Lab-Rotation at the Department of Systems Biology

Interleukin-6 (IL-6) is a major cytokine in the nervous system. It affects responses of mature neuronal cells in pathophysiological conditions e.g. the recovery after a stroke as well as neuronal development under physiological conditions. IL-6 and other IL-6 type cytokines activate JAK/STAT, MAPK and PI3K signalling pathways. These pathways contribute distinctly to neuronal cell fate. Exemplary JAK/STAT signalling triggers gliogenesis whereas MAPK signalling induces neurogenesis. Furthermore, IL-6 is an important regulator of inflammation and consequently target for several anti-inflammatory therapies. Mis-regulated IL-6 signalling causes chronic inflammatory diseases and cancer.

At the Department of Systems Biology (www.systembiologie.ovgu.de) at the Institute of Biology of the Otto-von-Guericke University we focus on the activation, regulation and interconnection of the IL-6-induced signalling pathways applying molecular biological and systems biological methods. Several projects in our lab offer the opportunity for lab rotations both in winter and summer semester.

It is possible to expand the projects to a molecular biology-focussed master thesis.

Please send your application with short CV and a topic of interest to fred.schaper@ovgu.de

Lab Rotation Projects WS 2013/2014

1) Epo and JAK dose-dependent signaling

In 2005, a somatic activating point mutation in Jak2, Jak2V617F, was discovered in myeloproliferative neoplasm patients. These hematopoietic disorders are characterized by an overproduction of mature-appearing blood cells of one or more lineages and can lead to failure of the bone marrow and ineffective haematopoiesis. The V617F mutation has been shown to constitutively activate the Jak, resulting in cytokine hypersensitivity and constitutive activation of STAT3 and 5, MAPKs and the PI3K/AKT pathway.

Project: To show the hypersensitivity of Epo-signalling in our model cell line we want to conduct Epo response curves

Supervisor: Dr. Wiebke Hessenkemper

- model cell line: HFR with Epo-receptor and inducible expression of JAK2-wt/V617F
- induction of JAK2-wt or V617F expression with different concentrations of doxycycline
- stimulation of these cells with different concentrations of Epo
- analysis of activated signalling proteins and expression level of JAK2

2) Activation of mTor signalling by IL-6

The activation of mTor signalling is essential for the regulation of protein synthesis and thereby influences cell growth, proliferation and survival. Deregulated mTOR signaling has been found in several

diseases including depression and Alzheimer`s disease. IL-6 is able to activate mTOR signaling. However, the underlying molecular mechanisms are strongly cell type specific and not yet understood completely. It is though known that IL-6 interferes in the expression of the mTOR inhibitor REDD1. Aim of this project is to analyse whether IL-6 influences REDD1 mRNA stability.

Project: Define the half-life of endogenous REDD1 in control and IL-6 stimulated cells

Supervisor: Dr. Anna Dittrich, earliest possible start of this lab rotation is 1st of May 2014.

- model cell line: HepG2
- experiments: cell culture, pulse chase experiments using Actinomycin D to block transcription, RNA analysis, cDNA synthesis, quantitative real-time PCR