Neuron-Glia communication in health and disease

Associate Professor Åsa Fex Svenningsen

Contact: aasvenningsen@health.sdu.dk - Tel: 6550 3812

The group's research interests

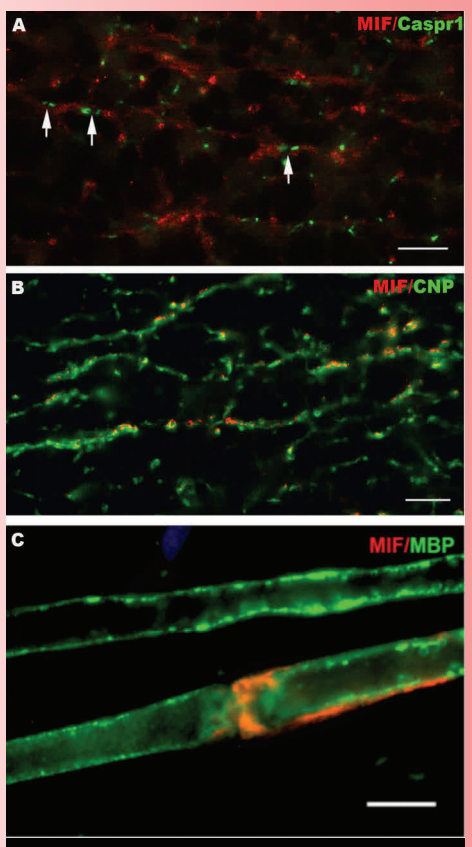
It is important to understand development of the nervous system in order to understand neurodegenerative disease and to be able to facilitate its re-generation.

Our research focuses on neuron-glia communication and the molecules used by the different cells to communicate with each other when the nervous system develops. The research we carry out is mostly based on primary cell cultures of glia and neurons from both the central nervous system (CNS) and the peripheral nervous system (PNS). In the cultures it is possible to investigate different aspects of cell communication, such as proliferation, migration, axon and dendrite elongation, synapse formation and myelination, using different molecular methods.

The research in my group is currently focused on the functions of Macrophage migration inhibitory factor (MIF) in the nervous system. We are investigating the distribution during development in both the CNS and PNS, binding partners to MIF and how MIF interacts with these binding partners.

The methods we use in the lab include:

- Cell culture, both primary neuronal cell cultures and cell lines, in some cases transfected to express specific proteins using expression vectors or lentivirus
- Primary cell assays to investigate synapse formation, axon elongation, myelination and migration
- Protein analyzing techniques such as western blotting, immunochemistry, Yeast-two hybrid assay and immunoprecipitation.
- Molecular biological techniques such as PCR, cloning and qPCR

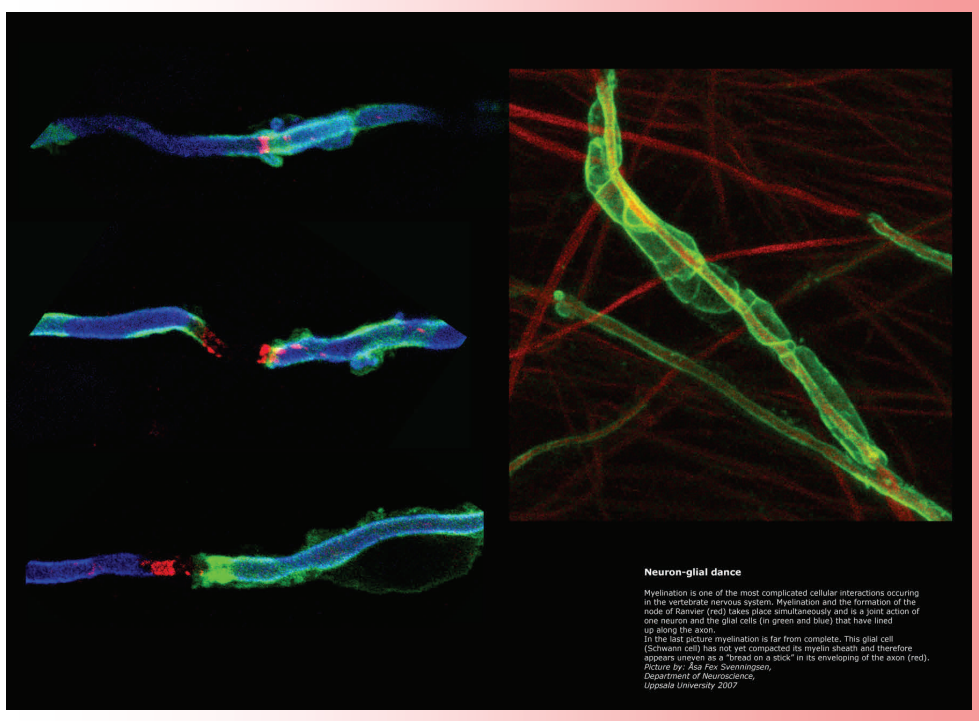


MIF in the CNS: A. MIF (red) in and around the nodes of Ranvier. The node is indicated by Caspr1 (green), in the paranodes of the axons. B. MIF (red) is in the myelina sheath of myelinating. oligodendrocytes (CNP-green). MIF in the PNS: C Teased adult rat sciatic nerve labeled with antibodies for myelin basic protein (MBP-red) and macrophage migration inhibitory factor (MIF-green)

Contact present / former students

Anna Lahn Sørensen:
Email: annalahns@hotmail.com
Tel: 77 55 20 17

Stine Hansen:
Email: stihansen@health.sdu.dk
Tel: 29 21 78 60



Project examples

The function of MIF in nervous system development and disease

The protein Macrophage Migration Inhibitory Factor (MIF) is a highly conserved 12.5-kDa cytokine-like protein, that has been linked to several diseases such as multiple sclerosis (MS). Promoter polymorphisms in the MIF gene have been shown to determine the severity of MS in patients. MIF is up-regulated in cerebrospinal fluid and blood, in patients with MS relapses and has been suggested as a clinical biomarker for MS relapses. The actions of glucocorticoids, often prescribed to shorten the attack, are also inhibited by MIF. For this reason, antagonists to MIF may be part of new treatments for the disease. What MIF does in development and disease, or where in the brain it is located normally or during progressing MS disease is not known.

The aim of our research is to identify:

1. Identify novel binding partners to MIF.
2. Identify the function of MIF in development and disease.
3. Establish the location of MIF, its receptor and binding partners in CNS and PNS.