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Bridging the gap between academia and industry

Prof. Dr. Katja Schenke-Layland divides her work equally between the Stuttgart-based Fraunhofer Institute for Interfacial Engineering and Biotechnology IGB, where she is the deputy head of the Department of Cell Systems, and the University Hospital in Tübingen where she teaches and researches the use of biomaterials in the field of regenerative medicine at the Department of Thoracic, Cardiac and Vascular Surgery. By working between the two universities, Prof. Dr. Katja Schenke-Layland contributes to strengthening the cooperation between the Universities of Stuttgart and Tübingen.

Prof. Dr. Katja Schenke-Layland has a broad scientific background: she studied at the University of Jena where she obtained a master's degree in biology, sociology and psychology. "In 1995, Jena was one of the first German universities to offer a master's programme. However, the combination of the three subjects was only offered for a limited period of time," said Schenke-Layland explaining that the students were examined in all three subjects, and were awarded a combined master's degree. The master's thesis had to deal with a topic that touched on all three subjects. The reason the study programme was dropped was very probably because it was too demanding. Schenke-Layland was the only student in her year to successfully conclude the programme.

A rather special master's degree

The subject of her master's thesis was no indicator of her future career in the field of biomedical research. The area Schenke-Layland initially worked on was aggressions and their biological importance. She combined aspects of behavioural biology and popular sociology in order to fulfil Jena University's interdisciplinarity requirements. "My thesis also touched on the psychology and sociology of wars," added Schenke-Layland. While she was working on her master's thesis she also did voluntary work as an assistant nurse, which took her career in a new direction.

"I wanted to do something where I could help people directly. I did a practical course on the intensive ward and this made me consider studying medicine," said Schenke-Layland who was in a position to apply to the Thuringia Medical Association to get some of her previous courses acknowledged to gain time. However, this would have saved very little time, and talks with friends finally helped her make up her mind. "I talked about my idea of changing to medicine with some friends and I eventually came to the conclusion that I could also help people if I went into biomedical research, which is why I did my doctoral thesis in the field of cardiac surgery," said Schenke-Layland.

Schenke-Layland did her doctorate in Jena at the Institute of General Zoology and Animal Physiology and at the Department of Cardiothoracic and Vascular Surgery. "My supervisor, Prof. Dr. Ulrich A.

Prof. Dr. Katja Schenke-Layland heads up one research group at the Stuttgart-based IGB and one at the Tübingen University Hospital
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Stock, supported me in my efforts to gain insights into biological aspects; he made it possible for me to participate in international conferences where I made contact with other researchers and built up my experience," recalls Schenke-Layland. One of the people she met at a conference during her doctorate offered her a postdoc position in the USA and two months after finishing her doctorate on cardiovascular tissue engineering, Schenke-Layland moved to the Children's Hospital Los Angeles (CHLA) at the University of Southern California (USC) where she spent her postdoctoral period in a research laboratory focused on engineering science.

DFG grant for research in regenerative medicine

Schenke-Layland was awarded a DFG research grant and applied for a postdoctoral position at the University of California Los Angeles (USA). She then spent 3.5 years at the David Geffen School of Medicine at UCLA where she focused on stem cells and biomaterials for use in regenerative medicine for the treatment of cardiovascular diseases. This enabled her to continue the research she had been doing at the University of Jena. “I must say that I was in the perfect place at the perfect time, and the DFG grant gave me the scientific freedom I was looking for. This was very important to me and I am very focused on teaching my students that scientific freedom is highly important for one’s achievements,” said Schenke-Layland.

As her roots were in Germany and her American husband also liked the idea of going to Germany, Schenke-Layland thought about returning to Germany. In the meantime, she had become assistant research professor at UCLA and had received a NIH Kirschstein postdoctoral fellowship. The next step was once again the result of excellent contacts, this time with Prof. Dr. Heike Walles, who heads up the Department of Cell Systems at the Stuttgart-based Fraunhofer IGB and is a professor at the University of Würzburg. “The Fraunhofer Society had established a special programme to encourage German scientists to return to Germany from abroad. This programme is known as the “Attract” programme. Prof. Walles wanted me to apply for this programme and offered me her assistance to do so,” said Schenke-Layland.

A twofold benefit for German science

With the support of the director of the Fraunhofer IGB, Prof. Dr. Thomas Hirth, Schenke-Layland and her husband Shannon Layland were able to pursue a dual-career lifestyle. Layland, a computer scientist, was also offered an attractive position at the IGB. "He provides bioinformatics support in areas such as gene analyses and is also very much involved in the education and training of our young scientists," said Schenke-Layland who also benefits from the cooperation for personal reasons. "As I focus 100% on my work and on my students, having my husband around is personally very important for me. Otherwise, we would not see much of each other. And I seriously believe that this should be discussed in greater detail in Germany. There is far too little support for couples working in full-time positions at German universities and institutions, especially in terms of child care," said Schenke-Layland.

Schenke-Layland not only works on projects at the Fraunhofer IGB. On 1st October 2011, she accepted a professorship at the University Hospital in Tübingen where she heads up the "Biomaterials in cardiovascular regenerative medicine" research group which has recently been established at the Department of Thoracic, Cardiac and Vascular Surgery. This position gives Schenke-Layland the possibility to transfer her research activities at the Fraunhofer IGB into clinical application and speed up the use of newly developed biomaterials, implants and therapies in patients. Schenke-Layland is particularly focused on cell-based cardiac valve substitutes and the development of regenerative therapies for the application of heart muscle tissue. "At the moment, we are mainly concentrated on extracellular matrix proteins. We are investigating how these proteins can be used in regenerative medicine. We hope to combine these proteins with biopolymers," explained Schenke-Layland who hopes that proteins treated with biopolymers will help minimise the reaction of the human immune system to regenerative implants. The cellular components of implants are no problem as they are typically derived from the cells of the patients being treated.

Focus on basic and applied research

Human heart – tissue engineering in regenerative medicine is focused on the development of replacement tissue for cardiac valves, arteries and heart muscle tissue

In addition to applied research, Schenke-Layland is also interested in basic issues: "We are looking at developmental processes in order to find out how human nature creates stem cell niches. We are trying to decipher these processes in order to be able to reconstruct them in the laboratory and develop three-dimensional stem cell cultures. In this context, we are also investigating how matrix proteins can be used to create stem cell niches."

The scientist strengthens the Stuttgart-Tübingen axis through her teaching assignment in the medical technology course of the Interuniversity Centre for Medical Technologies Stuttgart-Tübingen IZST. This course was actually the first interuniversity course established in Germany. Schenke-Layland is very much focused on communicating expert skills in the subjects she is teaching, but she also takes great care to communicate at an early stage all the other things that students need to know to pursue a scientific career: "For me excellence in one's work is important as well as remaining critical about one's own data. This is what I teach my students. It is also important to work independently as early as possible and deal with the mechanisms that provide researchers with the financial means for carrying out the research they want to focus on. All this requires us to be able to communicate our own research in an understandable way. We need to be able to tell the broader public what we do and why we do it. Many students lack this ability at first. And I believe that this is partly because not much is taught about it at university," said Schenke-Layland.

Such soft skills have, amongst other things, contributed to Schenke-Layland being awarded the German Society of Biomedical Engineering Prize of the Klee Family Foundation in 2004 for her doctoral thesis. She believes that this award was an important milestone in her career: "The award was also important when I applied for the DFG postdoctoral grant, which enabled me to study in the USA. I think prizes in general are very important. I also find it personally rewarding when a committee of renowned researchers and industrial partners is convinced that the work one does is good enough."

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Article

06-Dec-2011
leh (01.12.2011)
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