UNIVERSITÄT LEIPZIG

BuildMoNa

SCIENTIFIC AND METHOD MODULES

Module name	Chemical Biology and Biophysics of Cancer
Number	2016-A2
Aims	This module discusses how molecular and materials science can provide a new perspective in oncology. Molecular biology shows the complexity and ambiguity that arises from the variability of tumours. Nevertheless, some biochemical and biophysical changes are universal to solid tumour progression and may provide both, novel diagnostic as well as therapeutic concepts. The state of the art in diagnostics and therapeutics will be discussed to identify the current needs.
Contents	Tumour progression (tumour growth and homeostasis, uncontrolled proliferation, invasion and metastasis, tumour induced alterations of the stroma, vascular system and immune system, role of chemical cues as well as active and passive forces in triggering cell division and apoptosis), Diagnostics and screening (cytobrushes, imaging [CT, MRI], tumour markers, histology, tumour staging), Therapy (surgery, radiation, chemotherapy [antineoplastic drugs, cytostatic molecules, protein kinase inhibitors]), Targeted tumour therapy (specific and unspecific shuttles, specific expression of cell surface proteins, internalization of biomolecules into tumour cells, linkers for controlled release, etc.), Personalised medicine and better tumour staging (single cell analysis, high throughput and content, genetic networks, tumour specific tracers and their application by PET-imaging or fMRI-scanning, tumour cell biomechanics and adhesion), Models of tumour growth (finite element-based models, differential adhesion hypothesis, glass-like behaviour), Relapse (selective pressure and resistant tumour cells, dormant cancer cells, cancer stem cells).
Methods	Hybrid molecules as novel or optimised drugs (advanced synthetic methods, combining organic, inorganic and biochemical approaches), Imaging (CT, MRI, PET, fMRI), Active and passive cell mechanics and adhesion (AFM-based cell rheology, cellhesion, magnetic bead rheology, optical stretcher), Tumour cell migration (wound healing, migration through collagen gels, traction force microscopy), Vital imaging of tumour cells.
Type	Two-day block course/ yearly recurrence with modification
Date (month/year)	4–6 October 2016
Time	See program: http://conference.uni-leipzig.de/poc/2016
Work load	15 hours presence/ 45 hours self-study
Examination	2-page report about the conference, submission to Prof. Käs approx. 7 days after the conference
Credit points	2
Responsible scientists	Käs
International guest lecturers	
Industrial partners	
Recommendations for literature	

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