DEPARTMENT OF CLINICAL NEUROSCIENCE

K8F3200 Clinical and Experimental Neuroimmunology, 1.5 credits (hec)

Klinisk och experimentell neuroimmunologi, 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

No prerequisite courses, or equivalent, demanded for this course.

Purpose & Intended learning outcomes

Purpose

The purpose of this course is to enable doctoral students and other participants to gain an understanding of the major neuroinflammatory diseases and the key players involved, including the interaction between the central nervous and immune systems. An additional purpose is that those who participate in the course learn to understand critical aspects of creating and using experimental systems to model neuroinflammatory diseases.

Intended learning outcomes

After this course the students should be able to: (i) describe the basic clinical characteristics of the major neuroinflammatory diseases; Multiple Sclerosis (MS), Myasthenia Gravis (MG) Guillain-Barré Syndrome (GBS), and Narcolepsy, (ii) explain how to create experimental models for neuroinflammatory diseases in rats and mice, compare models and discuss their advantages and limitations, (iii) evaluate and interpret new findings and recent scientific papers in the field in relation to main previous findings and (iv) speculate on and discuss molecular mechanisms underlying neuroinflammatory disease and hypothesize how knowledge on these mechanisms can enable therapy and prevention.

Course content

The course includes an overview of clinical symptoms, signs, pathology, treatments and diagnostic criteria for the most important neuroimmunological diseases including MS, MG GBS/CIDP and Narcolepsy. Also included is an overview of experimental models of neuroimmunological diseases, with an emphasis on techniques for genetic analysis (designing and creating intercrosses, congenics, transgenics in rats and mice etc). Key molecular concepts in neuroinflammation are covered such as immune mechanisms (the blood-brain barrier (BBB), major cell players, MHC-TCR interaction, costimulation, chemoattraction) as well as key tissue degeneration/regeneration. Different techniques used to study neuroinflammation are discussed including imaging, high-throughput genotyping, expression analysis and proteomics.

Forms of teaching and learning

The course combines: (i) traditional lectures (usually in the morning), given by the experts in the field, (ii) presentation of diverse experimental models, (iii) a structured discussion in small groups to design an experimental model for one of the major neuroinflammatory diseases with a short presentation to the class, followed by the evaluation of strengths and weaknesses of an experimental model proposed by another group and (iv) an individual assignment followed by an interactive presentation/discussion on the last day. The assignment will preferably consist of a presentation of a high-impact scientific paper relevant to the student's own research topic, and that is of importance for the neuroimmunology field. Alternatively, experimental setting/ data as a part of ones own doctoral project may be presented.

Language of instruction
The course is given in English.

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

All lectures, demonstrations and group tasks are compulsory. Compensation for absence can be discussed with the course directors, and may involve literature reviews with written reports on the topic missed.

Forms of assessment

Examination will be based on the groups assignment/discussion and the individual assignment, including the subsequent discussions (please see ""Teaching and learning activities"") and the feedback given to other students on their assignments. In their presentations, students should be able to comment on the design of their experimental model for one of the major neuroinflammatory diseases or article of choice in the context of the items described above under ""learning outcomes"". Guidelines for the preparation of the assignments will be sent out to the students two weeks before the start of the course.

Course literature

Course literature will consist of lecture handouts and current scientific articles (original and reviews) handed out during the course.
Recommended reading:
Focus collection in Nature Reviews Neurology: https://www.nature.com/collections/gjjjhiejfd
Recommended book: Principles of Neural Science, Sixth Edition; Eric R. Kandel, Thomas M. Jessell, Steven A. Siegelbaum