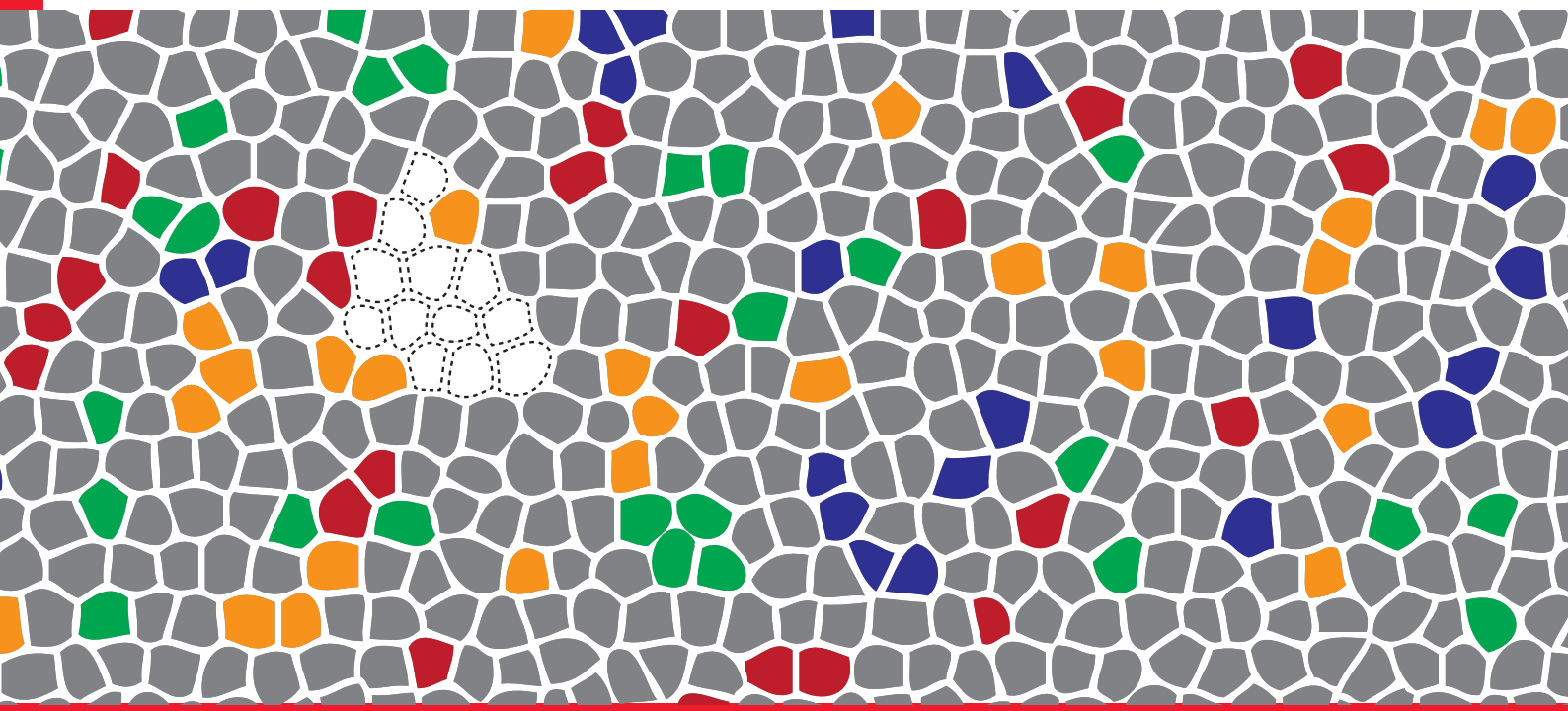
From Eye to Insight

Leica
MICROSYSTEMS



## Molecular Insights with spatial Information

# Automated Laser Microdissection for Proteome Analysis

Cancer is a disease of cellular dysfunction, with accompanying correlates of protein abundance or malfunction of proteins. The proteome is therefore a crucial differentiator of health and disease states. Interestingly, the protein content of cells in the cancer microenvironment can vary tremendously. Understanding the cellular heterogeneity is key in deciphering the differences of health and disease. The Matthias Mann lab has developed a groundbreaking method called Deep Visual Proteomics (DVP) that combines Laser Microdissection (LMD) with ultra-high sensitivity mass spectrometry to deliver molecular insights with spatial context on a cellular level. You can explore the proteome of individual cells without mixing their molecular information with neighboring cells. This allows the individual proteomes of cancerous and healthy cells within the same microenvironment to be separated and annotated.

In this new approach, Artificial Intelligence (AI) is used in conjunction with LMD to increase discovery throughput. Cells of a defined phenotype are discovered automatically and can be marked for subsequent isolation. Coordinates of the marked cells are imported to the LMD and dissected precisely. The isolation process with the LMD can also be automated for additional time saving.

**Typical fields of research**

- Translational Research
- Personalized Medicine
- Cancer Research
- Proteomics
- Metabolomics

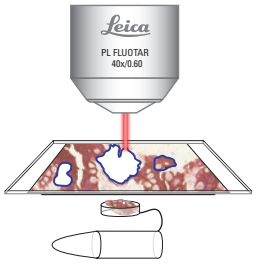
**References**


- Mund et al., Nature Biotechnology, 2022
  https://doi.org/10.1038/s41587-022-01302-5

# Increased throughput by automated Laser Microdissection

**Sample preparation**
Patient tissue samples sectioned and prepared on LMD slides.

**High-resolution Imaging**
Whole-slide high-resolution microscopy.



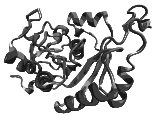

**Laser Microdissection (LMD) used to isolate tissue areas under visual control. The dissected cells are collected for downstream analysis.**

**AI driven Image Analysis**
Biological Image Analysis Software (Aivia & BIAS) performs image segmentation using deep learning. Machine learning-based identification of cell types and states. Provision of ROIs for LMD. (Mund et al. 2021)

**Automated Single Cell Laser Microdissection**
Import of ROIs into LMD Software.
Dissection direct into PCR well-plates.
1250 ROIs dissected per hour automatically and with remote control.

**Ultra-high sensitivity mass spectrometry**
Liquid chromatography mass spectrometry (LC-MS)

**Bioinformatic Data Analysis**
Insights into the proteome in health and disease at the cellular level

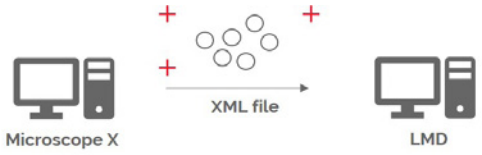


## Automated Laser Microdissection

ROIs which were defined with a separate software e.g. AI-based image analysis, can be imported to the LMD software via an open interface (XML based). Thus, you can create your own detection algorithm to define your ROIs and transfer your data to the LMD for dissection.

An automatic focus finder corrects eventual focus drifts during a high-throughput experiment.

The Leica LMT350 ultra stage allows collection directly into well plates for comfortable and time-saving downstream workflows.




DEMO AND DETAILS

Leica Microsystems CMS GmbH | Ernst-Leitz-Strasse 17–37 | D-35578 Wetzlar (Germany)
Tel. +49 (0) 6441 29-0 | F +49 (0) 6441 29-2599

www.leica-microsystems.com/lmd