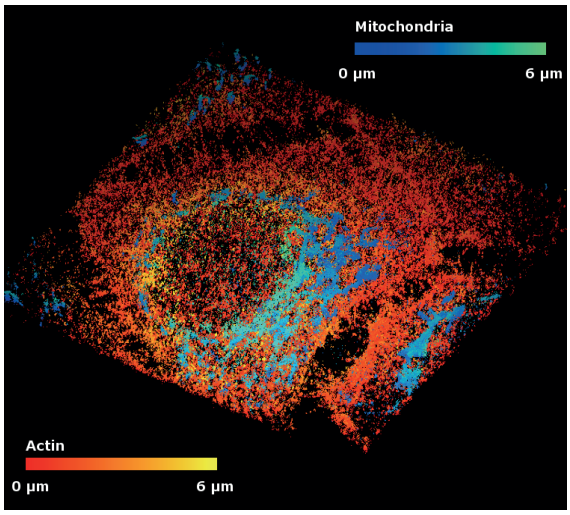
TIMed CENTER
Technological Innovation in Medicine

TIMED CENTER CORE FACILITIES

NANOSCOPIC CHARACTERIZATION OF CELLULAR PROCESSES



Functions

- Real time-visualization of biomolecules, interactions and dynamics
- (Real time) analysis of dynamic and static cellular and biomolecular processes (diffusion, localization, morphology, protein cluster) by means of specialized software packages
- 3D-localization of biomolecules in cells and tissue by means of super resolution fluorescence microscopy

Services

- Determining affinities, stoichiometry, multivalence, interaction kinetics of molecules, absorption of molecules by cells
- Proof of proteins/RNA/DNA in cells from cell cultures in tissue
- Tests of bio-markers (e.g. fluorescence markers)
- Toxicity tests (e.g. on surfaces)

Gaining a more detailed insight into the underlying biomolecular mechanisms of biology and medicine is the main interest of the research group at the *FH Upper Austria, Linz Campus*. Their most important instrument in this context is **high-resolution single-molecule fluorescence microscopy (SM-FM)**. This method is used to monitor specific molecules in living cells, tissue as well as in whole organisms. With fluorescence microscopy, both bio-molecular (antibodies – antigens) and cellular (migration and invasion of cells, cell-division and apoptosis) dynamics, co-localizations as well as interactions can be investigated. This is done by selectively and specifically marking predefined cell components.

In order to conduct an analysis, the generated series of images are converted into a film sequence. After that, the multi-scale-parameters of dynamic cellular processes (e.g. dynamics, movement and interactions of proteins) and static cellular processes (e.g. morphology of cells, protein clusters, localization of biomolecules) are evaluated using specialized software packages.

Super resolution microscopy (PALM/STORM) is a technique used to represent fixed or living cells and different kinds of tissue in a three-dimensional space. Its resolution is only limited by the accuracy of the localization of single molecules, which is usually around 20 nanometers.

Processes like the **localization of single bio-molecules** in tissue or in a cell, the **migration of cells** or the **dynamics of biomolecules** can be recorded and quantified automatically by means of computers. The imaging procedure is supported by molecular biological methods (e.g. real time-qPCR-device, FACS, multiwell plate reader, western-blot-tools) used to characterize bio molecules as well as by a fully equipped cell culture.

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