DEPARTMENT OF NEUROBIOLOGY, CARE SCIENCES AND SOCIETY

Karolinska Institutet

H1F5572   Neurodegenerative Disorders I: Genes, Mechanisms and Clinical Aspects, 1.5 credits (hec)

Neurodegenerativa sjukdomar I: Gener, mekanismer och kliniska aspekter, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus is approved by the The Committee for Doctoral Education on 2023-12-13, and is valid from Spring semester 2024.

Responsible department

Department of Neurobiology, Care Sciences and Society, Faculty of Medicine

Prerequisite courses, or equivalent

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

Purpose & Intended learning outcomes

Purpose

The purpose of the course is for participants to gain knowledge concerning genetics, molecular mechanisms as well as clinical features and treatment strategies of neurodegenerative disorders. To gain and apply new knowledge, participants will (in addition to lectures by experts in the field) prepare and give own oral presentations as well as ask and answer questions in the group during the course week. The course will allow interaction between PhD-students and students of the KI Master's programme in biomedicine (elective course in their second year), all with a special interest in neuroscience.

Intended learning outcomes

The student should after the course: Be able to discuss and give examples of
1) genetics, molecular mechanisms and cellular processes of neurodegeneration,
2) how genetic dysfunctions help us understand the molecular mechanisms of disorders and
3) mechanisms of protein turnover, degradation and aggregation in relation to neurodegenerative disorders. The student should at the end of the course

---

4) have achieved basic knowledge about epidemiology, symptoms, inheritance, pathology and current treatments (symptomatic or curative) of the most common neurodegenerative disorders such as Alzheimer disease, Parkinson disease, frontotemporal dementia, amyotrophic lateral sclerosis and multiple sclerosis.

5) In addition, the student should be able to discuss the relevance (pros and cons) of different disease models, i.e. give examples of how well different models can model the clinical picture as well as possible disease mechanisms.

Course content

The course will cover topics related to the degeneration of neural cells, apoptosis and necrosis as well as the cellular and biochemical reactions to neurodegeneration. During the course we will also present and discuss genetics, epidemiology, pathology, symptoms, diagnosis and treatment strategies of the most common neurodegenerative disorders such as Alzheimer disease, Parkinson disease, frontotemporal dementia, amyotrophic lateral sclerosis and multiple sclerosis. Molecular mechanisms of current and future treatment strategies, disease models and their potential will be presented and discussed. In addition, the students may within group assignments study other neurodegenerative diseases such as dementia with Lewy bodies, ataxias and prion diseases.

Forms of teaching and learning

The course runs daytime for 1 week full-time with a mix of lectures by invited scientists, participants group assignments as well as individual studies.

Language of instruction
The course is given in English.

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

In order to achieve the learning outcomes all participants are expected to be present the whole week. The group assignments, the oral presentations by the students and the following general discussion between all participants are compulsory. Students that are absent from these parts will have to individually submit a written presentation of the subject.

Forms of assessment

The examination part includes: the group assignments, short formative examination questions at the end of some of the days during the course week, the oral presentations by the students and the following general discussion between all participants. All students are individually assessed.

Course literature

Recommended course literature: Articles and handouts from the course organizers and respective lecturer. Articles can be found on PubMED and other databases available via KIB. Principles of neural science, edited by Kandel et al., 6th edition, 2021 McGraw-Hill.