

BuildMoNa Minisymposium in October 25th and 26th 2010

Physics of Cancer

The investigation of changes in physical, i.e. material, properties of cells during progression of cancer is an emerging field in physics redefining medical physics, which has been predominately a service to clinicians (imaging, radiation, etc) and now redefines itself based on material science. During malignant transformation of cells changes in their cytoskeleton, e.g. down regulation of actin and up regulation of intermediate filaments such as vimentin, occur. This leads to significant changes in tumor cells' viscoelastic properties, which are prerequisites for high cell proliferation and tumor invasion. Additionally, the expression of adhesion receptors such as E-cadherins decreases which changes cell motility due to less binding sites with adjacent cells and alters surface tensions that stabilize compartment boundaries between different cell types. The for tumor cells typical high proliferation, invasiveness, and metastasis are greatly hindered without these changes in a cell's material properties. Thus, the knowledge of these physical properties provides a powerful tool to determine the aggressiveness of a tumor and ultimately these findings may result in new therapies that stop the progression of cancer. These results illustrate that materials science can shed new light on tumor progression. The minisymposium will gather world-wide the pioneering groups that are concerned with the physics of cancer. These meeting will have a defining impact on a newly emerging scientific field.

The minisymposium "Physics of Cancer" aims towards bringing together the most important investigators in this field. Nature has expressed an interest to cover the meeting with a short report. Since the big "C"-word is always of public interest we have asked the mayor of the city of Leipzig, Burkhard Jung, to open this event.

The following speakers have accepted our invitation:

Prof. Dr. Ramsey Foty
Prof. Dr. Françoise Brochard-Wyart
Prof. Dr. Jacques Prost
Prof. Dr. Ben Fabry
Prof. Dr. Robert Austin
Prof. Dr. rer. nat. Dr. med. Michael Höckel
Prof. Dr. Roland Eils
Prof. Dr. Harald Herrmann
Prof. Dr. med. Peter Friedl



BuildMoNa Minisymposium

Physics of Cancer

Universität Leipzig, Seminargebäude, Room 420, Universitätsstr. 1

Schedule

Monday, Oct. 25

9:00 – 9:15 h

Burkhard Jung (Governing Mayor, Leipzig)

Welcome

9:15 – 9:20 h

Josef Käs

Welcome

9:20 – 9:35 h

Evamarie Hey-Hawkins

Welcome / Introduction to BuildMoNa

9:35 – 10:35 h

Peter Friedl

Physical limits of cell migration

10:35 – 11:00 h

Coffee Break

11:00 – 12:00 h

Ramsey Foty

Physical Models of Malignant Invasion

12:00 – 14:00 h

Lunch Break

14:00 – 15:00 h

Jacques Prost

Constructing tools for describing tissue dynamics

15:00 – 15:30 h Coffee Break

15:30 – 16:30 h **Harald Herrmann**
*Intermediate filaments in development and disease:
Mediators of a cell type-specific switch in cell elasticity*

16:30 – 17:30 h **Ben Fabry**
*Forces and migration of cancer cells in a 3-dimensional
environment*

19:00 h Dinner

Tuesday, Oct. 26

9:00 – 10:00 h **Michael Höckel**
*Ontogenetic anatomy and the compartment theory of
tumor permeation*

10:00 – 11:00 h **Robert Austin**
The Goldilocks Principle and Rapid Evolution of Resistance

11:00 – 11:20 h Coffee Break

11:20 – 12:20 h **Roland Eils**
*High-throughput mechanical cellular phenotyping by
combined optical stretching and computational modeling*

12:30 – 14:00 h Lunch

14:00 – 15:00 h **Francoise Brochard-Wyart**
Wetting transition of living drops

15:00 – 15:30 h Coffee Break

15:30 – 16:30 h **Josef Käs**
*Are biomechanical changes necessary for tumor
progression?*

17:00 h Departure