TGN-06

TISSUEGNOSTICS

PRECISION THAT INSPIRES

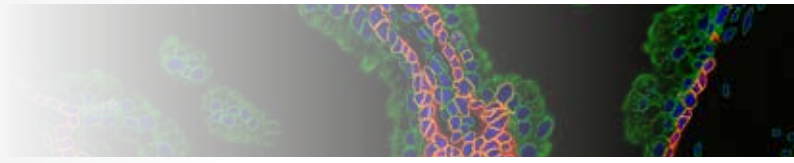
7TH GENERATION OF
IMAGE CYTOMETRY SOLUTIONS

STRATAQUEST

CONTEXTUAL **TISSUE CYTOMETRY**

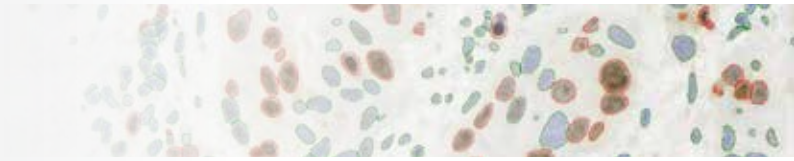
TISSUEQUEST

IF CELL **ANALYSIS SOFTWARE**



HISTOQUEST

IHC/HC CELL **ANALYSIS SOFTWARE**



TISSUE CYTOMETRY SOLUTIONS

IHC/HC & IF CELL **ANALYSIS SOFTWARE**

01 DIGITAL SAMPLE

import fluorescence/brightfield scans of tissue sections, TMAs or cell cultures from various sources

02 SPECTRAL UNMIXING AND COLOR SEPARATION

03 SEGMENTATION ALGORITHMS

allows automated detection of cells and stained areas based on morphological or antibody staining

04 STRATAQUEST: AI-POWERED TISSUE CYTOMETRY

machine learning-based classifier and deep learning- based nuclear segmentation

05 QUANTITATIVE ANALYSIS

automatic detection of various parameters attributed to cells and markers

06 DATA VERIFICATION

Explore your sample!

07 EXPORT RESULTS

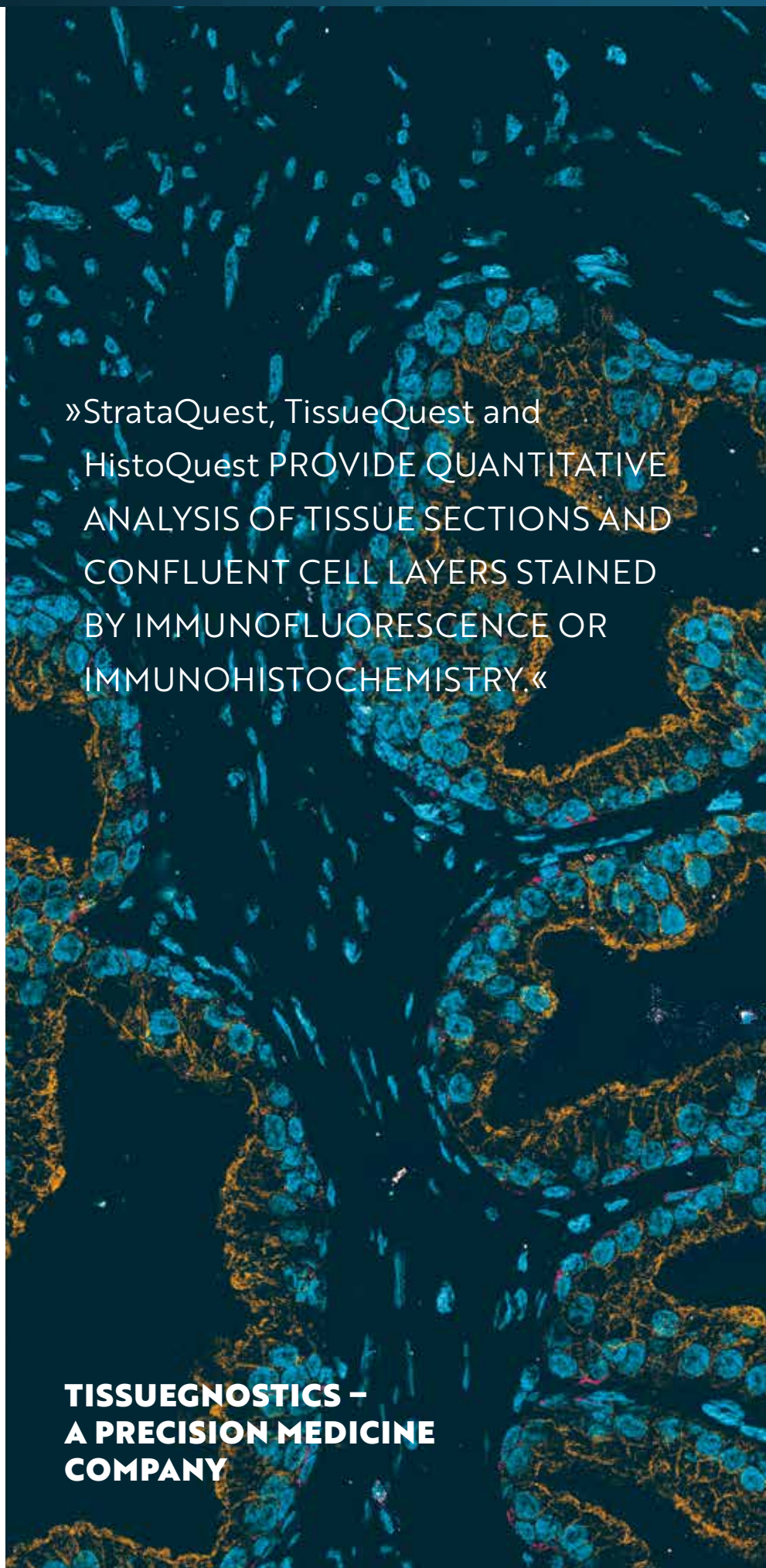
straight-forward workflow for exporting the desired parameters, images and graphs

REFERENCE PUBLICATIONS

TG USER EXPERIENCES

Please check online for the constantly updated list of reference publications at

www.tissuegnostics.com



TISSUEGNOSTICS – A PRECISION MEDICINE COMPANY

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NEW VERSION: TISSUE CYTOMETRY SUITE 7.1

TissueGnostics is proud to announce the release of StrataQuest, TissueQuest and HistoQuest version 7.1. In their 7th generation these highly cited image analysis applications advance FACS-like data analysis with an improved graphical user interface and added powerful machine- and deep-learning modules.

DR. RUPERT ECKER
TissueGnostics, Vienna, Austria

PRECISION AND REPRODUCIBILITY WITH EASE

StrataQuest generation 7 focuses on making high-end contextual image analysis accessible to everyone through machine- and deep-learning modules which require minimal user input.

Customized analysis pipelines can be built and packaged into simplified user interfaces called StrataQuest APPs.

StrataQuest has included streamlined image analysis engines for specific tasks such as proximity measurements, background removal, spectral unmixing, and tissue detection.

HistoQuest as well as StrataQuest APPs worklfow is designed for simplicity and usability. Automated analysis starts with a few simple settings or by loading an analysis template.

Proven proprietary algorithms for nuclear segmentation and detection of nuclear, membrane and cytoplasmic markers reduce the complexity of the analytical workflow, measurement and reporting.

Data visualization using interactive flow cytometry like scattergrams (dot plots) and histograms permit analysis of subpopulations by gates.

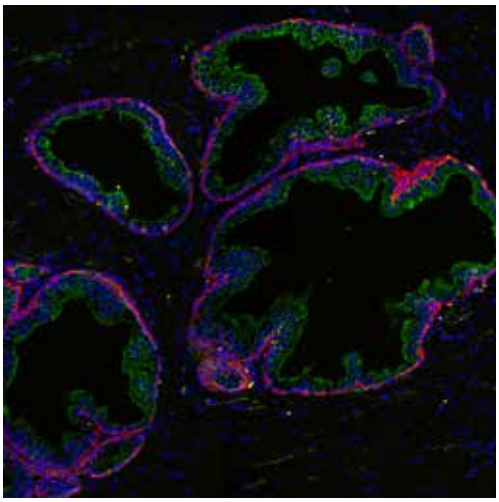
Backward gating and Forward-connection between image and data display simplifies identification of subpopulations and unique understanding of the acquired data.

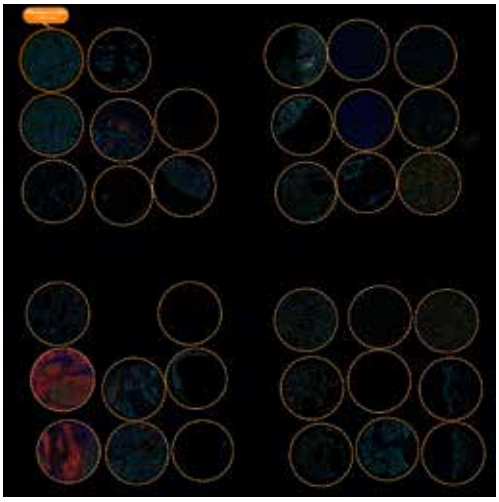
01 DIGITAL SAMPLE

Import fluorescence and brightfield scans of tissue sections, TMAs, and cell cultures from many popular scanning platforms.

SUPPORTED FILE FORMATS
StrataQuest, TissueQuest and HistoQuest support the following file formats:

- TissueFAXS platform (aqproj)
- StrataFAXS II (vmic)
- PreciPoint (vmic, gtif)
- Generic BigTIFF Import
- support for multipage BigTIFF files
- OME-TIFF
- JPEG, PNG, BMP, TIFF
- Zeiss (czi)
- Hamamatsu NanoZoomer (ndpi)
- Aperio (svs)
- Leica (scn)
- 3D HISTECH Pannoramic
- Mirax (mrxs)
- Olympus (vsi)
- More slide scanners to be added

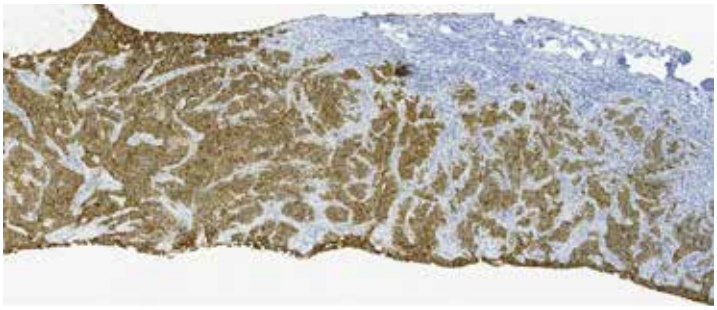




StrataQuest, TissueQuest and HistoQuest support the ICE (Image Cytometry Experiment) file format, thereby enabling raw data export to the *FCS Express Image Cytometry* Tool (De NovoTMsoftware). *FCS Express Image Cytometry* software (https://denovosoftware.com/image-cytometry/) combines a flexible user interface with extensive and interactive data analysis including advanced statistics options and advanced high-dimensional analysis and machine learning algorithms such as t-SNE, UMAP, FlowSOM and many others.

USE BOTH StrataQuest and HistoQuest FOR THE ANALYSIS OF ALL KINDS OF IHC/HC STAININGS

- DAB
- AEC
- HistoGreen
- Discovery purple
- HE
- Trichrome
- ...

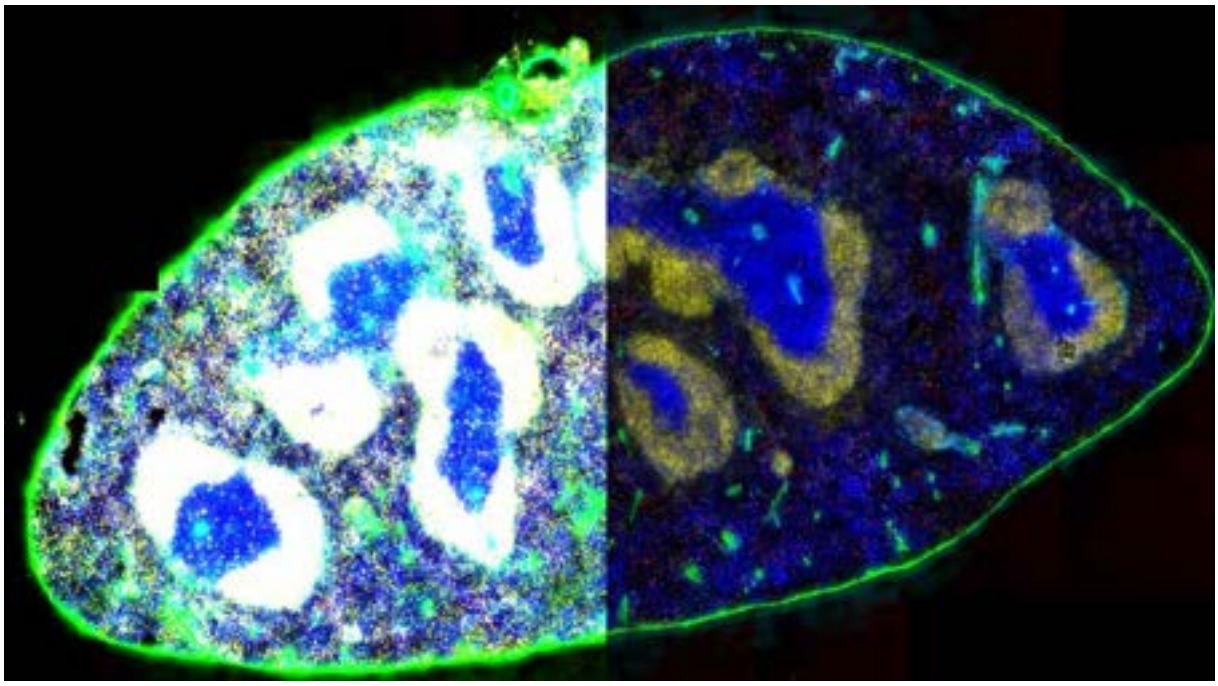


02 SPECTRAL UNMIXING AND COLOR SEPARATION

SPECTRAL UNMIXING

Using reference spectra from our database, the spectral unmixing engine in StrataQuest can eliminate autofluorescence and bleed-through from overlapping channels in multispectrally acquired images.

BEFORE SPECTRAL UNMIXING **AFTER SPECTRAL UNMIXING**

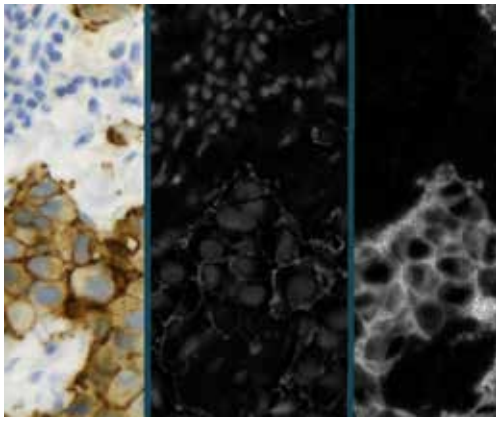


mouse spleen stained for 5 markers

COLOR SEPARATION

StrataQuest- and HistoQuest-integrated color separation uses spectral unmixing of RGB color information in brightfield images to colorimetrically separate image components into individual channels for each identified marker. StrataQuest and HistoQuest support separation of mixtures of up to four blended chromogens or markers.

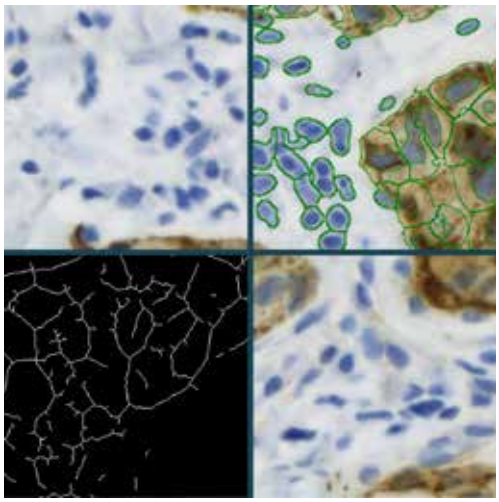
Fluorescence analysis in TissueQuest does not require colorimetric separation.



03 SEGMENTATION ALGORITHMS

Choose from multiple algorithms for automated segmentation for highly flexible data analysis.

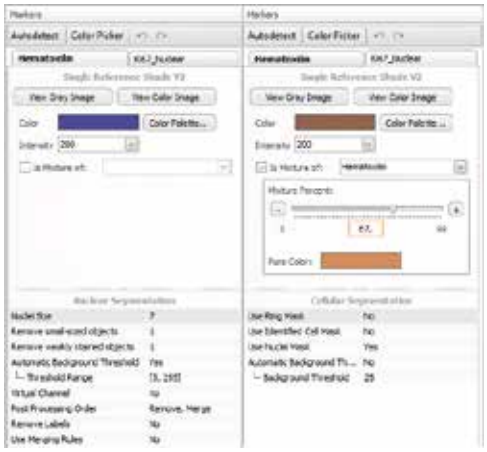
- **Nuclear Segmentation** – detect events/cells with various shapes and sizes and segment them into nucleus, cytoplasm and membrane (requires the membranes to be stained).
- **Total Area Measurement** – measure the total area stained by a marker.
- **Dot Detection** – detect dot-like features (e.g. FISH, CISH). This algorithm can be added to Nuclear Segmentation or Total Area Measurement algorithms.
- **Membrane Detection** – discriminate nuclear membrane from nucleoplasmic staining.



IHC MARKER PROFILES

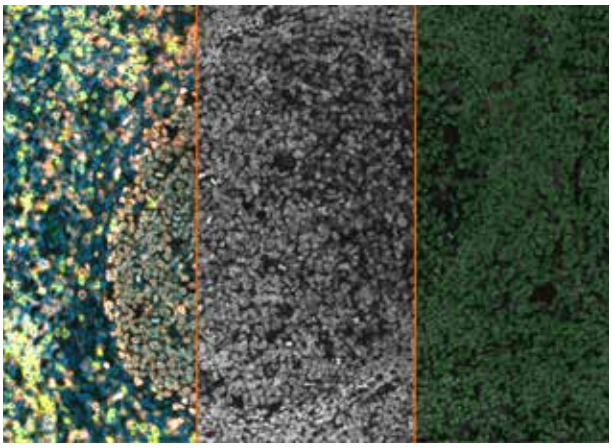
StrataQuest and Histoquest include dedicated marker management functionality. Colorimetric marker definition includes parameters for detection and measurement masks. Quickly and easily test your color segmentation parameters within your sample. Store marker profiles for future analyses.

Save TissueQuest fluorescence analysis profiles for re-use, repeatability and precision.



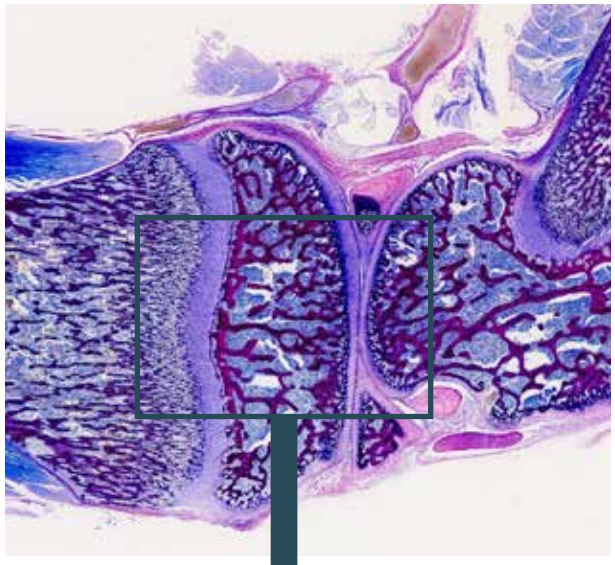
04 STRATAQUEST: AI-POWERED TISSUE CYTOMETRY

Use a combination of SQ's integrated AI features for a precise detection of morphological entities and increased accuracy for nuclear segmentation even in tissues comprising a high cellular density.



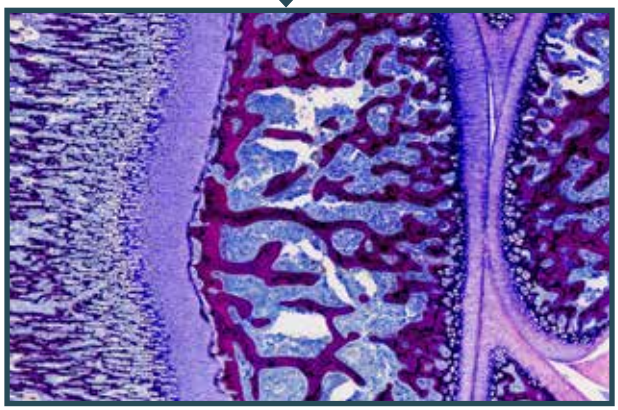
Deep learning based nuclear segmentation – the Deep Neural Network (DNN) can segment nuclei especially in challenging tissue samples displaying extremely dense tissue microenvironments, non-homogenous chromatin distribution patterns, and weak DAPI signal intensity.

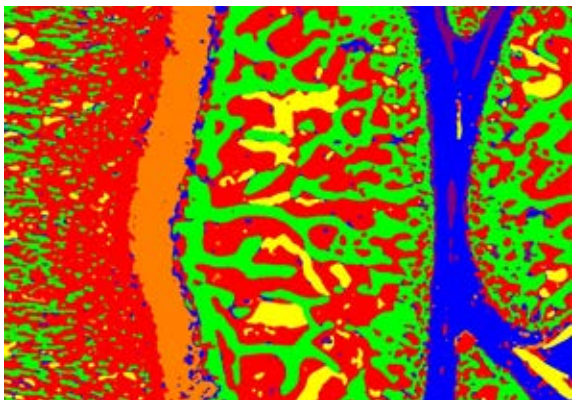
DNN applied on a lymphatic tissue



Machine learning based classifier – dissect your tissue into multiple tissue classes/morphological entities with minimal user input. The machine learning-based classifier works by marking just a few areas representative for the specific morphological entities of interest and the background.

Based on these defined areas the classifier is able to separate the tissue into specific tissue classes, including the background, and will automatically generate specific measurement masks for the detected areas.





Rat joint classified into 5 different classes

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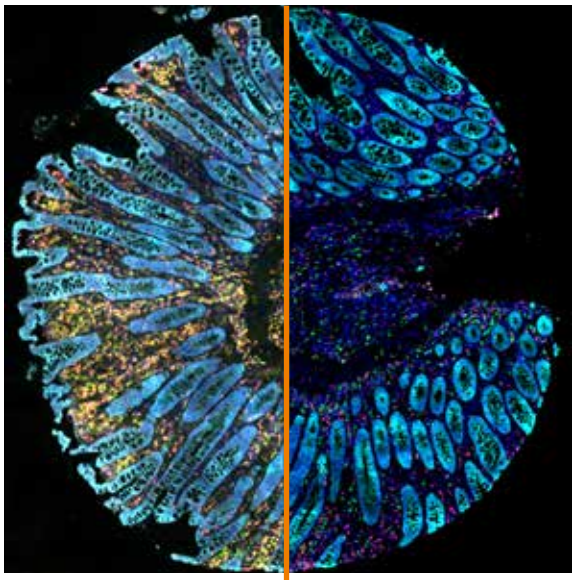
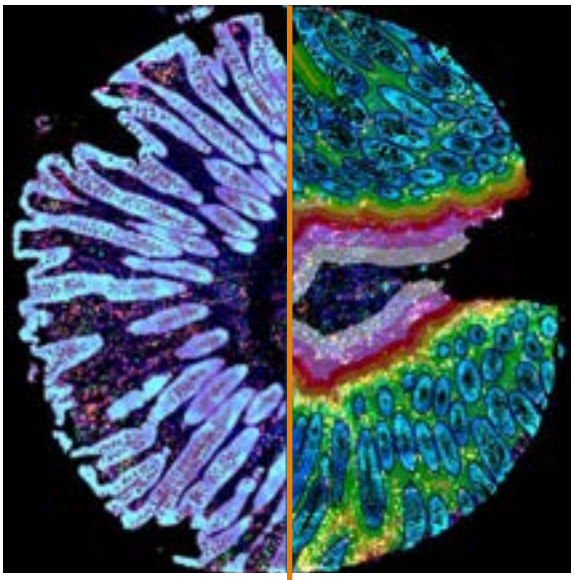
Add more depth to your research with StrataQuest engines in which specific tasks are simplified into automated modules providing a more insightful and comprehensive analysis

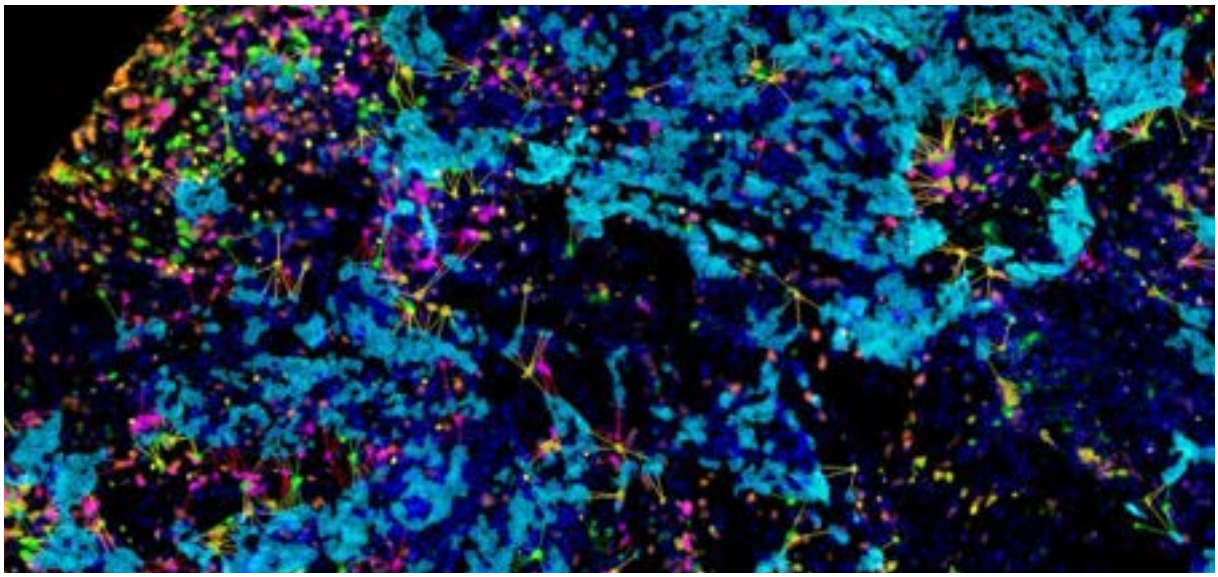
- **proximity measurements** – discover spatial relationships between metastructures and specific cell populations
- **background removal** – remove unspecific signals to increase object detection accuracy
- **spectral unmixing** – remove autofluorescence and channel bleed-through from multispectrally acquired virtual slides
- **dot measurements** – applicable to RNAscope, FISH, CISH, intracellular parasites
- **manual correction** – add the final touches and prune your analysis
- **membrane detection** – can be used for any network-like structure including neurons, blood vessels, canaliculi etc.
- **tissue detection** – automatically detect tissue areas



Multispectral image | Spectal unmixing engine



Automated epithelial detection | Proximity measurement engine

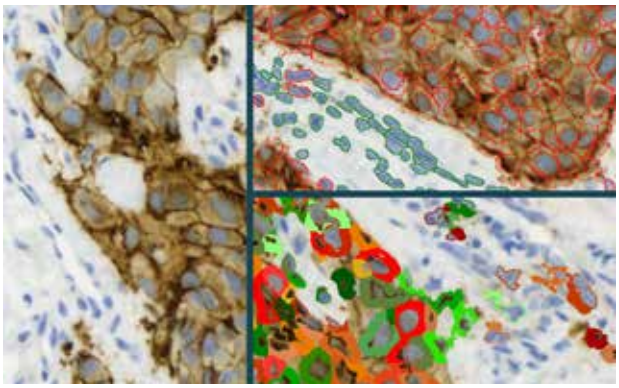


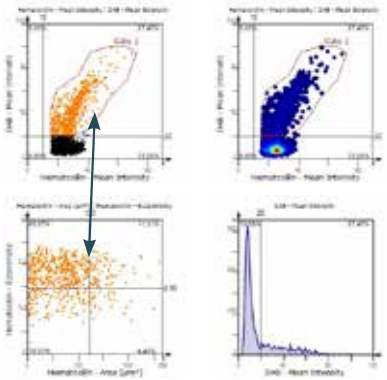
Spatial relationships

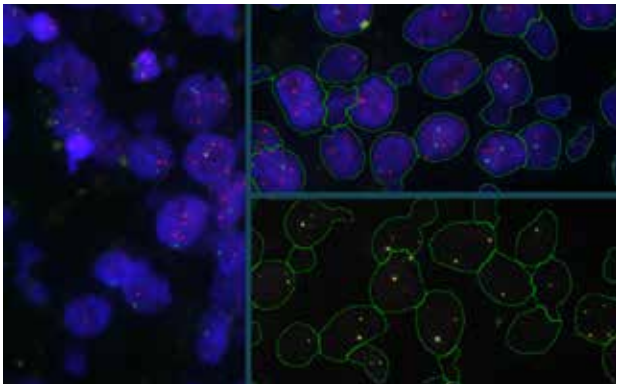
05 QUANTITATIVE ANALYSIS

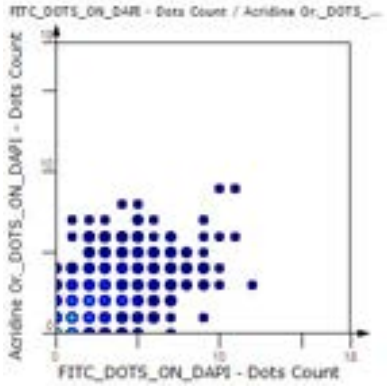
StrataQuest, TissueQuest and HistoQuest automate the measurement of multiple parameters for each cell, ROI, group of ROIs, and whole samples across multiple samples/slides. Apply prepared analysis protocols for rapid analysis and straight forward reporting.

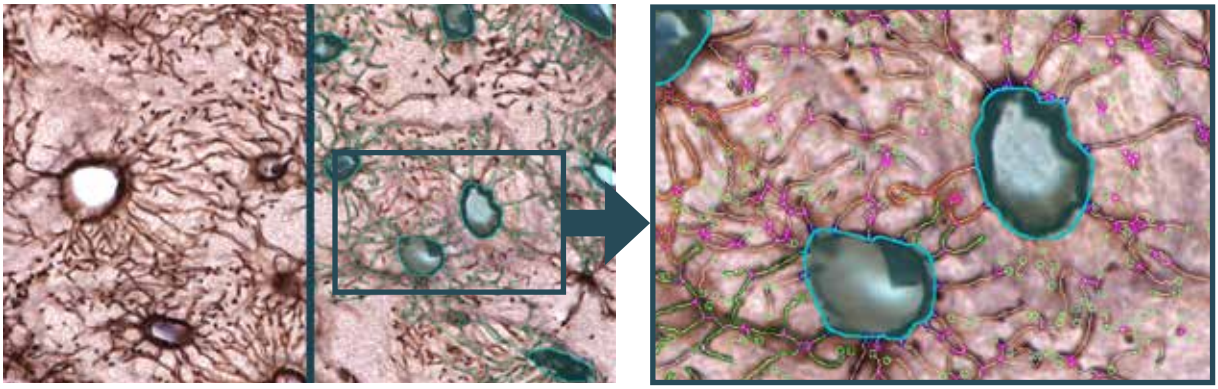
Both applications support up to 18 individual metrics per marker for each detected object and analysis can be easily adjusted to fit evolving requirements. TissueGnostics Image Cytometry software analyzes and reports on populations of millions of cells at a time with clarity and precision.











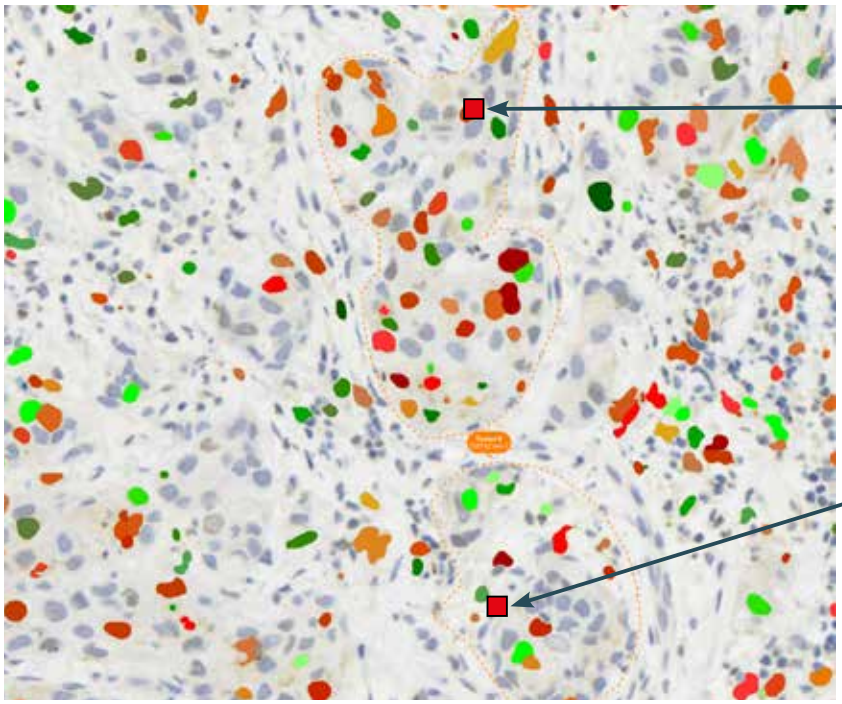
Bone sample acquired at 100x magnification. Automated detection of lacunar-canalicular networks (LCN) and detection of interconnected lacunae

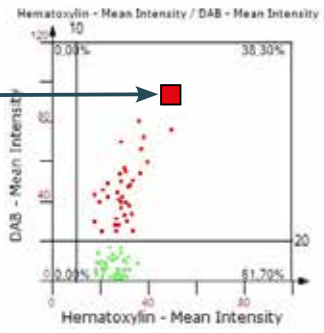
06 DATA VERIFICATION EXPLORE YOUR SAMPLE!

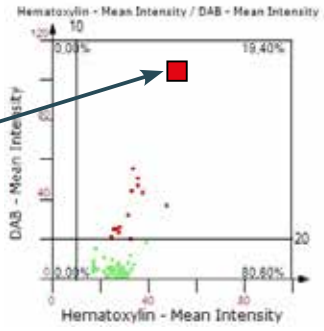
Gain insight through contextual analysis that juxtaposes and connects data and sample. Use visual exploration, comparison, display, verification to better make qualified conclusions.

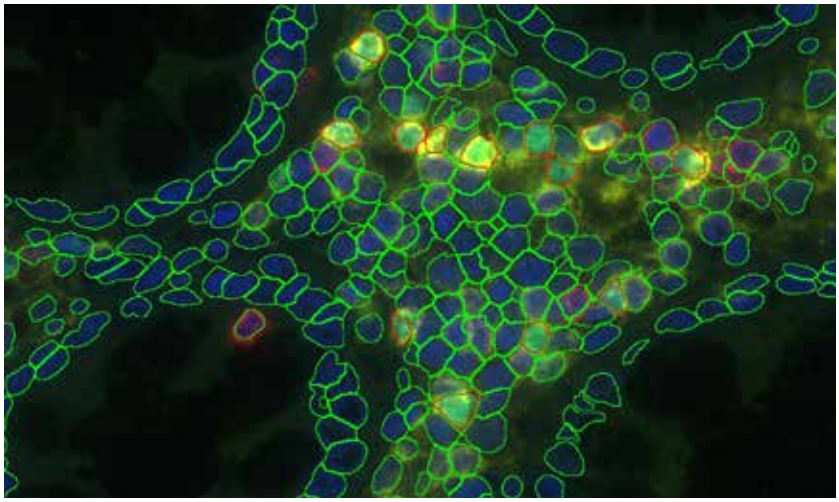
BACKWARD AND FORWARD CONNECTION

Evaluate your results by selecting any event or group of events (gate) in the scattergram to immediately highlight the corresponding cell(s) in the image and vice versa. Users gain control of the accurately analysed data and can verify outliers with ease. Real-time backward gating from scattergram quadrants and gates is used to interactively set cut-offs in the absence of an isotype-matched negative control.









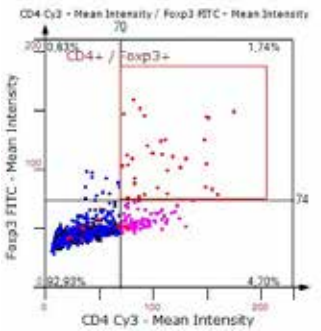
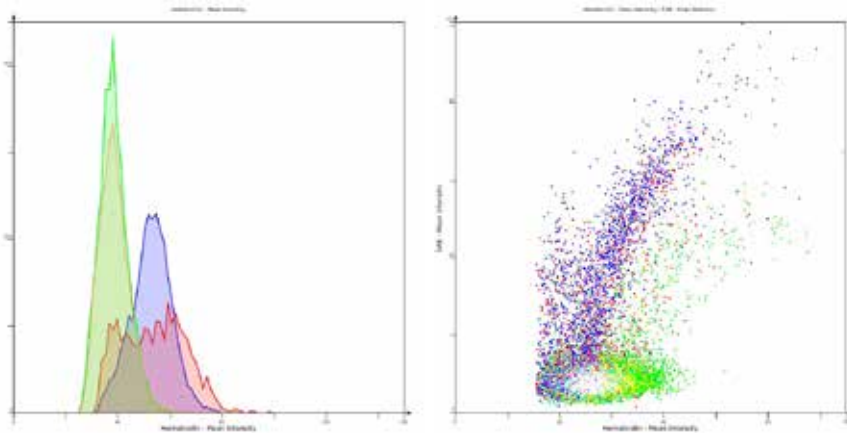


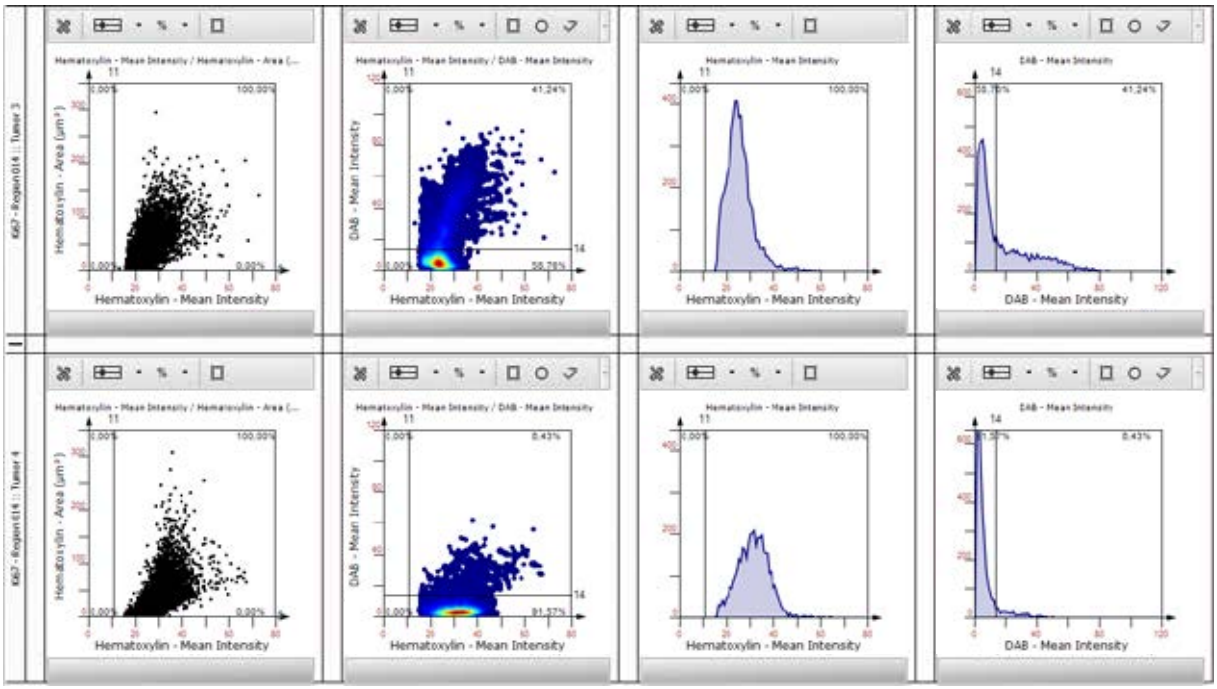
IMAGE COMPARE SETS

Easily display multiple virtual slides for comparison and review. Use TissueGnostics registration algorithm to align consecutive tissue sections stained with different markers. Compare the analysis of the same histological structure across multiple samples.

DATA COMPARE SETS/OVERLAY DIAGRAMS

Perform side-by-side or overlayed comparison of diagrams within a project.

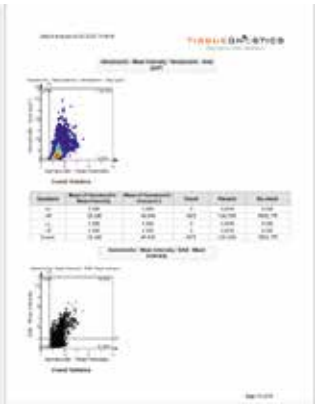




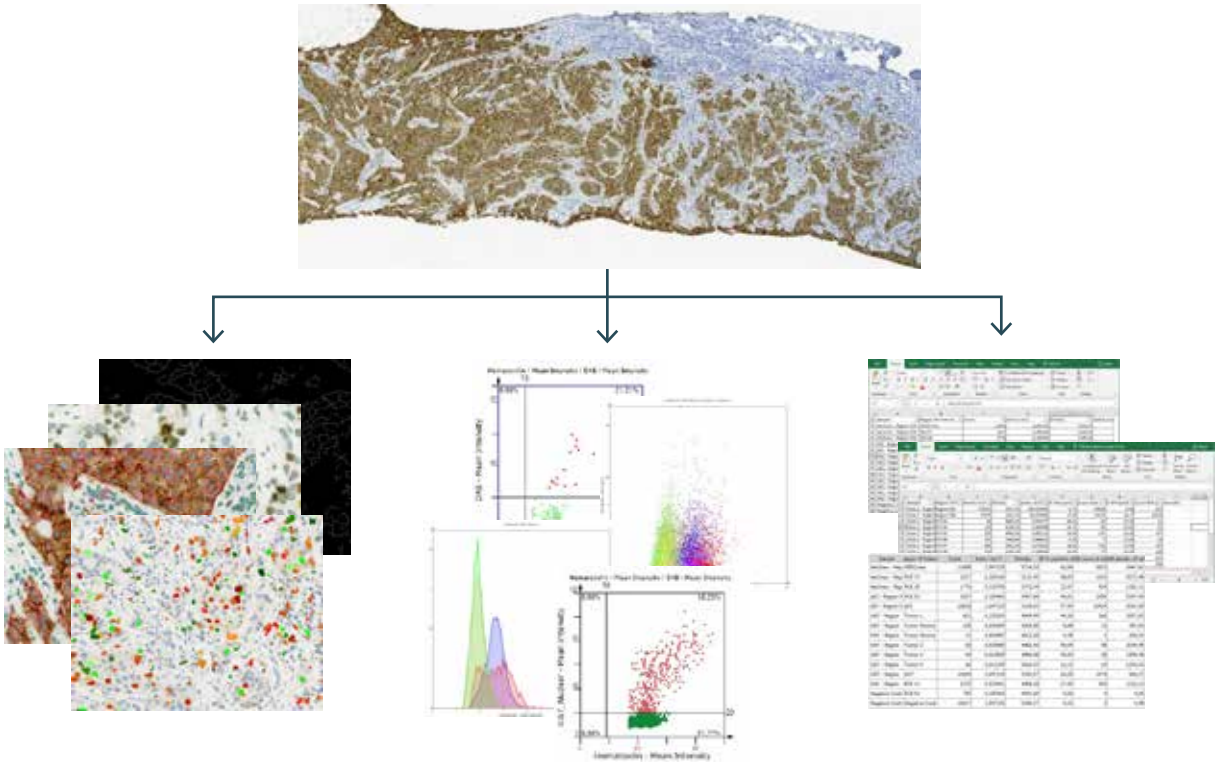
Analyzed parameters of cellular characteristics and marker expression can be compared among different regions and/or samples.

07 EXPORT RESULTS

Report upon measured ROIs and full samples using the Statistics Report. Export data in .xlsx, .pdf or .csv file formats. Export images and diagrams in a range of file formats (TIFF, BMP, PNG, JPG, OME-TIFF). Every measured value of each cell is available for list review and backward connection or export as raw data.



StrataQuest, TissueQuest AND HistoQuest offer you the possibility to get the maximum of information from your stained tissue sections, cell cultures and TMAs.



REFERENCE PUBLICATIONS

TissueGnostics' tissue cytometry solutions are used for high-impact research worldwide and the list of publications grows daily. Explore the online database of reference publications to find out how tissue cytometry can elevate your research.

www.tissuegnostics.com »»»

TISSUE CYTOMETRY ASSISTED METABOLIC IMAGING IN SKIN

Prof. Florian Gruber and Christopher Kremslehner, MSc from Medical University of Vienna, Austria, integrated TissueFAXS i PLUS and StrataQuest into their Metabolic Imaging workflow, through which they are able to analyse immediate effects of UV light on skin. The automated stratification of the skin via StrataQuest allows to determine marker expression within specific skin layers.

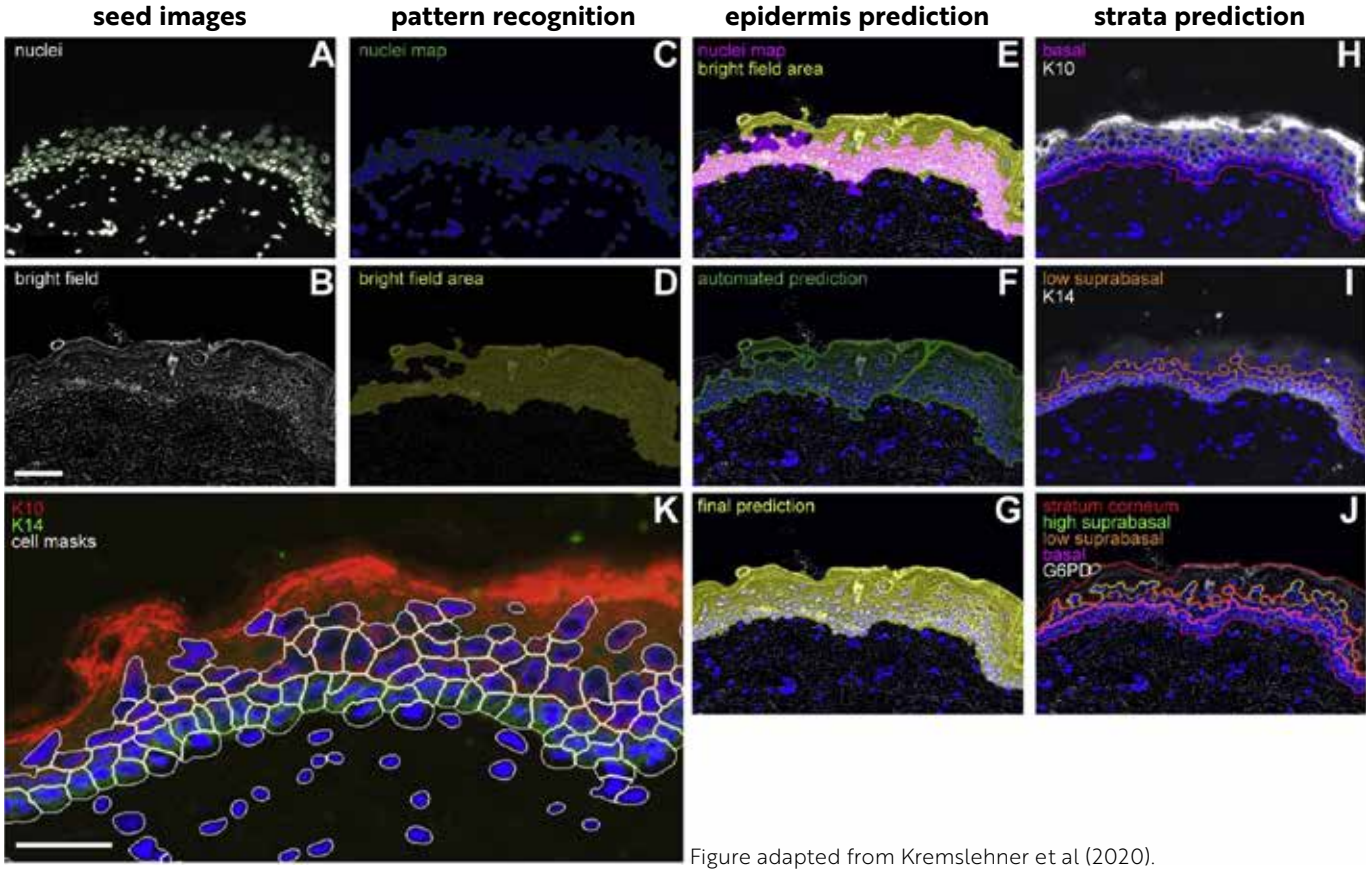


Figure adapted from Kremslehner et al (2020).

Kremslehner C, Miller A, Nica R, Nagelreiter IM, Narzt MS, Golabi B, Vorstandlechner V, Mildner M, Lachner J, Tschachler E, Ferrara F, Klavins K, Schosserer M, Grillari J, Haschemi A, Gruber F. Imaging of metabolic activity adaptations to UV stress, drugs and differentiation at cellular resolution in skin and skin equivalents - Implications for oxidative UV damage. Redox Biol. 2020 Oct;37:101583. doi: 10.1016/j.redox.2020.101583. Epub 2020 Jul 19. PMID: 32713735; PMCID: PMC7767734.

SPATIAL IMMUNOPHENOTYPING IN COLORECTAL CANCER

A study conducted by the group of Prof. Melanie McCoy from the University of Western Australia, published in the journal Cancer Science, explores spatial relationships and the prognostic impact of PD-L1+ dendritic cells and CD8+ T cells on survival of colon cancer patients. The contextual image analysis solution StrataQuest was used for the biomarker assessment.

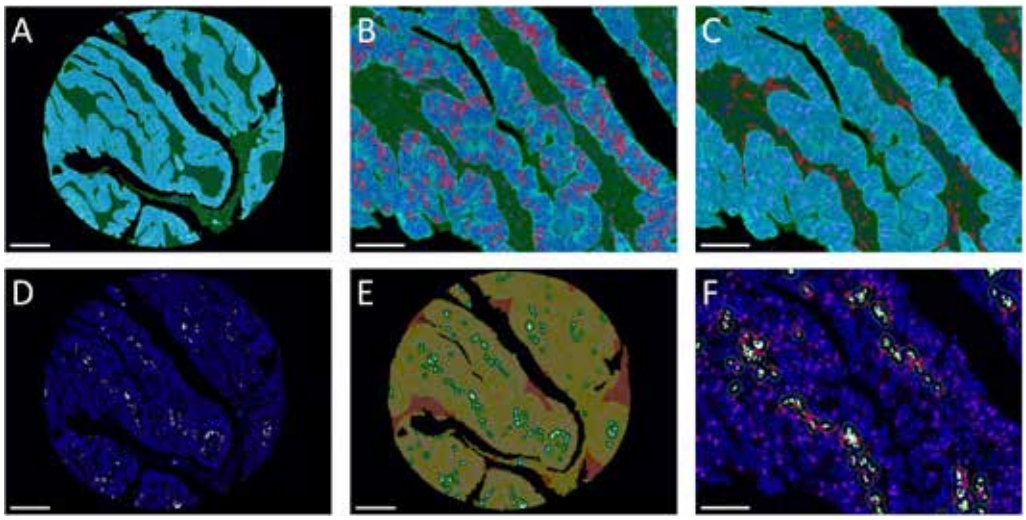


Figure adapted from Miller et al (2020).

Miller TJ, Anyaegbu CC, Lee-Pullen TF, Spalding LJ, Platell CF, McCoy MJ. PD-L1+ dendritic cells in the tumor microenvironment correlate with good prognosis and CD8+ T cell infiltration in colon cancer. Cancer Sci. 2021 Mar;112(3):1173-1183. doi: 10.1111/cas.14781. Epub 2021 Jan 21. PMID: 33345422; PMCID: PMC7935795.

IN SITU IMMUNOPHENOTYPING IN FOREIGN BODY REACTION

A recent study published in the Journal Hernia of the group of Prof. Uwe Klinge, University of Aachen, Germany, addresses the characterization of the adaptive and innate immune cells involved in foreign human body reaction. High content immunophenotyping as well as proximity measurements were conducted by TGs tissue cytometry solutions.

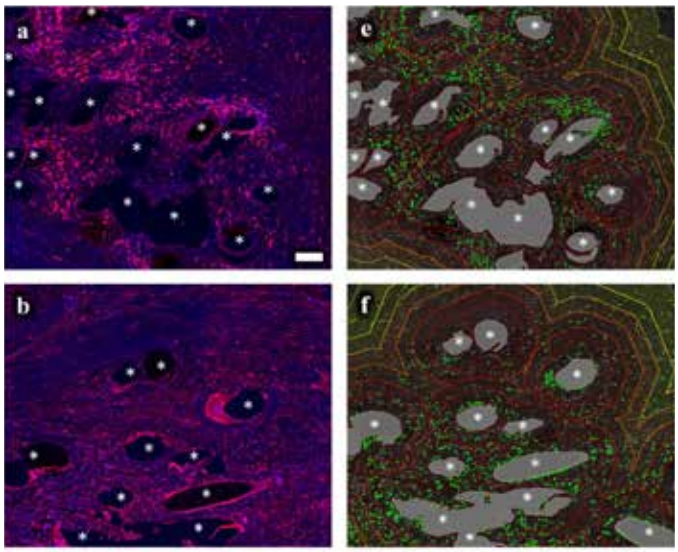


Figure adapted from Dievernich et al (2021).

Dievernich A, Achenbach P, Davies L, Klinge U. Characterization of innate and adaptive immune cells involved in the foreign body reaction to polypropylene meshes in the human abdomen. Hernia. 2021 Mar 31. doi: 10.1007/s10029-021-02396-7. Epub ahead of print. PMID: 33788008.

TG USER EXPERIENCES

DISSECTING THE COMPLEXITY

»I am working with the TissueFAXS system for almost 13 years. Then and now, pioneering in Austria and worldwide, the unique digital image technology with the analysis software packages from TissueGnostics enabled my research group to dissect the multilayer complexity of immune cells in cancer.«

(Associate Professor, Dr., Dipl.-Ing. Diana Mechtcheriakova, Medical University of Vienna)

THE BEST STATE OF ART

»I have been working with the TissueFAXS Cytometer and the analysis software from TissueGnostics for more than 10 years. My focus was to determine markers in the tissue, not only to determine the protein expression profile of the marker but also the subcellular location within the tissue. Looking into other systems, the TissueGnostics systems still provide in my opinion the best state of art and a unique analysis platform. I´m a strong TissueGnostics supporter and will continue the investigation of protein expression with the TissueFAXS analysis system in cancer tissue. «

(Dr. Franco Fortunato, University of Heidelberg)

ULTIMATE TMA MODULE

»HistoQuest is the ideal tool for TMA-Analysis. Superior data management and intuitive user interface, for exact and quantitative analysis of every single core.«

(Professor Dr. Lukas Kenner, Ludwig Boltzmann Institute for Cancer Research, Vienna, Austria)

MEET US GLOBALLY

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