Ulrich Schraermeyer, an eye researcher with a great deal of experience in the establishment of companies

Prof. Dr. Ulrich Schraermeyer is the head of a research division at the Eye Hospital at the University of Tübingen. He focuses on the treatment of degenerative diseases such as age-dependent macular degeneration (AMD) in which he is looking for new pharmaceutically active substances. In 2001, he successfully founded a biopharmaceutical company dealing with cell therapeutics for use in ophthalmology and is now once again planning to economically exploit his latest research results.

A division focusing on experimental vitreoretinal surgery was established at the University Eye Hospital in Tübingen in 2003. This division focuses on investigations of the vitreous body and the retina of the human eye. The appointment of Prof. Schraermeyer as head of this new division brought to the University Eye Hospital in Tübingen a scientist with huge academic experience, and also a great deal of entrepreneurial experience: during his eight-year position as head of laboratory at the University Eye Hospital in Cologne, Schraermeyer founded CEVEC GmbH in 2001.

“When I established CEVEC I initially focused on the development of cell therapeutics for the treatment of AMD and Parkinson’s disease. However, the project failed due to the patent situation back then. We did not have access to the therapeutic gene, which essentially means that we did not have enough money to purchase a licence from the patent owners,” explained Schraermeyer. He is still a shareholder of the company, which nowadays develops amnion cell lines that can be genetically modified to produce therapeutic proteins. “The proteins can for example be used to inhibit blood clotting,” said Schraermeyer.

The retinal pigment epithelium as research priority

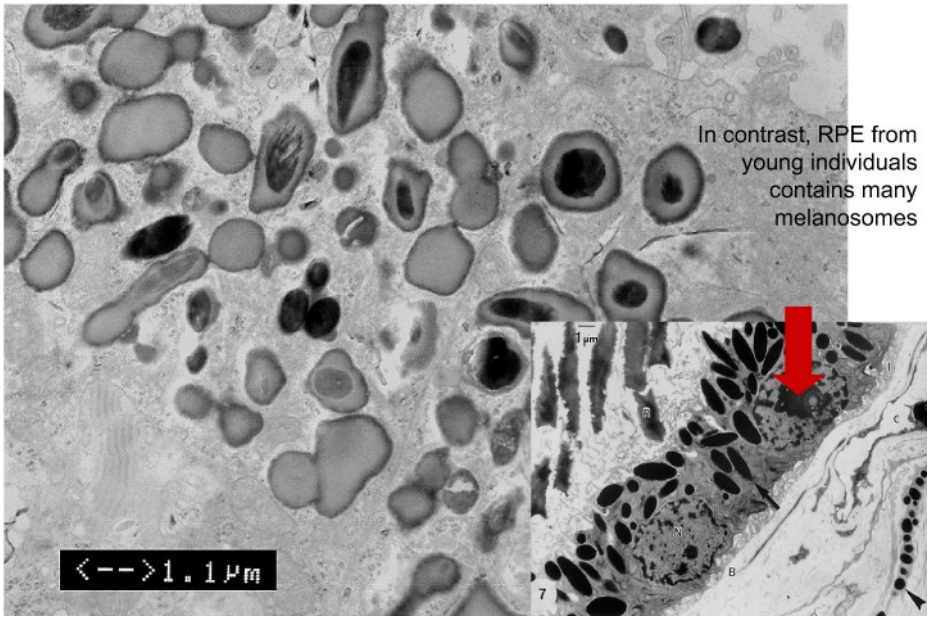
Schraermeyer's academic research has for a long time been focused on the retinal pigment epithelium. This is where his major scientific competence lies. "Following my doctoral degree, i.e. during my time as assistant at the Institute of Zoology at the RWTH Aachen, I became extremely interested in pigments and I investigated omochromes in invertebrates," said Schraermeyer. Between 1989 and 1995, Schraermeyer also came up with a hypothesis relating to the development of pigment granules. In the end, his research on mammalian pigments motivated him to investigate pigments of the human retina. "I wanted to expand my research activities and focus more on clinical issues," added the biologist explaining his motivation to move to the University Eye Hospital in Cologne and later accept a chair at the University Eye Hospital in Tübingen.

In Tübingen, Schraermeyer also develops ideas on company establishment. His ongoing project was also partially sparked off as a result of chance: Schraermeyer acted as a reviewer for a pharmaceutical company and investigated unusual side effects of a drug used to treat metabolic diseases, which actually had nothing to do with eyes. However, Schraermeyer found that the drug led to changes in the animals' retina due to the fact that it led to the degradation of lipofuscin, a protein-lipid pigment that accumulates in unusually high concentrations in the pigment epithelium of the retina in people suffering from AMD. "This finding was contrary to the dogma that lipofuscin, once it has accumulated, cannot be removed," said Schraermeyer.

Lipofuscin has been found to be a major risk factor for AMD. "In the dry form of AMD, lipofuscin leads to the local atrophy of the pigment epithelium and in consequence damages the retina," said Schraermeyer. If atrophy (tissue necrosis) affects the area of the macula, the "blind spot" in the retina, the affected patient loses the acuteness of vision, since this is where the fovea centralis, an area responsible for sharp central vision, is located. Visual loss produced by wet AMD is often rapidly progressive. With the progression of the disease, affected patients are only able to see peripherally and in the worst case might even lose their sight completely.

New AMD drug to become basic product of a new company

The cell biologist Prof. Dr. Ulrich Schraermeyer is head of the Division of Experimental Vitreoretinal Surgery at the University Eye Hospital in Tübingen.



Electron microscope image of melanosomes (dark), lipofuscin (light) and melanolipofuscine granules in the retinal pigment epithelium.

Schraermeyer has plans to further develop the chance find of a pharmaceutically active substance that enables the degradation of lipofuscin into a drug in cooperation with a biopharmaceutical company. This drug can be used to treat the dry form of macular degeneration. "Alternatively, we are also investigating a similar substance which we could use to initiate own developments. However, this would take much longer. In any case, we can count on the cooperation of the University Eye Hospital," said Schraermeyer highlighting the current state of development. Schraermeyer has plans to set up a BGB company with two partners, and the team is currently looking for investors to provide venture capital for the establishment of the company.

In addition, Schraermeyer is focusing on research dealing with the wet form of AMD, a complication of AMD affecting around 15 per cent of all AMD patients. This project focuses mainly on neovascularisation, i.e. the formation and ingrowth of blood vessels into the retina. The wet form of AMD results in the detachment of the retina and the pigment epithelium. "We are part of a postclinical study that focuses on gaining a better understanding of a drug mechanism targeting wet AMD," said Schraermeyer. The active drug substance is an antibody fragment that binds to the vascular endothelial growth factor (VEGF), thereby making it non-functional. However, Schraermeyer assumes that VEGF is not exclusively, i.e. not causally involved in the development of wet AMD. "I believe that the hypoxia of the choroids is the major cause of wet AMD. We are therefore looking for ways to treat hypoxia, thereby addressing the problem at its roots," said Schraermeyer.

Another major priority of Schraermeyer's research is melanin, a pigment that not only leads to tanned skin, but is also found in the retinal pigment epithelium of the eye. "Melanin has been my professional passion for many years. Melanin is produced in the retina before birth and is maintained throughout a person's lifetime. Although there is a theory that melanin is useful and contributes to maintaining sight, the mechanism is still unknown. That is why we are looking to gain insights into this mechanism," said Schraermeyer who has just submitted a funding proposal for the project. He also plans to investigate the role of melanin particles as the stores of environmental toxins and pharmaceuticals in greater detail.

Plea for electron microscopy

The electron microscope is an essential tool used by Schraermeyer for his research. Schraermeyer also assumes that the electron microscope will experience a major comeback. “The electron microscope has somehow become discredited because many things were over- or wrongly interpreted. This led researchers to switch from morphological to molecular biology analyses and the technology somehow fell into oblivion,” said Schraermeyer regretting this development. He is quite concerned that expertise in the use of electron microscopes and the competence in interpreting the images is dwindling.

“There are hardly any experts who know how to interpret electron microscope images. That is why we have established a university-wide network for encouraging young scientists to make use of electron microscopes. The network was initiated by Prof. Dr. Oliver Eibel from the Institute of Applied Physics in Tübingen with whom Schraermeyer has been working for many years. Schraermeyer is chairman of the network. The two professors are also focussing on electron microscopy in their lectures and practical courses, where they familiarise medical, biology, geology and other science students with the use and application of electron microscope technology.

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