

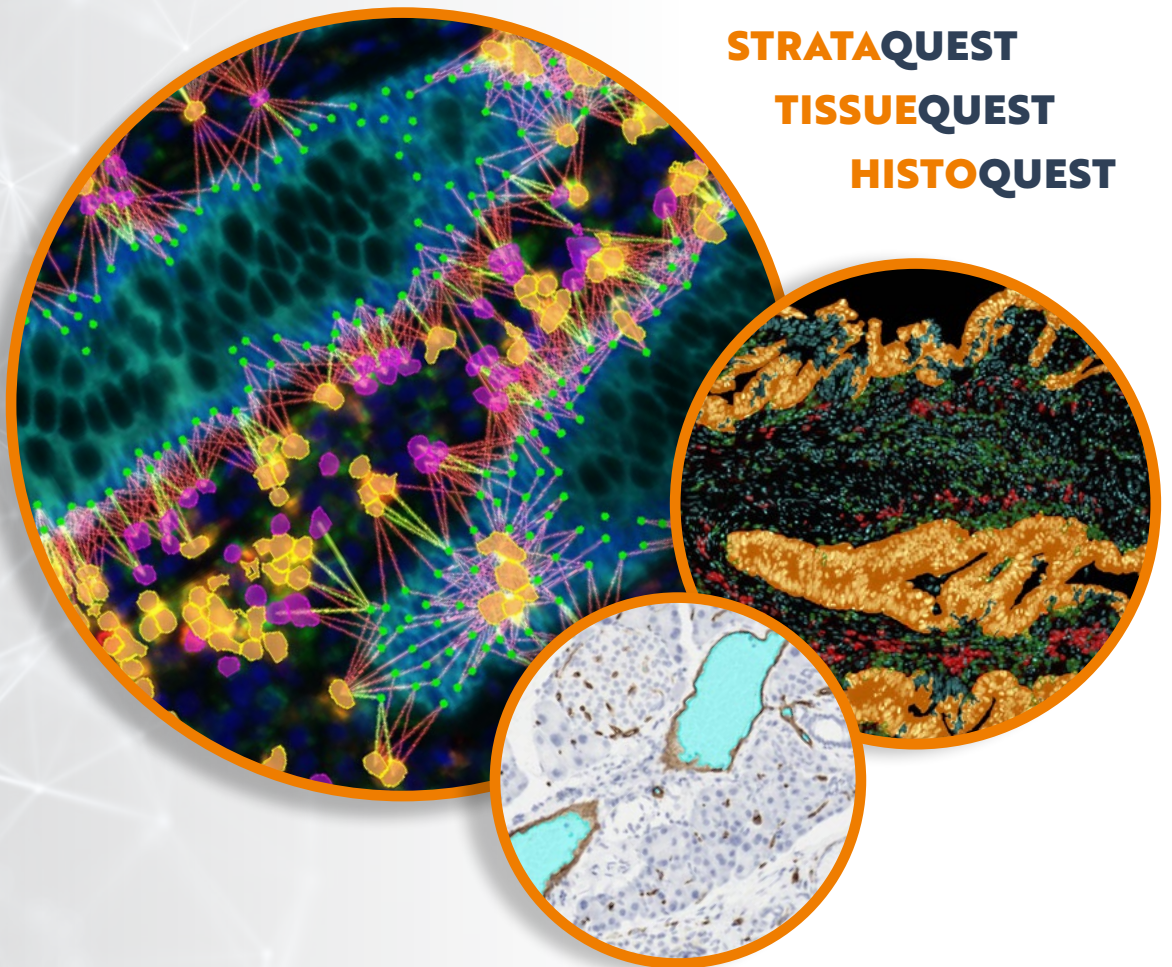
TISSUEGNOSTICS

PRECISION THAT INSPIRES



8TH GENERATION OF
IMAGE ANALYSIS SOLUTIONS

STRATAQUEST
TISSUEQUEST
HISTOQUEST



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 IMAGE ANALYSIS

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

05 QUANTITATIVE ANALYSIS

Exact measurement of custom parameters attributed to cells and markers

06 RESULT VALIDATION

Adjust your analysis and explore your sample!

07 EXPORT RESULTS

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

SUPPORTED FILE FORMATS

CUSTOMER PUBLICATIONS

TG USER EXPERIENCES

www.tissuegnostics.com

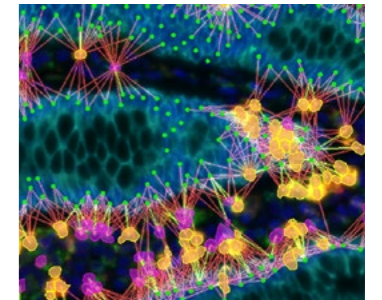
»SPATIAL ANALYSIS: QUANTIFY CELL POPULATIONS AND MULTICELLULAR STRUCTURES IN THEIR NATIVE TISSUE ENVIRONMENT.«

TISSUEGNOSTICS –
A PRECISION MEDICINE
COMPANY

01

NEW VERSION: IMAGE ANALYSIS SUITE 8

TissueGnostics is proud to announce the release of StrataQuest, TissueQuest and HistoQuest version 8. The 8th generation is characterized by an improved graphical user interface, more intuitive workflow, powerful AI modules as well as new data mining tools.



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PRECISION AND REPRODUCIBILITY WITH EASE

The 8th generation of the image analysis suite focuses on making high-end contextual image analysis accessible to everyone through **machine- and deep-learning modules** with minimal user input.

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Save customized analysis pipelines as **analysis template** or package into simplified user interfaces called **StrataQuest Apps**.

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Use streamlined analysis engines such as proximity measurements, phenotype interactions, spectral unmixing, and tissue detection.

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Reduce time spent on analysis with proven proprietary algorithms for **nuclear segmentation and detection** of nuclear, membrane and cytoplasmic markers.

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Visualize and verify your data by gating subpopulations in **(3D) scattergrams and histograms**.

Present your high-dimensional data with **t-SNE, UMAP, SONG** and **Violin plots**

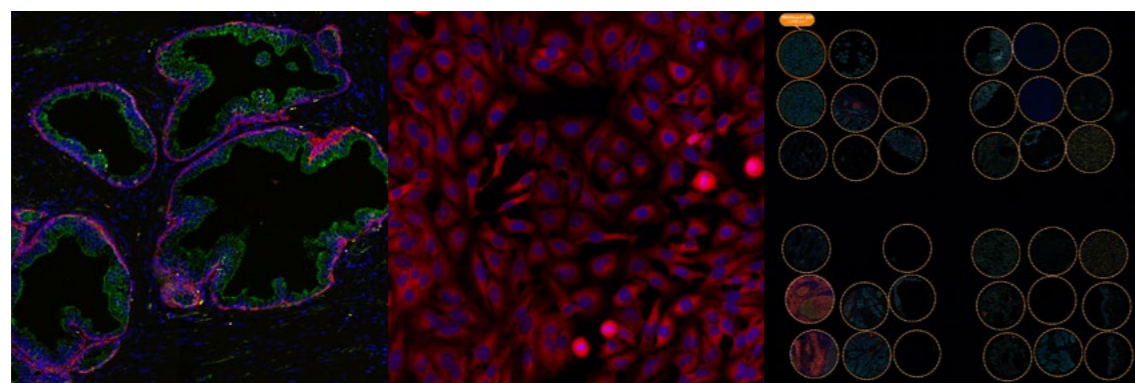
Backward gating and Forward-connection between detected objects in the image and data in the graphs simplifies identification of subpopulations and unique understanding of the acquired data.

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01 DIGITAL SAMPLE

Start your workflow by importing fluorescence and brightfield scans of tissue sections, TMAs, and cell cultures from a range of popular scanning platforms. This integration makes it easy to move from scanning to analysis without delay.

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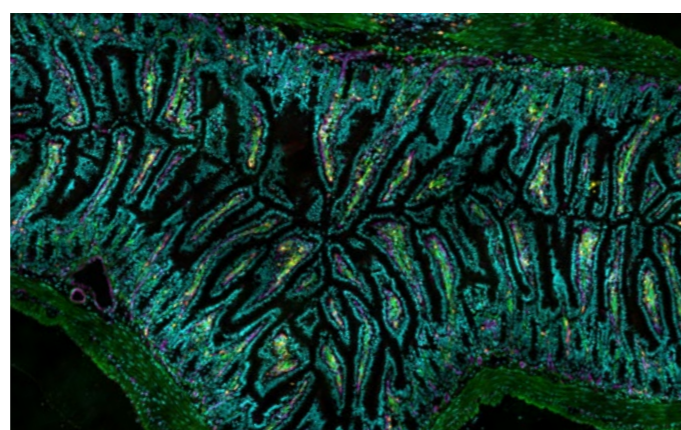
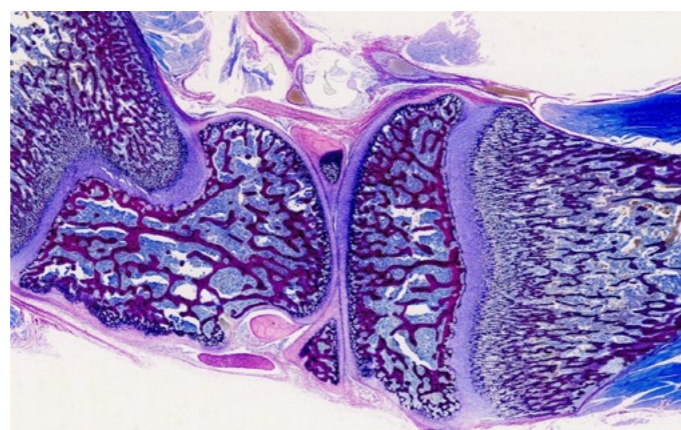
USE OUR PREMADE IMAGE ANALYSIS WORKFLOWS FOR ALL KINDS OF STAINING/IMAGING METHODS

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- Immunofluorescence
- FISH/CISH
- RNAScope
- DAB
- AEC
- HistoGreen
- Discovery Purple
- H&E
- Trichrome Staining
- Silver Staining
- Safranin O Staining
- Goldner Staining
- Von Kossa Staining
- Nissl Stain
- Multiplexing
- Imaging Mass Cytometry
- Stain-Free Imaging
- ...



Need Additional Methods? Just Let Us Know!

No matter how you image your samples, our software is ready to analyze them.

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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.

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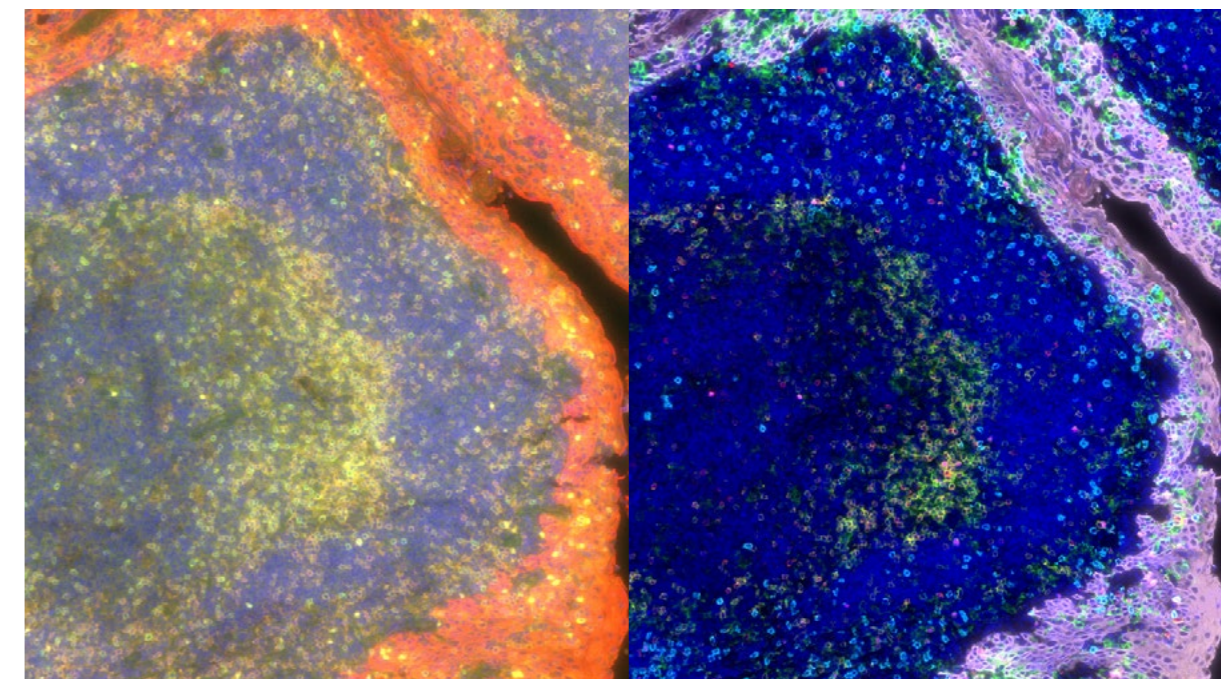
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BEFORE SPECTRAL UNMIXING

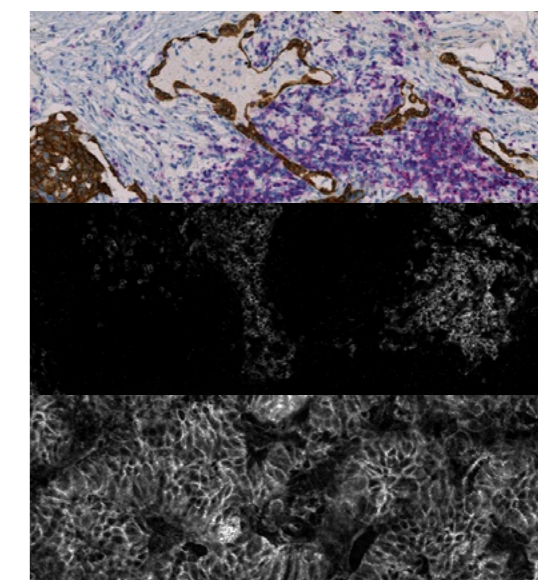
AFTER SPECTRAL UNMIXING



tonsil stained for 7 markers

COLOR SEPARATION

Our color separation engine uses spectral unmixing of RGB color information in brightfield images to colorimetrically separate image components into individual channels for each identified marker. The separation of mixtures of up to four blended chromogens or markers are supported.



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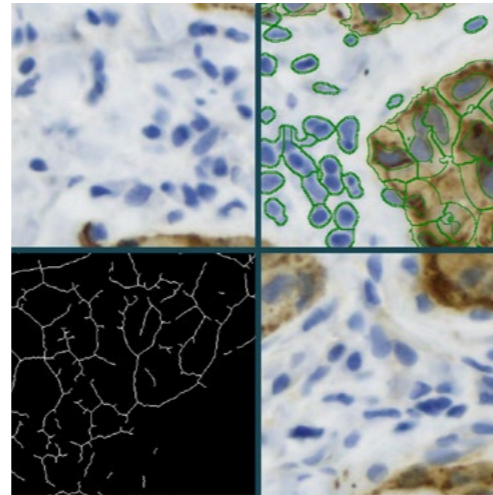
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03 SEGMENTATION ALGORITHMS

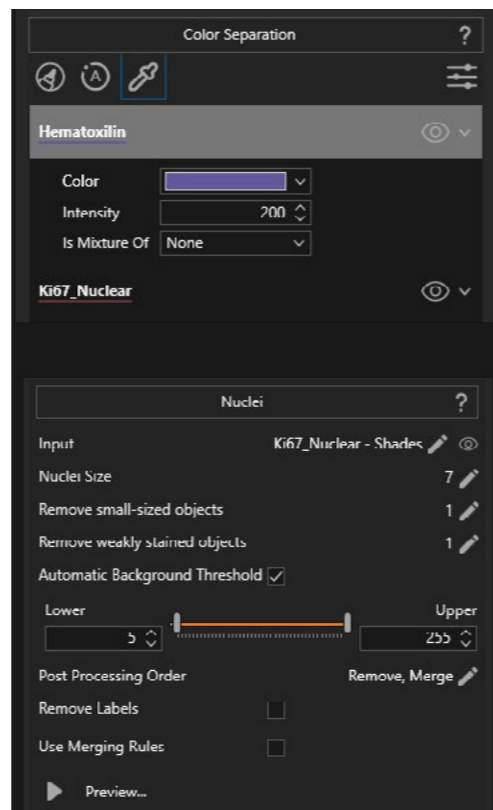
Choose from multiple algorithms for automated segmentation for highly flexible data analysis.

- **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** – Identify areas for simple measurements or contextual analysis
- **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.



MARKER PROFILES AND APPS

TG's analysis software includes dedicated marker management functionality to save colorimetric (brightfield) marker definition as well as parameters for detection and analysis masks. It also includes the possibility to save developed analysis pipelines as profiles/Apps for re-use, repeatability and precision.



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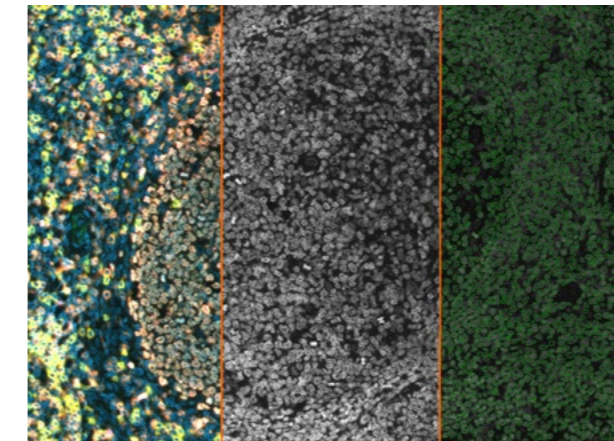
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04 AI-POWERED IMAGE ANALYSIS

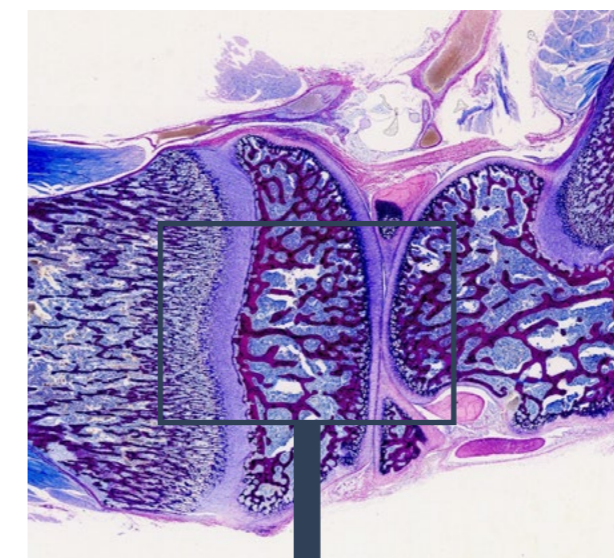
Use a combination of integrated AI features for a precise detection of morphological entities and increased accuracy for nuclear segmentation even in tissues comprising a high cellular density.



Deep learning based nuclear segmentation

– the Deep Neural Network (DNN) effectively segments nuclei, even in challenging tissue samples with dense cellular environments, non-homogenous chromatin distribution, and weak DAPI signals.

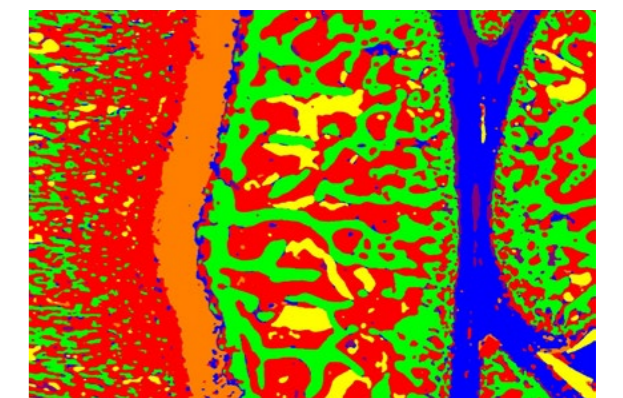
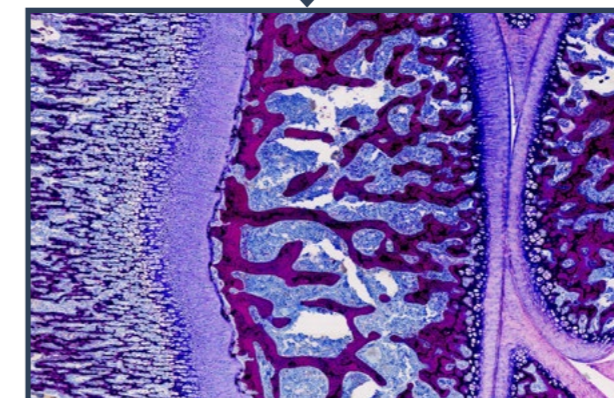
DNN applied on a lymphatic tissue



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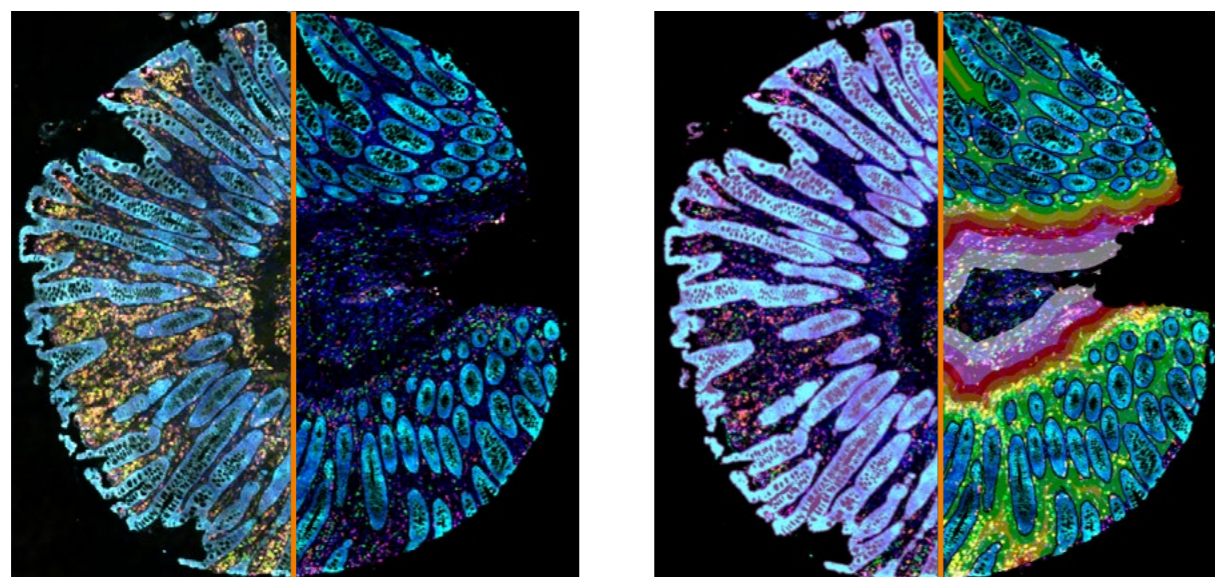
Add more depth to your research with StrataQuest engines in which specific tasks are simplified into automated modules providing a more insightful and comprehensive analysis

02

- **proximity measurements** – discover spatial relationships between metastructures and specific cell populations
- **spatial phenotyping** – explore spatial relationships between cellular subpopulations and/or tissue substructures
- **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

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Multispectral image

Spectral unmixing

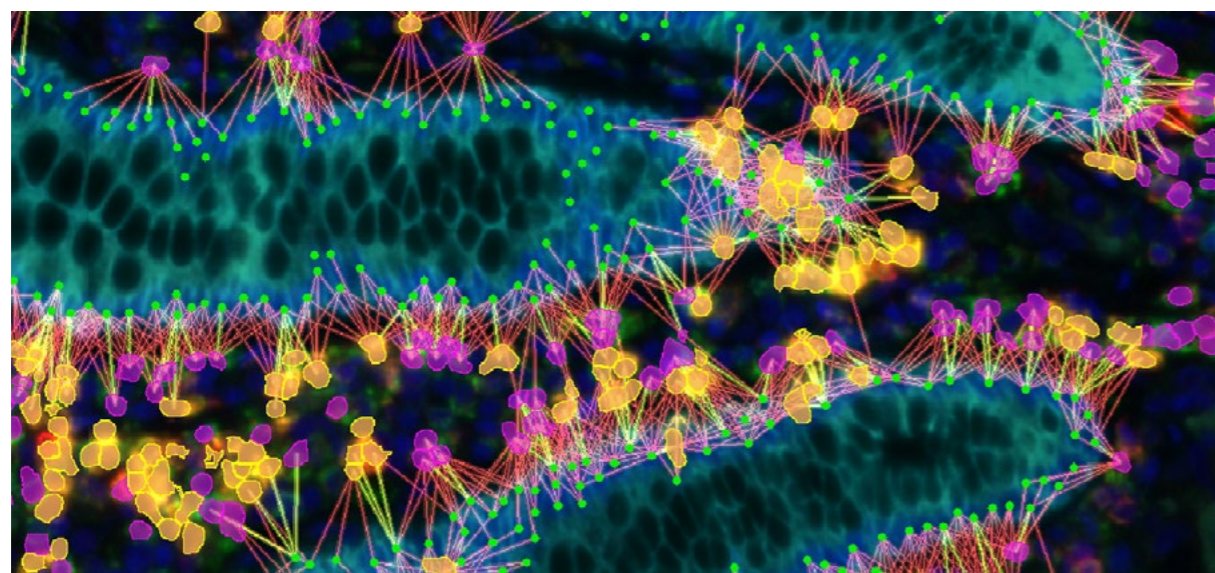
Epithelial detection

Proximity measurement

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Spatial relationships

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05 QUANTITATIVE ANALYSIS

TG's analysis solutions automate the measurement of multiple parameters across individual cells, regions of interest (ROIs), groups of ROIs, and entire samples, even across multiple slides. Easily apply ready-to-use analysis protocols for fast, straightforward reporting.

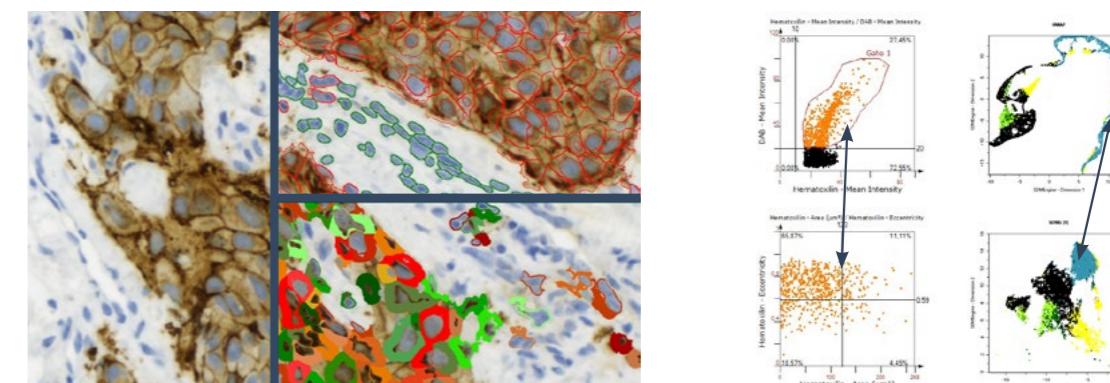
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Measure up to 18 metrics per marker for each detected object, with flexible options to adapt analyses to evolving needs. TG's software enables clear, precise analysis of cell populations in the millions, delivering high-quality insights every time.

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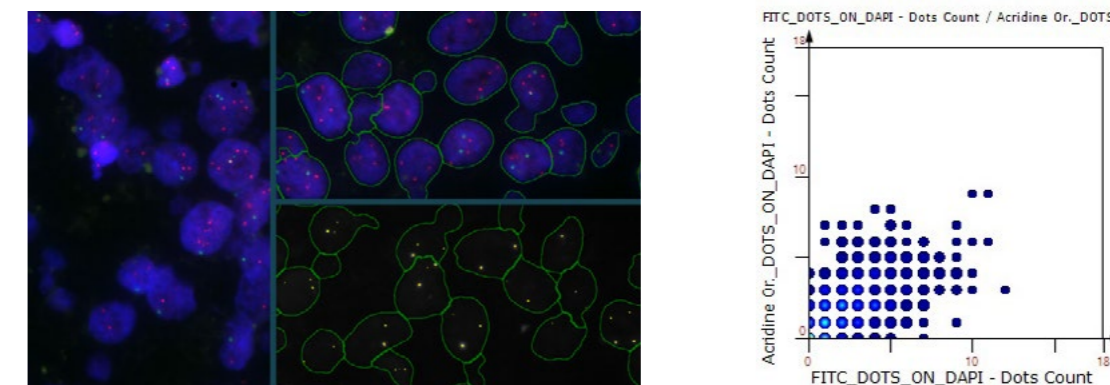
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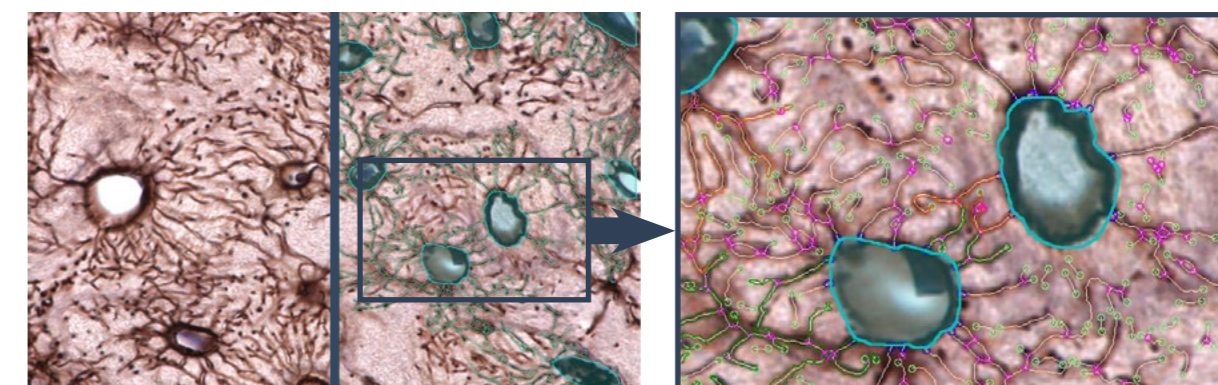
Spatial phenotyping in a mouse small intestine sample including dimensionality reduction plots

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Dot detection in cultured FISH-processed cells including dot count scattergram



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

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06 VALIDATE RESULTS AND ADJUST ANALYSIS

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

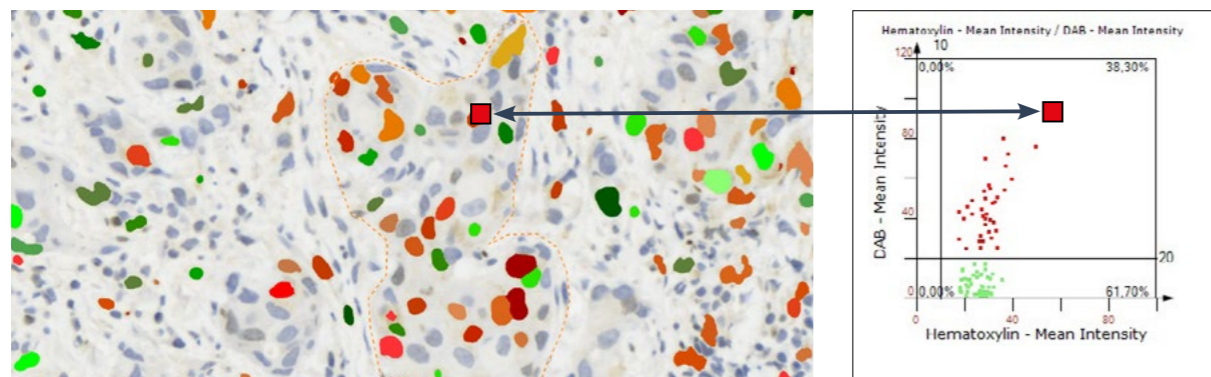
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BACKWARD AND FORWARD CONNECTION

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.

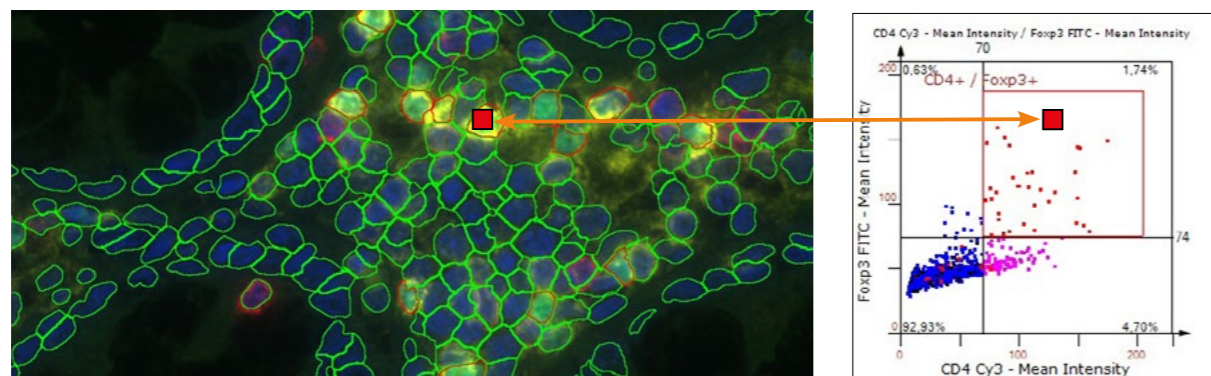
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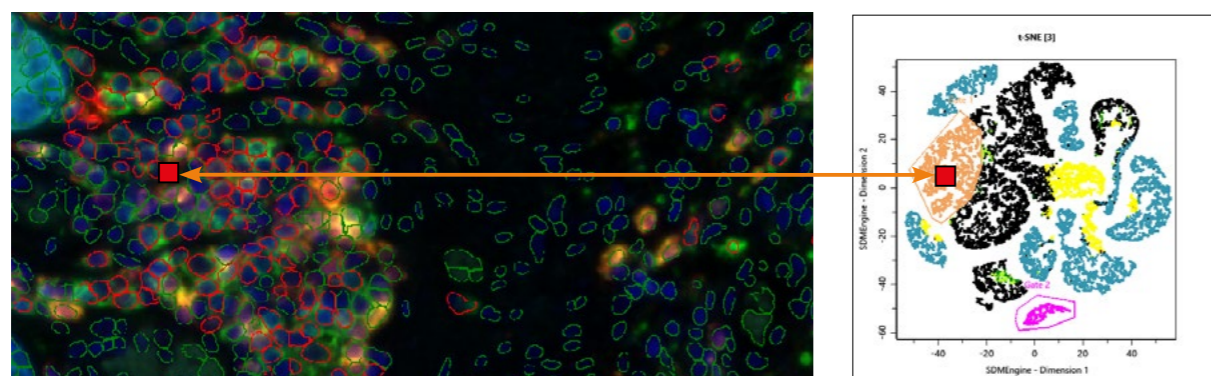


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IMAGE COMPARE SETS

Easily display and review multiple virtual slides side by side for direct comparison. Align consecutive tissue sections stained with different markers using the registration algorithm to examine the same histological structure across multiple samples for consistent analysis.

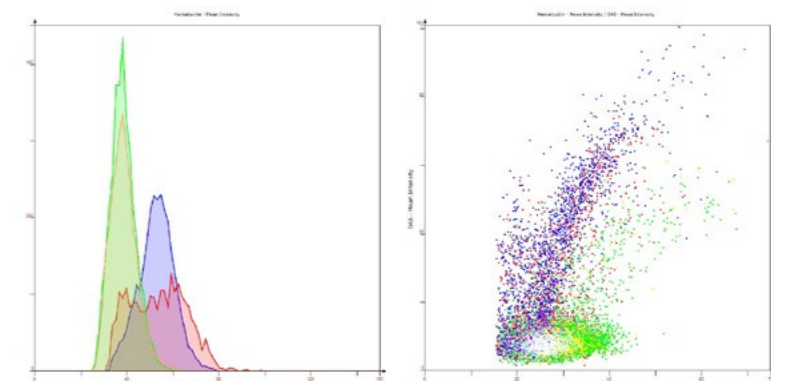


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DATA COMPARE SETS / OVERLAY DIAGRAMS

Easily compare datasets with side-by-side or overlay views, allowing you to examine multiple diagrams within a project. Making it easy to track changes across samples or experimental conditions.



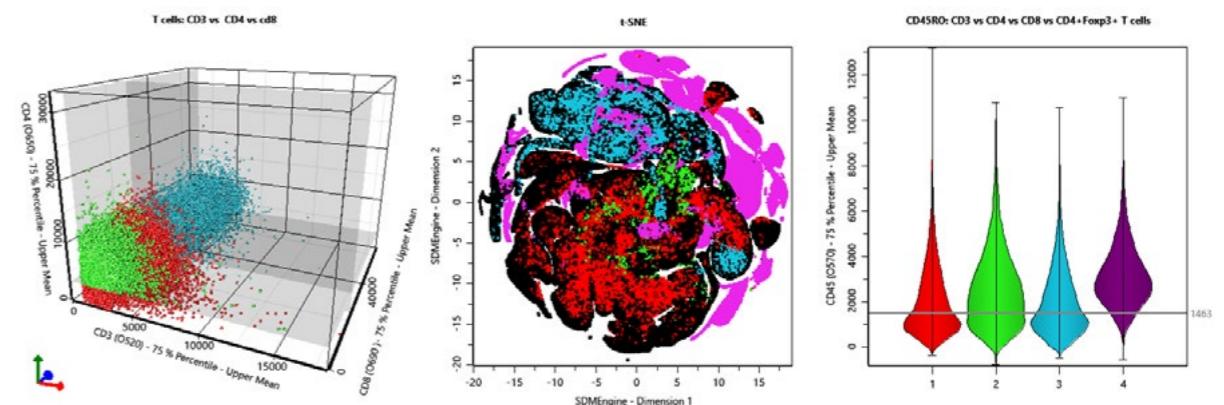
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DATA MINING TOOLS

Access a suite of data mining diagrams to elevate your interpretation of complex datasets. Apply dimensionality reduction techniques like t-SNE, UMAP, and SONG to reveal hidden relationships between cell phenotypes by mapping similarities in staining intensity, cell size, and other features in an intuitive 2D space. Use 3D diagrams to explore the distribution of three phenotypes along x, y, and z axes, and illustrate distribution patterns with Violin plots to compare marker expression across multiple cellular phenotypes simultaneously.



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

01

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.

TG's analysis solutions offer you the possibility to get the maximum of information from your stained tissue sections, cell cultures and TMAs.

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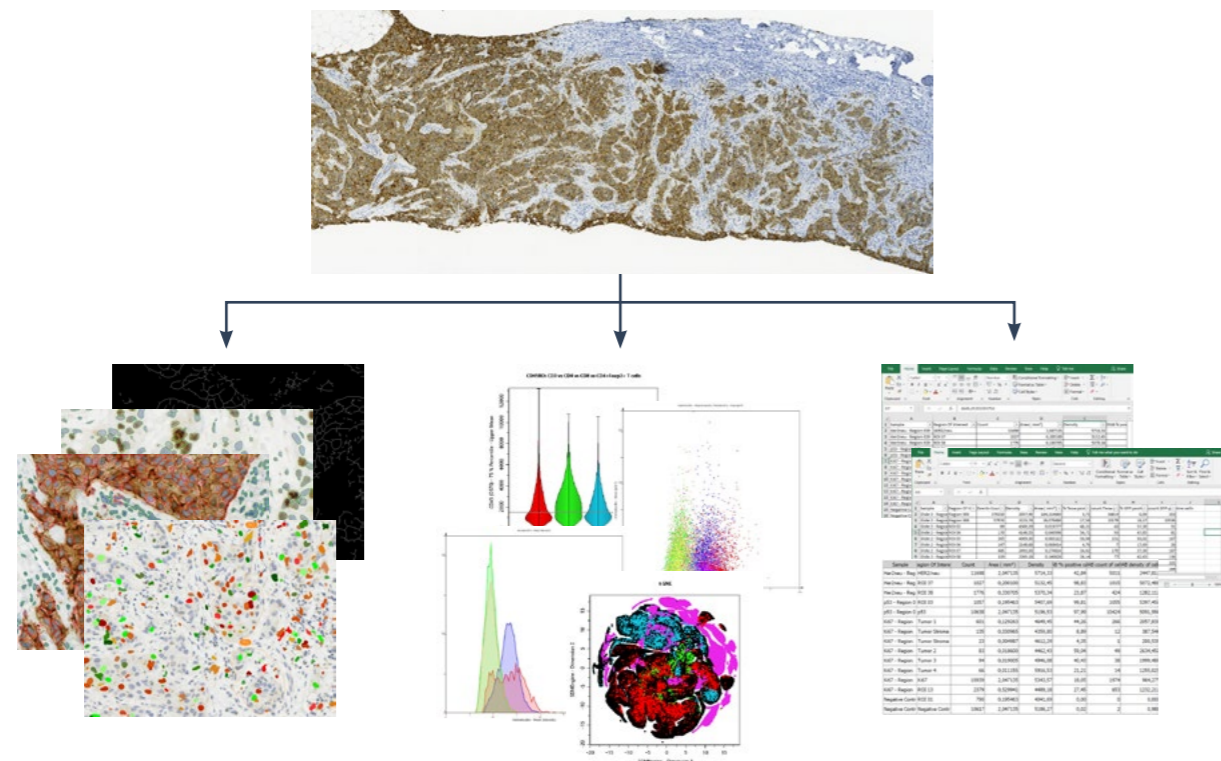
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SUPPORTED FILE FORMATS

StrataQuest, TissueQuest and HistoQuest support the following file formats:

- TissueFAXS (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 Panoramic
- Mirax (mrxs)
- Olympus (vsi)
- More slide scanners to be added



CUSTOMER PUBLICATIONS

TissueGnostics systems produce valuable research on six continents, with over 3,000 publications and growing. Explore our searchable online database of publications and discover how our solutions can support your research too!

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METABOLIC IMAGING IN SKIN

Prof. Florian Gruber and Christopher Kremsehner, 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.

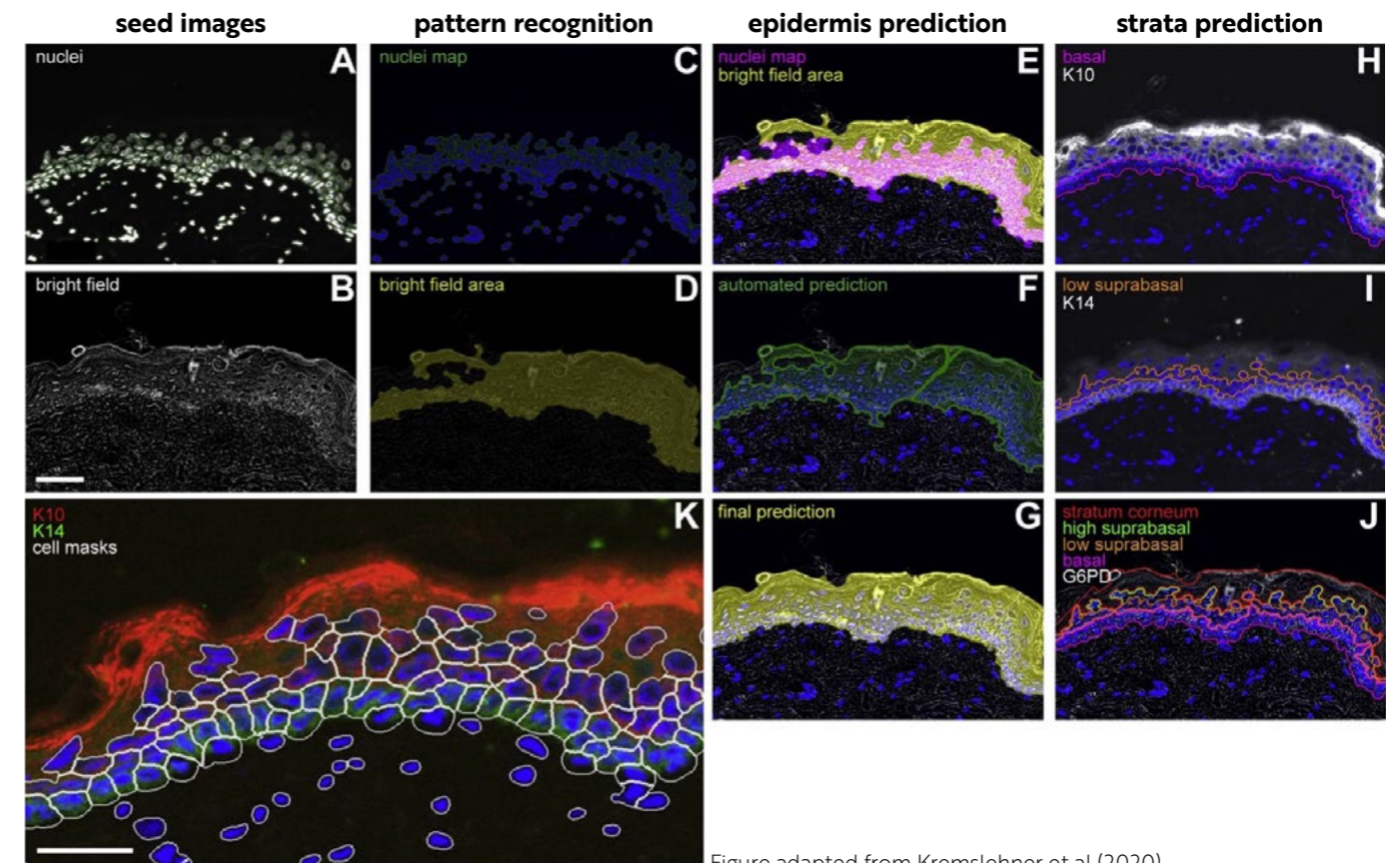


Figure adapted from Kremsehner et al (2020).

Kremsehner C, Miller A, Nica R, Nagelreiter IM, Narzt MS, Golabi B, Vorstandlechener 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.

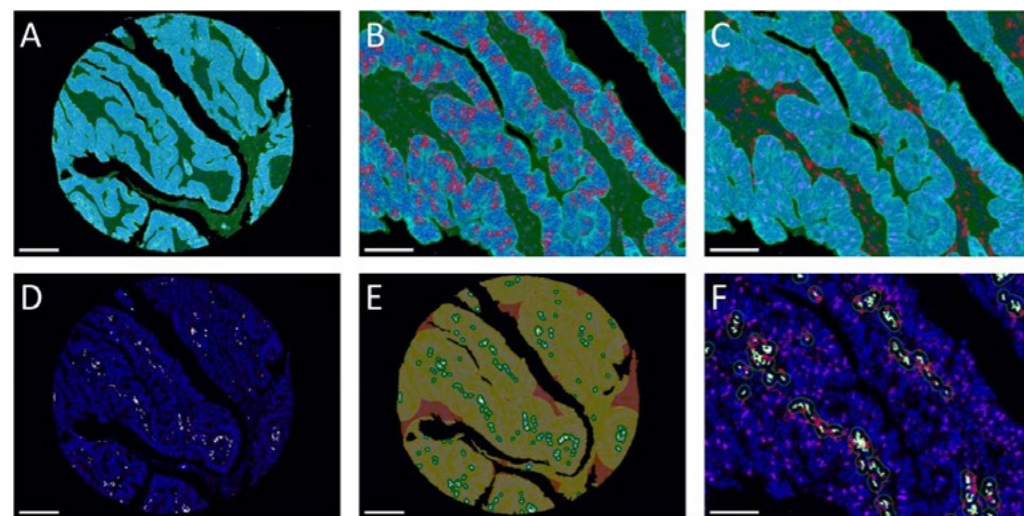


Figure adapted from Miller et al (2020).

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.

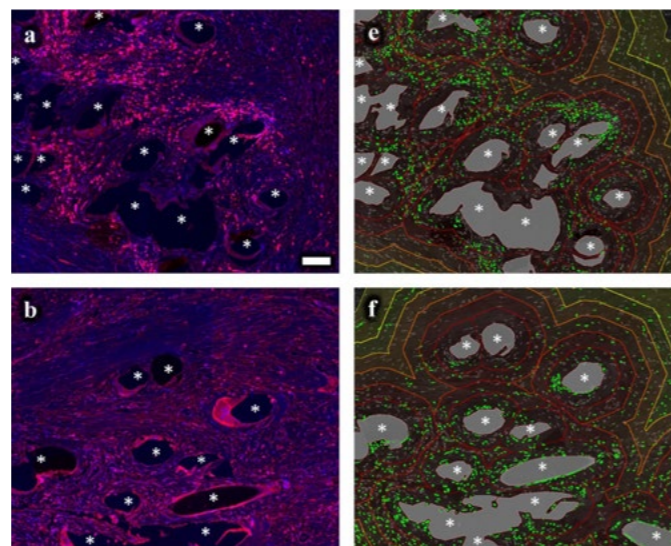


Figure adapted from Dievernich et al (2021).

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)



CUSTOMIZED MULTIPLEX IMAGING ANALYSIS

»With advanced tools like single-cell RNAseq, we can precisely characterize immune cell properties. The challenge now is detecting cells with specific expression profiles within tissue, and multiplex imaging enables this visualization. In my experience, StrataQuest ranks among the top imaging software packages in the market. With this software and the customized support, tailored algorithms can be developed, enabling an evaluation of the imaging data generated with most of the current imaging platforms.«

(Professor Dr. Uwe Ritter, LIT - Leibniz Institute for Immunotherapy)



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



REFERENCE PUBLICATIONS

TissueGnostics systems produce valuable research on six continents, with over 3,000 publications and growing. Explore our searchable online database of publications and discover how our solutions can support your research too!

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