DEPARTMENT OF CLINICAL NEUROSCIENCE

K8F3193 The Vascular Brain, 1.5 credits (hec)

Den vaskulära hjärnan, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus is approved by the The Committee for Doctoral Education on 2023-11-28, and is valid from Spring semester 2024.

Responsible department
Department of Clinical Neuroscience, Faculty of Medicine

Prerequisite courses, or equivalent

Understanding of basic cell biology and molecular biology.

Purpose & Intended learning outcomes

Purpose

Brain function depends on constant supply of glucose and oxygen from blood vessels. Efficient communication between neural cells and vessels is essential for correct brain function and relies on selective transport of nutrients across the blood-brain barrier. Brains are particularly vulnerable to dysfunction of blood flow and loss of barrier properties which can lead to dementia and neurodegenerative disease. The purpose of the course is to deepen the understanding of concepts underlying cerebrovascular development, cell signaling, imaging methods and vascular contributions to neurodegenerative diseases.

Intended learning outcomes

After the completed course, the students should be able to describe and understand the principles of molecular and cellular mechanisms responsible for neurovascular development, imaging and vascular contribution to neurological disease. The student should be able to use the acquired knowledge in their specific projects and areas of research.

Course content

The course covers central aspects of neurovascular development, cerebrovascular cell biology, blood-brain barrier function, principles of cerebral blood flow and vascular contribution to dementia and neurodegenerative disease. The course will cover genetic animal models, tracer technologies and imaging methods available to study blood vessel function in rodent models and human patients. We will discuss mechanisms leading to vascular dysfunction and loss of blood brain barrier properties as well as recent therapeutic methods to cross the blood-brain barrier for treatments of neurological disease. Highlights from the neurovascular field will be presented in the frame of a minisymposium.

Forms of teaching and learning

Lectures by invited Swedish and international experts, minisymposium, group and individual work, seminar presentations.

Language of instruction
The course is given in English.

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

All lectures and minisymposium are compulsory to attend. Absence cannot be compensated for.

Forms of assessment

The students should demonstrate that they have reached the intended learning outcomes stated above and to reflect on which aspects are relevant for their own research in during the presentations and discussions.

Course literature

Relevant original research and review papers will be provided by the course organizers as recommended reference literature.