DEPARTMENT OF ONCOLOGY-PATHOLOGY

K7F3026, Cell Cycle, Cancer and Anti-Cancer Targets, 1.5 credits (hec)

Cellcykel, cancer och anticancer strategier, 1,5 högskolepoäng

Third-cycle level / Forskarnivå

Approval

This syllabus was approved by the The Committee for Doctoral Education on 2024-08-29, and is valid from spring semester 2025.

Responsible department

Department of Oncology-Pathology, Faculty of Medicine

Prerequisite courses, or equivalent

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

Purpose & Intended learning outcomes

Purpose

The course aims to provide the students with an updated overview of the cutting edge research activities within the fields of cell cycle and oncology focusing on the role of cell cycle (de)regulation as a cause and possible treatment opportunity for cancer.

Intended learning outcomes

The course is organized to encourage analytical and critical thinking. At the end of this course, students should:

- be able to understand, analyze and criticize current strategies towards exploiting the available information on cell cycle regulation, tumor suppressors and oncogenes for the development of novel therapeutics,

- evaluate the relevance of the topics presented for their future research activities and PhD studies

Course content

The course contains approximately 10 seminars/lectures, held by invited national and international prominent scientists, as well as 15 hours of discussion/problem-based learning. The speakers will be asked to give a comprehensive and pedagogical overview of the research area as well as an in depth discussion on their own research. Each seminar will be followed by a discussion led by the course organizers where the students are encouraged to interact with the invited speaker. To enable a fruitful discussion the students will have to read relevant literature in the field in advance of each seminar. The topics presented will cover the main aspects of the following themes:

1. Cell Cycle - molecular overview and biological functions
2. Oncogenes and tumor suppressors within the cell cycle
3. The connection between cell cycle and the hallmarks of cancer
4. Targeting aberrant cell cycle signaling in cancer - current therapeutics
5. Technological advances in cancer cell cycle therapeutics

Each day will be dedicated to a cell-cycle phase/process and these themes will be incorporated.

Forms of teaching and learning

The course is full-time. It will consist of approximately of 3 hours lectures/day. Each lecture will be followed by a discussion led by one of the course organizers. To increase the learning process and to stimulate the reflection on the seminars, the students will be required to study the most recent literature, still not present in the text books within the presented fields in advance of each seminar. Further, students will be required to individually present and discuss specific aspects of the content.

Language of instruction

The course is given in English

Grading scale

Pass (G) /Fail (U)

Compulsory components & forms of assessment

Compulsory components

Students are expected to attend and participate in all lectures, presentations and discussions. In the case of absence, the student will be asked to read a relevant review and/or original research article on the topic missed, summarize it and discuss it with the organizer of the course at a convenient time by appointment.

Forms of assessment

As assessment, students will be evaluated based on their contributions i) to the discussion during

the problem-based learning of each topic; ii) in connection to an individual presentation on a specific topic assigned at the beginning of the course.

Course literature

Literature and other teaching material

Beroukhim, R., Mermel, C. H., Porter, D., Wei, G., Raychaudhuri, S., Donovan, J., Barretina, J., Boehm, J. S., Dobson, J., Urashima, M., et al. (2010). The landscape of somatic copy-number alteration across human cancers. Nature 463, 899-905.

Chu, I. M., Hengst, L., and Slingerland, J. M. (2008). The Cdk inhibitor p27 in human cancer: prognostic potential and relevance to anticancer therapy. Nat Rev Cancer 8, 253-267.

Hydbring, P., Malumbres, M., and Sicinski, P. (2016). Non-canonical functions of cell cycle cyclins and cyclin-dependent kinases. Nat Rev Mol Cell Biol 17, 280-292.

Malumbres, M., and Barbacid, M. (2009). Cell cycle, CDKs and cancer: a changing paradigm. Nat Rev Cancer 9, 153-166.

Musgrove, E. A., Caldon, C. E., Barraclough, J., Stone, A., and Sutherland, R. L. (2011). Cyclin D as a therapeutic target in cancer. Nat Rev Cancer 11, 558-572.

Otto, T., and Sicinski, P. (2017). Cell cycle proteins as promising targets in cancer therapy. Nat Rev Cancer 17, 93-115.

Sherr, C. J., and Roberts, J. M. (1999). CDK inhibitors: positive and negative regulators of G1-phase progression. Genes Dev 13, 1501-1512.

Sherr, C. J., and Roberts, J. M. (2004). Living with or without cyclins and cyclin-dependent kinases. Genes Dev 18, 2699-2711.

Slingerland, J., and Pagano, M. (2000). Regulation of the cdk inhibitor p27 and its deregulation in cancer. J Cell Physiol 183, 10-17.

Zarkowska, T., and Mittnacht, S. (1997). Differential phosphorylation of the retinoblastoma protein by G1/S cyclin-dependent kinases. J Biol Chem 272, 12738-12746.