

Research topic: Glaucoma and the brain : a novel optogenetic approach towards retinal ganglion cell protection

A post-doctoral position is available in the Department of Biology at the University of Leuven (Belgium) for a motivated scientist with an interest in neurobiology and preferably with expertise in molecular biology, confocal microscopy and/or optogenetic modulation.

The research group of 'Neural Circuit Development and Regeneration' (Dr. Moons) investigates the role of proteinases, growth factors and signalling neuropeptides in brain physiology and pathology, with special emphasis on their involvement in development and in survival/regeneration of retinal ganglion cells (RGCs). The group of 'Neuroplasticity and Neuroproteomics' (Dr. Arckens) has many years of experience with research in the field of neocortical plasticity in the brain of mammals and more specifically with visual system plasticity in response to retinal damage. Together they have an interest in developing novel therapeutic strategies for treatment of glaucoma. The goal of their research program is to investigate the role of the visual system circuitry in glaucoma disease progression and the potential to manipulate these brain areas in providing neuroprotection towards the RGCs.

Within this project they envision to develop novel strategies for improved RGC survival using a novel microbead-induced mouse glaucoma model. Glaucoma, an eye disease affecting over 60 million people worldwide, is characterized by progressive loss of RGCs and optic nerve fiber atrophy, resulting in irreversible blindness. Lowering the intraocular pressure (IOP) is currently the only standard treatment to prevent disease progression. However, despite a successful IOP control, some patients continue losing vision. This emphasizes the need to unravel the precise pathophysiological events in glaucoma in order to discover new effective therapies for this widespread ocular disorder.

Although glaucoma has long been considered a retinal disease, the involvement of the visual target areas in the brain is increasingly being recognized. Therefore, we aim to unravel the influence of chronic hypertension on the structure and function of the neuronal circuitry from eye to cortex. Furthermore, we intend to use optogenetic neuromodulation in retinal target areas to reduce RGC death in glaucomatous eyes. The loss/protection of RGCs and related visual abilities will be evaluated by histological, functional and behavioral analyses.

These studies will advance our knowledge on the structural adaptations of the visual system to ocular hypertension and on ways to induce neuroprotection of RGCs, thereby contributing to the search for novel therapeutic approaches to halt or retard this neurodegenerative disease.

Key words: retinal disease, visual system, neuroprotection, plasticity, optogenetic modulation, mouse

Remarks: Knowledge of molecular biology is required
Fluent English speaking is required

Financing: available or to apply for (Marie Curie IEF or IIF)

Start date: 2011-10-01

Link: <http://bio.kuleuven.be/df/> and <http://bio.kuleuven.be/df/la>

Research group: BIOLOGY DEPARTMENT - RG Neural Circuit Development and Regeneration and RG Neuroplasticity and Neuroproteomics

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