FACULTY OF SCIENCE
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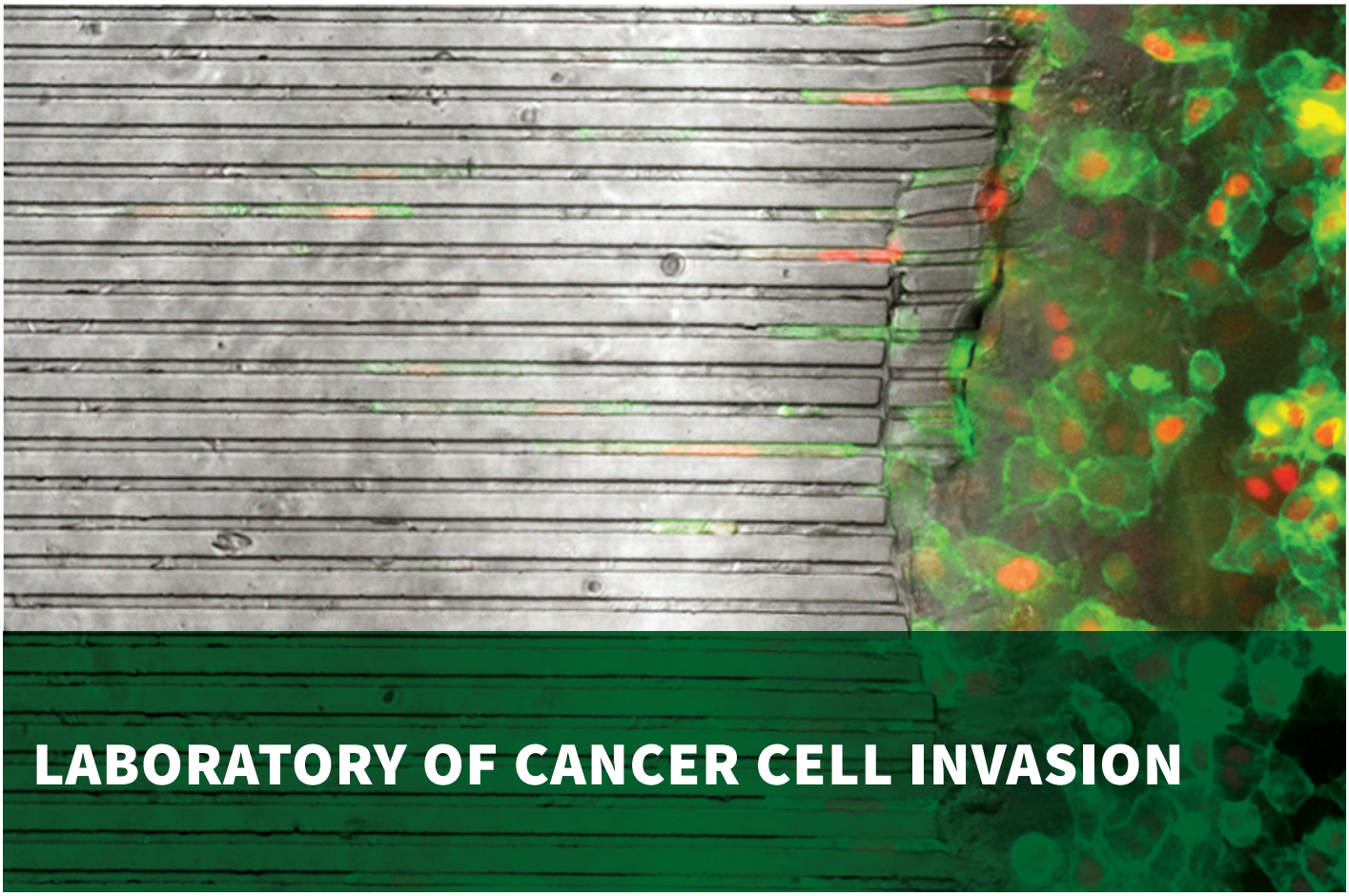


LABORATORY OF CANCER CELL INVASION

OFFER

- Our expertise in quantitative analysis of cell migration and invasiveness in various 2D and 3D environments under any selected conditions.
- Suitable targets and – in cooperation – suitable drug candidates for anti-metastatic treatment.

REQUIREMENT

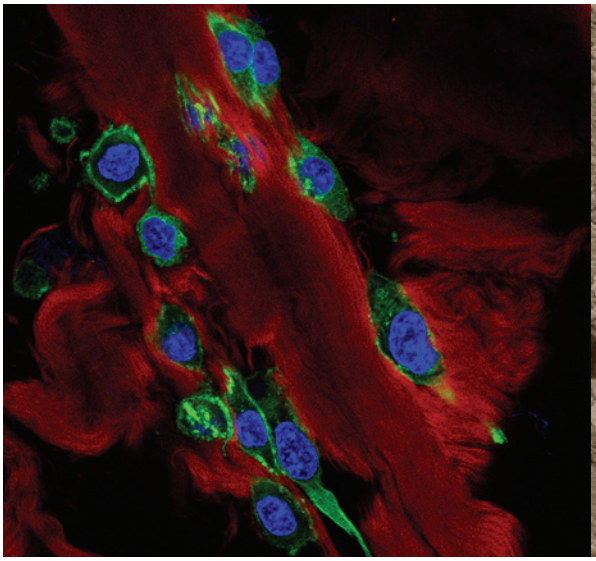
- All kind of cooperation in field of cancer cell invasiveness.
- Collaborations on translation of our anti-metastatic drug candidates into clinics.

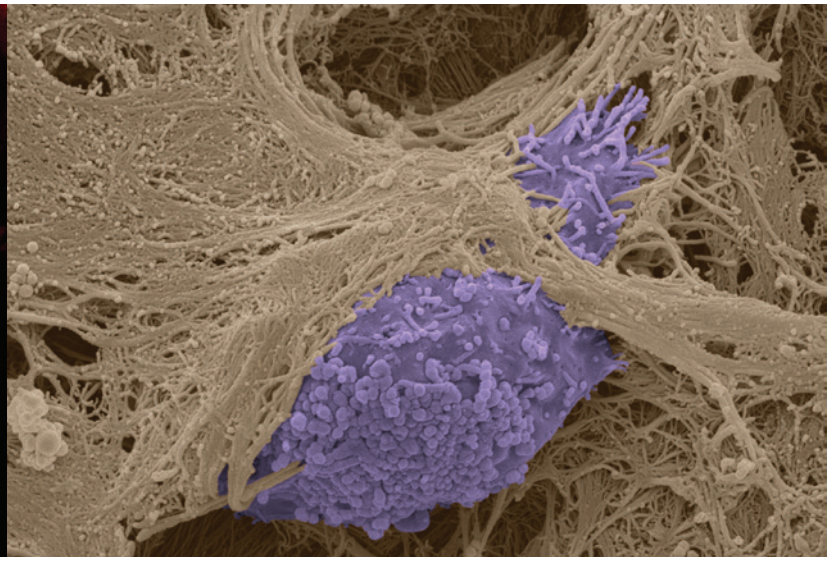
To elucidate the mechanisms of cancer cell **invasiveness**, identify novel targets for **anti-metastatic treatment** and help to develop anti-metastatic drugs – **migrastatics**.

KNOW-HOW & TECHNOLOGIES

- Identification and understanding of proteins and signaling pathways involved in amoeboid and mesenchymal cancer cell invasiveness.
- Elucidation of the mechanisms of plasticity of cancer cell invasiveness.
- Functional analysis of subcellular structures involved in cancer cell invasiveness.
- Analysis of general mechanisms of cell migration and mechanosensing.

The focus of our laboratory is on molecular and cellular mechanisms of cancer cell motility and invasiveness and its plasticity, including subcellular structures. We discovered and characterized amoeboid invasiveness and metastasis in cancer cells of mesenchymal origin. We were the first to elucidate the structure of invadopodia in a complex 3D environment. Later, we concentrated more on plasticity of cancer cell invasiveness and succeeded in identification of several important signaling molecules involved in this process.





MAIN CAPABILITIES

- Wide range of basic and advanced genetic, molecular biology and biochemistry techniques (including qPCR, CRISPR/Cas9, shRNA, affinity purifications, kinase assays and many others).
- Cell culture in 2D and 3D conditions on various matrices (including acellular dermis, Matrigel, 3D collagen, cell-based matrices).
- Transcriptomic and proteomic analyses in 3D collagen.
- Qualitative and quantitative cell adhesion, proliferation, migration, ECM degradation, invadopodia formation and invasion assays in 2D and 3D environments.
- Advanced microscopic analyses of migrating cancer cells as well as signaling proteins and structures involved in cell adhesion, migration and invasiveness.

KEY RESEARCH EQUIPMENT

All standard facilities required for molecular biology and biochemistry, cell culture facilities, biohazard box, fluorescent microscopes (Nikon Eclipse TE2000S, JuLi), xCELLigence. As a part of the BIOCEV biocenter, the Cell Invasion in Cancer laboratory has access to all facilities at BIOCEV including Advanced Imaging facility to cover all required microscopy techniques (superresolution, correlation, spinning disc), namely: Leica TCS SP8 WLL SMD-FLIM, Super-resolution Nikon Ti-E microscopes with N-SIM and N-STORM modules and Nikon Ti-E with STED module from Abberior Instruments, Carl Zeiss LSM 880 NLO (Intravital inverted two-photon and confocal microscope), FEI Helios NanoLab G3 UC–FIB-SEM equipped for CLEM plus accessories for sample preparation. The proteome or metabolome analysis and quantification on the latest generation of Mass spectrometry equipment–Thermo Orbitrap Fusion is also available at BIOCEV. The research team has also access to the Faculty of Science Laboratory of Electron Microscopy (JEOL JEM-1011 TEM, JEOL JSM-6380LV SEM and all other necessary equipment).

PARTNERSHIPS & COLLABORATIONS

ACADEMIC PARTNERS

Ben Fabry (FAU, Erlangen-Nürnberg, biophysics), Karel Sme-tana Jr. (Charles University, tumor microenvironment), Victoria Sanz--Moreno (King´s College, plasticity of cancer cell invasiveness), Alissa Weaver (Vanderbilt University, invadopodia), Stephen J. Weiss (University of Michigan, proteases in cancer cell motility), Daniel Zícha (CEITEC, advanced microscopy).

PRIVATE AND PUBLIC SECTOR

Medicem (acellular dermis), Medbase (clinical translation).

MAIN PROJECTS

- GA ČR grant 18-15684J The role of matrix metalloproteinases and vimentin cooperation in cancer cell invadopodia function.
- GA ČR grant 15-07321S Analysis of Src kinase activation using a novel FRET-based biosensor.
- GA ČR grant 15-174195 Crosstalk of CAS/BCAR1 and PKN3 signaling in invasiveness and metastasis of cancer cells.
- KFF PI Grant The Kellner Family Foundation grant The analysis of plasticity of cancer cell invasiveness.
- GA ČR grant 13-24851J Dissecting of BCAR1/CAS role in mechanosensing.

ACHIEVEMENTS

Publications in peer-reviewed and high-impact journals such as Oncogene, Molecular Cancer Research, Journal of Proteome Research, Molecular Carcinogenesis, Cellular and Molecular Life Sciences, Molecular Biology of the Cell, Oncotarget, Lancet Oncology, Journal of Cell Science, New England of Medicine. Results are regularly presented as invited lectures at leading international conferences and at prestigious universities.

OUR WEBPAGES

www.natur.cuni.cz/biology/cell-biology/research-teams/skupina-invazivity-nadorovych-bunek-en