Dynamic Microscopy 2006

Oct. 9.-11.

Organizers: Gregory Harms, Peter Friedl
Location: Lecture Hall (Hörsaal) of the
Rudolf Virchow Center, Versbacher Str. 9

Symposium

09:00 - 09:15	Registration
09:15 - 09:30	Introduction – Gregory Harms and Peter Friedl
09:30 - 13:00	**Session I: Molecular, Cellular, and Intravital Imaging**
09:30 – 10:15	Daniel Müller (HTU, Dresden, Germany) "From tissues, cells to single molecules: Recent developments and applications of Atomic Force Microscopy and Spectroscopy in biology medicine"
10:15 – 11:00	Anne Kenworthy (Vanderbilt, Nashville, TN, USA) “Probing lipid raft structure and dynamics by Quantitative Fluorescence Microscopy"
11:00 – 11:30	**Coffee break and Vendor Exhibition**
11:30 – 12:15	Ernst Stelzer (EMBL, Heidelberg, Germany) "Avoiding flat and hard surfaces with single-plane illumination microscopy"
12:15 – 13:00	Robert Hoffman (Anti-Cancer, Inc. San Diego, CA, USA) "Whole-body subcellular imaging in the live animal"
13:00 – 14:30	**Lunch break and Vendor Exhibition**
14:30 – 18:15	**Session II: Molecular, Cellular, and Intravital Imaging**
14:30 – 15:15	Jackson Egen (NIH, Bethesda, MD, USA) "Visualization of immune cell dynamics using intravital multiphoton microscopy"
15:15 - 16:00	Maxime Dahan (DNS, Paris, France) "Establishment of cell polarity during nerve chemotaxis: a single-molecule approach"
16:00 – 16:30	**Coffee break and Vendor Exhibition**
16:30 – 17:15	David Kremers (Cal Tech, Pasadena, CA, USA) “Making seven dimensions into two: biting off what humans can not chew"
17:15 – 18:30	**Keynote Speaker Lecture:** Zena Werb (Univ. of California, San Francisco, USA) "Imaging the microenvironment during tumor progression"
18:30 – 19:00	**Reception and Vendor Exhibition**

Oct. 10, 2006

Location: Kurssaal 1 and Microscopy Core Facility
Rudolf Virchow Center, Versbacher Str. 9

Course

08:00 – 08:30	**Organization and Coffee** (Colloquium Room, Rudolf-Virchow-Center)
08:30 – 09:00	**Tutorial I: "The roles, benefits, and limitations with the use of nanoparticles in single-molecule imaging"** Maxime Dahan, DNS Paris
09:00 - 10:45	**First Rotating Group Session**
10:45 – 11:30	**Coffee Break and Vendor Demonstrations** **Tutorial II: "Technical aspects of multiphoton microscopy: strategies and troubleshooting"** Jackson Egen, NIH, USA,
11:30 – 13:15	**Second Rotating Group Session**
13:15 – 14:15	**Lunch, Vendor Demonstrations,** **Tutorial III: "FRAP: special considerations, aspects, and models"** Anne Kenworthy, Vanderbilt, USA
14:15 – 16:00	**Third Rotating Group Session**
16:00 – 16:45	**Coffee Break and Vendor Demonstrations** **Tutorial IV: "Special presentation"** David Kremers, Cal Tech, USA
16:45 – 18:30	**Fourth Rotating Group Session**
18:30 -	**Workshop Dinner and Wine**

Four Rotating Group Session Course Topics

(max. 8 people each) **(105 min)**

A Single-Molecule-Imaging
(Andrey Noskov, Benjamin Klasczyk, Kira Gromova, Gregory Harms)

Location: Room 013, Rudolf-Virchow-Center, Microscopy Core Center
System: Zeiss, custom-built, wide-field microscopes, Roper & INTAS Cameras
Topics:
- Single-molecule properties and microscope systems
- Fluorophores for single-molecule microscopy: GFP Varaints, Artifical Organics, and Nanocrystals (Quantum Dots)
- Wide-Field Single Molecule Studies: Tracking, Co-localization, Stoichiometry, and Function
- Considerations for "in vivo" situations
- Analysis

B Dynamic confocal fluorescence and reflection microscopy
(Katarina Wolf, Stephanie Alexander, Olga Levai – Leica Microsystems)

Location: Room 125 and Kurssaal 1, Rudolf-Virchow-Center
System: Leica SP5
Topics:
- Confocal reflection imaging for tissue reconstruction
- 3D reconstruction of collagen degradation
- Principles of 4D imaging and image reconstruction
- Live invasion of cancer cells in 3D collagen lattices
- Multiple-color simultaneous imaging

Spectral unmixing
(sponsored by INTAS GmbH/CRI)
Location: Kurssaal 1
- Principles of spectral unmixing
- Spectral unmixing for tumor detection in whole mice
- Multi-color unmixing from cell cultures and histopathological tissue sections

C Multiphoton microscopy and second harmonic generation imaging (Eline Hahnekamp, Markus Herzberg, Volker Andresen, Peter Friedl)

Location: Room 009, Microscopy Core Center
System: Lavision Trimscope/Verdi-Miro/APE OPO
Topics:
- Tuning the laser
- Second harmonic generation imaging of connective tissue
- 3D reconstruction of dermis and dermis vessels
- 4D Live cell imaging of GFP
- actin cytoskeleton in melanoma cells migrating in 3D collagen
- High-speed imaging of calcium transients

D Photoactivation and photobleaching (FRAP) (Geoffrey Lambright, Mike Friedrich, Wiebke Buck, Olga Levai - Leica Microsystems, Gregory Harms)

Location: Room 009 and Room 125, Rudolf-Virchow Center
System: Zeiss LSM 410 and Leica SP5
Topics:
- The essentials for FRAP, FLIP, and Photoactivation
- Characterization through control experiments
- Qualitative vs. Quantitative FRAP with artificial membrane staining on living cells
- Qualitative vs. Quantitative FRAP with GFP fusion proteins on Living Cells
- Two-color FRAP

Oct. 11, 2006
Organizers: Gregory Harms, Peter Friedl
Duration: 9:00 to 15:00
Location: Kurssaal 1, Colloquium Room and Microscopy Core Facility
Rudolf Virchow Center, Versbacher Str. 9

Demonstrator Day

Vendor Showroom and Demonstrations

09:00 – 15:00 - State of the art demonstrations by industrial partners
- **Guided Tours**
  - **Possibility to test your samples on the demonstration units.**
  - **The Vendors available are:**

Chromaphor
INTAS
Keyence
La Vision - BioTech
Leica
Nikon
Olympus
Perkin-Elmer
Till Photonics
Visitron
Zeiss

The third day will be held in Kurssaal 1 and Colloquium Room of the Rudolf-Virchow-Zentrum.

Individual appointments with the individual companies are possible but need to be made separately with them. Please make the individual appointments with the vendors on or before October 9 or 10, 2006.

Coffee and other refreshments: 09:30 - 15:00

Lunch: 12:00 - 13:30

Planned Specific Vendor Demonstrations and Lectures: (Tentative Schedule)
***** Subject to Change *****

09:00 - 09:45 **INTAS - Imaging Systems from INTAS with Spectral Un-mixing**
09:45 – 10:15 **La Vision - "Ultrafast Multiphoton Microscopy"**
10:15 - 11:00 **Leica - "Experience a new level of speed" - The new Leica Laser-Microdissection-System LMD 6000 - Intro to Leica SP5 and TIRF**
11:00 – 11:30 **Nikon - „Perfect Focusing System – Farewell to focus drift"**
11:30 – 12:00 **Olympus - "Advanced Image-Based Screening Applications in Life Science Research"**
13:00 – 13:30 **Perkin-Elmer- "Ultra-View ERS a focussed value for Live Cell imaging in the offering of confocal systems"**
13:30 - 14:00 **Visitron - "Confocal Live Cell Imaging"**
14:00 - 14:30 **Zeiss - "CellObserver for highspeed applications and ApoTome for optical sectioning"**
14:30 - 14:45 **Chromaphor- BIOPTECHS Cell Sample Chamber**

System Demonstrations by Exhibitors

-occurring throughout the symposium and workshop and by appointment

1. CHROMAPHOR Analysen-Technik GmbH

System: BIOPTECHS Cell Sample Chamber

2. INTAS GmbH/ CRI

System: Nuance Microscopy Imaging System, Maestro In Vivo Imaging System

- Principles of spectral unmixing with CCD camera imaging
- Spectral unmixing for tumor detection in whole mice
- Multi-color unmixing from cell cultures and histopathological tissue sections

3. Keyence Deutschland GmbH

System: Fluorescence Microscope BZ-8000

- Compact, fully automatic Fluorescence Microscope for Biological Research

4. La Vision BioTech GmbH

System: TriMScope

- Utra-fast Multi-photon Microscopy with Multiple point confocal scanning
- New light sources for Multi-photon Microscopy

5. Leica Microsystems GmbH

Systems: Leica Laser Microdissection System LMD 6000, SP5 Confocal with FLIM, Leica AM TIRF

- laser dissection microscope for the laboratory
- Multi-spectral Confocal Microscope: FRAP, FLIM, FCS, TPE
- Fully automated TIRF microscope

6. Nikon GmbH

System: TE2000 PFS- TIRF and TE2000 C1 confocal

- Total Internal Reflection Imaging with Perfect Focus System
- Spectral confocal imaging system on an TE2000 inverted microscope

7. Olympus GmbH

System: *cell R*, MVX10, *Scan R* Microscope

- All-in-one Live Cell Imaging system
- Macro Zoom Fluorescence Microscope
- Screening Station for Life Sciences

8. Perkin-Elmer GmbH

System: Ultra VIEW ERS

- Nipkow disc, fast live-cell confocal imaging system
- Equipped with an ultra-sensitive EMCCD camera

9. Till-Photonics

System: iMIC imaging Setup, TILL.TIRF system

- Real Time Imaging System for Widefield, FRET, DualColor, FRAP
- flexible, versatile and PC-based
- TILL.TIRF dual-port condensor for maximal S/N-ration for and controlable penetration depth

10. Visitron Systems

System: VT Infinity Confocal, Cascade II EMCCD

-Low Noise Single Molecule Imaging with CascadeEMCCD

-2D array multipoint confocal scanner with 800 frams/second and simple FRET measurments

11. Carl Zeiss GmbH

System: Axiovert 200 ApoTome, Cell Observer

- High resolution, ghigh contrast and simple fluorescence microscopy for 2D and 3D imaging with user friendly software
- Multi-channel, time-resolved biological imaging system