

Title of module

Special Lecture in the Focal Point Programme
"Molecular Medicine": VZ 185800, 185801
"Basic principles in molecular oncology"

Credit points

5

Available in semester(s)

2

Hours per week

2+1

Compact course



Lecturer(s)

S. Hahn, T. Brüning, G. Johnen, K. Lang, HP Rihs, D.G. Weber, G. Westphal

Teaching methods

Lecture: 2 hours per week

Evaluation of learning progress

Active participation in lectures

Mode of examination

Oral exam (30 min., bachelor and master students) and 15 min. presentation of a scientific publication

Learning objectives

Basic principles in molecular oncology

Soft skills

Contents of module

Hahn:

- Cancer a genetic disease
 - Oncogenes & Tumor suppressor genes
 - Progression models, clonal selection
 - Tumor stem cell concept
- Hereditary Cancer
 - HNPCC
 - FAP
- Targeted therapies
- Receptor tyrosine kinases in cancer development
- Signaling pathways in cancer biology: RAS, p53, APC/WNT, TGFbeta
- Apoptosis/Cell cycle
- Tumor angiogenesis

Brüning, Johnen, Lang, Rihs, Weber, Westphal:

- Tumor metastasis
 - Invasion, extravasation & cell migration
 - Role of integrins and cell adhesion molecules
- Chemical effects and occupational cancer
 - Principle toxicological mechanisms are explained by use of examples: Polycyclic Aromatic Hydrocarbons, Aromatic Amines, Halogenated Hydrocarbons, Vinyl chloride, 2-Chloro-1,3-butadiene, Trichloroethene, Benzene, Asbestos. In addition basics concerning fibers, particulate matter and syncarcinogenesis, latency period and dose-response effects in carcinogenesis are discussed
- Mechanisms of DNA repair
 - Reversion
 - Excision repair (BER, NER)
 - Mismatch repair
 - Repair of single- and double-string breaks
 - DNA repair defects and genetic diseases
- Carcinogenesis and syncarcinogenesis
 - Models of carcinogenesis
 - Hanahan-Weinberg model
 - Cancer stem cells
 - Genomic instability
 - Cancer metabolism and Warburg effect
 - Role of DNA methylation and microRNAs in cancer
 - Molecular epidemiology
 - Interaction of asbestos and PAH as an example for syncarcinogenesis
- Microarrays
 - Preparation of microarrays
 - Labeling methods
 - Expression analysis
 - Data analysis
 - microRNA microarrays