# REGULATION OF METABOLISM IN HEALTH AND DISEASE

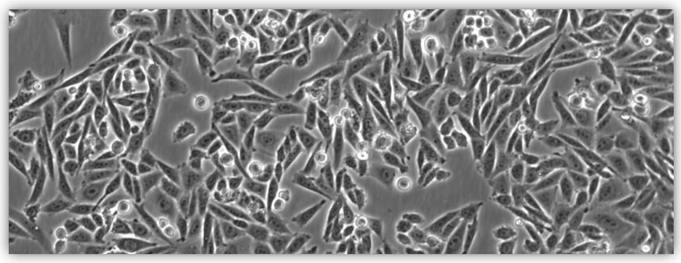
Principal Investigator Nils Joakim Færgeman

## Primary Research Focus

**Our research focus on how metabolism and signalling are coordinated to meet the nutritional needs of cells and organisms.** We are interested in understanding how cells and organisms sense alterations in the environment and in their genome and how they adapt their metabolism to maintain cellular homeostasis, promote survival and achieve balanced growth. We take a systems biology-wide approach and combines genomics, proteomics and metabolomics to untangle novel mechanisms regulating metabolism. We use mice and mammalian cells combined with molecular genetics and advanced analytical techniques to decipher how metabolism is regulated at the molecular level and how lipids and metabolites can act as signalling molecules to maintain cellular homeostasis.

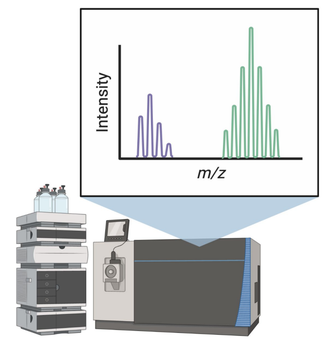
We use genetically modified mice to examine:

- the role of lipid metabolism in thermogenesis
- the link between lipid metabolism and cancer cachexia
- how lipid metabolism is regulated in white and brown adipocytes
- the fundamental role of lipid binding proteins in adipose tissue development and expansion



We use mammalian cell cultures to examine:

- how metabolism can regulate cell fate and cell transformation (or vica versa)
- the fundamental role of lipid binding proteins in adipocyte differentiation and metabolism
- protein interactions in regulation of lipid metabolism
- changes in metabolic fluxes in disease




We use LC/MS-based metabolomics and lipidomics to examine:

- how genetic, environmental or nutritional alterations affect metabolite levels and biochemical fluxes
- how metabolites can regulate cell fate and cell transformation
- tissue-specific responses to e.g. intensity training in healthy, obese and T2D human subjects

## Studying metabolism by cell biology techniques and LC/MS

We aim at understanding the importance of gene- and protein functions as part of metabolic networks. Therefore, quantitative analysis of the molecular factors that define the activity of cellular networks, e.g. gene expression, protein abundance, protein activity, metabolite concentration or metabolic flux, is required. As project student you can learn a range of techniques that include:

quantitative RT-PCR
Western blotting
enzyme assays
mitochondrial oxygen flux assays
mass spectrometry-based metabolomics/lipidomics

to unravel molecular mechanisms underlaying control and maintenance of tissue-specific and systemic metabolism.

Stop by our lab for further information, you may start at