TISSUEGNOSTICS
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Contextual Tissue Cytometry with AI – Immunophenotyping and Quantifying the Tumor Microenvironment *in-situ*

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Abstract

Determining the in-situ immune status of diseased organs or quantify coexpression of molecules on the single-cell level has mostly been subject to visual estimation, or – at best – to manual counting for decades. Hence, experts usually had the choice of the "least of evils" between *guessing* and *endless (manual) counting*. In tumor immunology, infiltrating inflammatory cells need to be phenotypically characterized on a quantitative basis. To better understand the function of inflammatory cells in tumor development, type and number of inflammatory cells and their proximity to glandular/tumor structures have to be analyzed in-situ and correlated with disease state. Using TissueFAXS™ Cytometry the time-consuming and error-prone human evaluation of stained histological sections can be approached with an observer-independent and reproducible technology platform, offering a high degree of automation, paired with user interaction at relevant points of the analytical workflow. This platform can be applied as a means of tissue cytometry for both immunofluorescence and immunohistochemistry and thus constitutes the microscopic equivalent to flow cytometry (FACS).

Likewise FACS, TissueFAXS™ can quantify any type of molecular marker in any type of cell – but in tissue context or in adherent cell culture monolayers without the need to solubilise the cells (i.e. TissueFAXS permits analyses *in-situ*). Applications include, but are not limited to, the exploration of the tumor microenvironment and/or the spatial organization of cellular subpopulations, detection and quantification of fluorescence in situ hybridization (FISH), assessment of different bone structures, or analysis of samples in multiplexing or multispectral mode.

The TissueFAXS Cytometry platform can be used in clinical multi-center studies to determine the immune response to certain drugs *in-situ*, measure proliferation, apoptosis, cytokine expression, signalling molecules, and others. It can do end-point assays as well as live-cell imaging and time-kinetic experiments. But TissueFAXS Cytometry also promotes tissue cytometry to a new level of quality, where complex cellular interactions can be addressed on the single-cell level but still in histological context.

Biography

Dr. Rupert Ecker has been co-founder of the TissueGnostics group in Austria, Romania, and USA. He is Chief Executive Officer in TissueGnostics-Austria and TissueGnostics-Romania, Vice President of TissueGnostics-USA, as well as Area Manager of TissueGnostics China Division.
Before founding TissueGnostics he was a research scientist at the Competence Centre for Bio Molecular Therapeutics in Vienna, a joint venture between the University of Vienna and the Novartis Research Centre.
As a co-inventor of the TissueFAXS technology Rupert Ecker has always been significantly involved in research and (product) development from system design to clinical testing and has successfully headed several joint R&D projects with academic partner institutions in the fields of advanced computer vision, cancer research, stem cell biology, and personalized medicine.
Rupert Ecker graduated in Cell Biology from the University of Vienna. He has more than 20 years of experience in microscopy and image analysis. In addition, he has been trained in software development.