SUCCESS STORIES

THE NORLUX NEURO-ONCOLOGY LAB(S)

In 2003, the CRP Santé Luxembourg and the University of Bergen, Norway, signed an agreement that has brought Luxembourg to the forefront of brain tumour research today. With the help of the renowned Professor Rolf Bjerkvig from the University of Bergen, the CRP Santé was planning to build a neuro-oncology laboratory in Luxembourg. When Dr. Simone Niclou joined the project in 2005, the setting up of the Luxembourgish lab began in earnest. And NorLux Neuro-Oncology is much more than a laboratory: it is also about joint research, scientific competence building and staff exchange. It is about two labs in two countries, functioning as one; a state-of-the-art centre with one aim: revealing the mechanisms behind the initiation and progression of brain tumours.

According to Professor Bjerkvig, one of the keys to the lab's success is the need to be competitive in two countries. And whereas the funding always stays in the country it has been raised in, scientific competence can travel freely: amongst others, it is thanks to the expertise and wide professional network of Professor Bjerkvig that the Luxembourgish team could rise from being virtually unknown to being at the top-end of the brain tumour community within a few years. The Luxembourgish side of the lab is ever expanding and their level of expertise is equalising with the Norwegian team now, forming the foundation to a real partnership.

One of the Norlux team's first collaborative efforts was the development of a novel mouse model to study tumour-host interactions. They started by implanting human tumour cells into immuno-deficient mice, where the cells were free to develop. The beauty of this model however, was the use of eGFP (enhanced Green Fluorescent Protein), which allowed a clear visual separation between host and tumour cells *in situ*. Several other teams that wish to use the model in their research have recently requested animals. As a consequence, some mice will soon be on their way to Singapore, Italy, Sweden, France and the USA.

The competence of NorLux is also reflected in the success rate of their project proposals: so far a 100% of their applications for funding with the FNR have been granted. Two projects are in the starting blocks, the results of one project (BIOSAN-PROVIE: NORLUX - Functional Validation of a New Therapeutic Strategy to Prevent Neurodegeneration and Subsequent Cognitive Impairment in Mouse Models of Alzheimer's Disease) are being submitted for publication at the time. This being a critical moment for any research project, Dr Niclou regrets that she cannot divulge detailed results, but "you can definitely say that the results are good".

The project used micro-encapsulation, a technique that could soon become a major factor in the treatment of brain diseases. Cells previously engineered to secrete therapeutic proteins, are integrated into the body. To prevent their destruction by the body's immune system and thus guarantee long-term delivery of the therapeutic factors, the cells are encapsulated in a protective coating. In the BIOSAN-PROVIE project, the release of an endogenous neuropeptide (CNTF – ciliary neurotrophic factor) was applied to reduce the cognitive decline of mice that display signs similar to Alzheimer's. The ultimate aim would be, of course, to stop degeneration completely.

"The contribution of the FNR was essential to our project," says Dr Niclou. The funding provided for one postdoctoral position over the course of two years, which allowed setting up the technology required for the cell encapsulation process.

The BIOSAN-PROVIE project was also a strong collaboration between NorLux, who provided encapsulated cells, and the Alzheimer's specialists around Dr Thierry Pillot of the INPL (Institut National Polytechnique de Lorraine) in Nancy, who used the cells in their animal models. This highly successful collaboration will continue within the scope of a newly approved CORE project started in February 2009. The aim is to optimise and expand the use of cell therapy based on encapsulation to other brain disorders, with a special focus on malignant brain tumours. A whole series of therapeutic factors will be tested in order to determine the most potent one in the combat against cancer.

Meanwhile, NorLux will also be working on another CORE project. The focus of this project will be on target identification for glioblastoma, the most common primary malignant brain tumour. Conventional radiation- and chemotherapy most often fail to destroy the most malignant and adaptable cells of tumours. These cells can be likened to stem cells in their properties: if they remain, the tumour will reform. The aim is to isolate and to characterise those cancer cells in order to locate exclusive targets to attack them.

In the words of Prof. Bjerkvig: "We have got a lot of challenges in front of us, but they are good challenges and fantastic opportunities."