal testing, although the animal models frequently aren't ideal. The immune system of mice and rats is not directly comparable to that of humans, for instance," Schenke-Layland explains. Nevertheless, each year throughout Germany over two million animals are used for testing purposes in basic research, for drug trials and for researching diseases. "In education and training it is imperative to get the message across that there are alternatives to animals," insists Schenke-Layland, who is working intensively on replacement methods - human in vitro models established outside living organisms on a petri dish, in a test tube or on an organ chip, and in silico simulations that run on a computer. "This is where we see a clash of technologies, ideologies and regulations, and everyone needs to change their position to recognise that animals are not the only solution and are often not the best either." She is therefore delighted that the Baden-Württemberg Ministry of Science, Research and the Arts is supporting the construction of a 3R centre - including a joint professorship between the NMI and the Medical Faculty in Tübingen with the aim of developing in vitro models

and other animal testing alternatives and making these available to researchers throughout Baden-Württemberg. "Baden-Württemberg first has to understand what Baden-Württemberg can already do. It isn't necessary to reinvent everything. Many skills are already available - they just need to be linked more effectively," she says confidently. Forum Gesundheitsstandort Baden-Württemberg has identified precisely this challenge and brings together partners from application- and business-oriented research, medicine and the healthcare sector to significantly boost the progress of research and innovation in Baden-Württemberg in the years ahead. The state of Baden-Württemberg started funding initial joint projects in spring 2020. Within this framework, the NMI has also been promised funding worth around four million euros. The approved funding will be used at the NMI to intensify research into personalised and predictive diagnostics and develop it further at the highest level, as well as to establish digital processes for the traceability of tissue samples. "You can never offer enough options for connecting people. Our industry often doesn't know who the right contact is. This is where an organisation such as BioRegio STERN Management GmbH is also essential for communication across disciplines."

Building bridges between the worlds of business and science is also of great importance for her own company Renovatum Therapeutics. Together with her husband Shannon Layland, who has a bachelor's degree in information technology and a master's in business creation and innovation, and the US cardiologist Ali Nsair, she is currently continuing to drive the start-up forward. This new venture aims to develop a cell-free protein therapy that can be used to regenerate diseased tissue - following a heart attack, for example. "We're producing a matrix made up of glycoproteins. These are found throughout the body and are able to protect cells and tissue from dying." If Renovatum is successful, this method could also be an alternative to stents.

Knowledge transfer between scientific and politics

There are only 24 hours in a day, even for Schenke-Layland, and she would like to be at the microscope more often herself. Instead, as director of the NMI, she helps her scientists carry out research projects, including the large-scale antibody study into COVID-19, which the institute is conducting in conjunction with the Helmholtz Centre for Infection Research. Knowledge transfer - including for non-medical experts - is very important to her in this process: "As a scientist, I can offer to explain issues in such a way that non-specialists understand them, too. For example, we can't force people to get vaccinated but we can explain why it is right and important." That's why she is also a member of the German National Academy of Science and Engineering (acatech) and acting chair of the German Central Ethics Committee for Stem Cell Research (ZES). "This is where I can transfer knowledge between the scientific and political communities - and build bridges." In doing this, there's no fear Prof. Schenke-Layland won't keep her feet on the ground - after all, she has a fear of heights.

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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