Course Specifications
Valid as from the academic year 2020-2021

Cellular Stress, Cell Death and Senescence (C002699)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size
(nominal values; actual values may depend on programme)
Credits 3.0
Study time 80 h
Contact hrs 25.0 h

Course offerings and teaching methods in academic year 2020-2021
A (semester 2) English Gent
seminar: coached exercises 10.0 h
lecture 15.0 h
online seminar: coached exercises 0.0 h
online lecture 0.0 h

Lecturers in academic year 2020-2021
Vandenabeele, Peter WE14 lecturer-in-charge
Bertrand, Mathieu WE14 co-lecturer

Offered in the following programmes in 2020-2021
crds offering
Master of Science in Teaching in Science and Technology (main subject Biochemistry and Biotechnology) 3 A
Master of Science in Biochemistry and Biotechnology 3 A
Exchange programme in Biochemistry and Biotechnology (master's level) 3 A

Teaching languages
English

Keywords
Cell biology, Signal transduction, Cellular stress, Cell death, Apoptosis, Necrosis, Inflammation, Senescence, Phagocytosis

Position of the course
This course aims at acquiring insights in the molecular signal transduction processes that form the basis of cell death, inflammation and senescence, with special attention to structure-function relation between of implicated proteins. The course is given from a research directed attitude. This means that attention is paid on the history of knowledge building, the confrontation with working hypotheses, the knowledge of signal transduction pathways in different model organisms and how this common knowledge of the molecular mechanisms contributes to a rational choice of therapeutic targets. The lessons are bases on review articles, representative research papers and examples of clinical trials.

This course contributes to the following program competencies: Ma.WE.BB.1.1, 1.2, 1.4, 1.5
Ma.WE.BB.2.1, 2.2, 2.6
Ma.WE.BB.3.3, 3.5, 3.6
Ma.WE.BB.4.1
Ma.WE.BB.5.1
Ma.WE.BB.7.RES.2

Contents
Cell death has several appearances: apoptosis, autophagic cell death and necrosis. In first instance we discuss in general terms the importance of cell death in development, homeostasis and pathology. The model organisms such as C. elegans and D. melanogaster allow a functional genomic study of cellular phenomena, a.o. cell death. Next we treat systematically the function and structure of homologs and orthologs of these proteins in mammalian systems and discuss their regulation and functioning in pathological systems in which cell death is an important compound such as ischemia-
reperfusion damage, neurodegenerative diseases and cancer. This knowledge allows the identification of therapeutic targets. Inflammation is crucial in many diseases. Chronic inflammation provides the suitable milieu for processes such as carcinogenesis, autoimmune reactions, chronic inflammatory diseases and neurodegenerative diseases. The signal transduction pathways that constitute the basis for inflammation are also the platform for the innate immune system. We will discuss signal transduction pathways of cytokines, Toll like receptors in men and fly in an evolutionary perspective. The part on senescence starts with the current theories on senescence, followed by genetic, cellular and biochemical aspects such as telomers, heat shock proteins, oxygen radicals, protein modifications. Next we will discuss functional genomic studies in model organisms on the molecular mechanisms of senescence (yeast, C. elegans, D. melanogaster, mouse). The existence of genetic programs for senescence will form the basis to discuss pathological aging processes in molecular terms.

Initial competences
- Advanced knowledge of cell biology, molecular cell biology, molecular biology, genetics, biochemistry, immunology.

Final competences
1. Profound insight in molecular aspects of signal transduction.
2. Translation of the knowledge in concepts of identification of molecular targets.
3. Research directed questions and attitude.
4. Attention for medical applicability of knowledge in signal transduction.

Conditions for credit contract
Access to this course unit via a credit contract is determined after successful competences assessment.

Conditions for exam contract
This course unit cannot be taken via an exam contract.

Teaching methods
- Lecture, seminar: coached exercises, online lecture, online seminar: coached exercises

Extra information on the teaching methods
- Classroom problems solving sessions (discussion and presentation of research articles)

Learning materials and price
- Powerpoint files, review articles, research articles, websites.
- Cost: 15 EUR

References
- Added review articles from Nature Reviews series.

Course content-related study coaching
- Individual guidance if requested. Review articles delivered with every lesson. Research articles. A series of questions on the course as guidance for exam preparation.

Evaluation methods
- end-of-term evaluation

Examination methods in case of periodic evaluation during the first examination period
- Written examination with open questions, oral examination

Examination methods in case of periodic evaluation during the second examination period
- Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation
- not applicable

Extra information on the examination methods
- Written exam; oral exam on research articles.
- Written exam is meant to judge to what extent the student has acquired knowledge and insight; the oral exam is meant to judge to what extent the student has acquired the skills for critical reading and scientifically discussing an article in the field of signal transduction research using the course as background knowledge.

Calculation of the examination mark