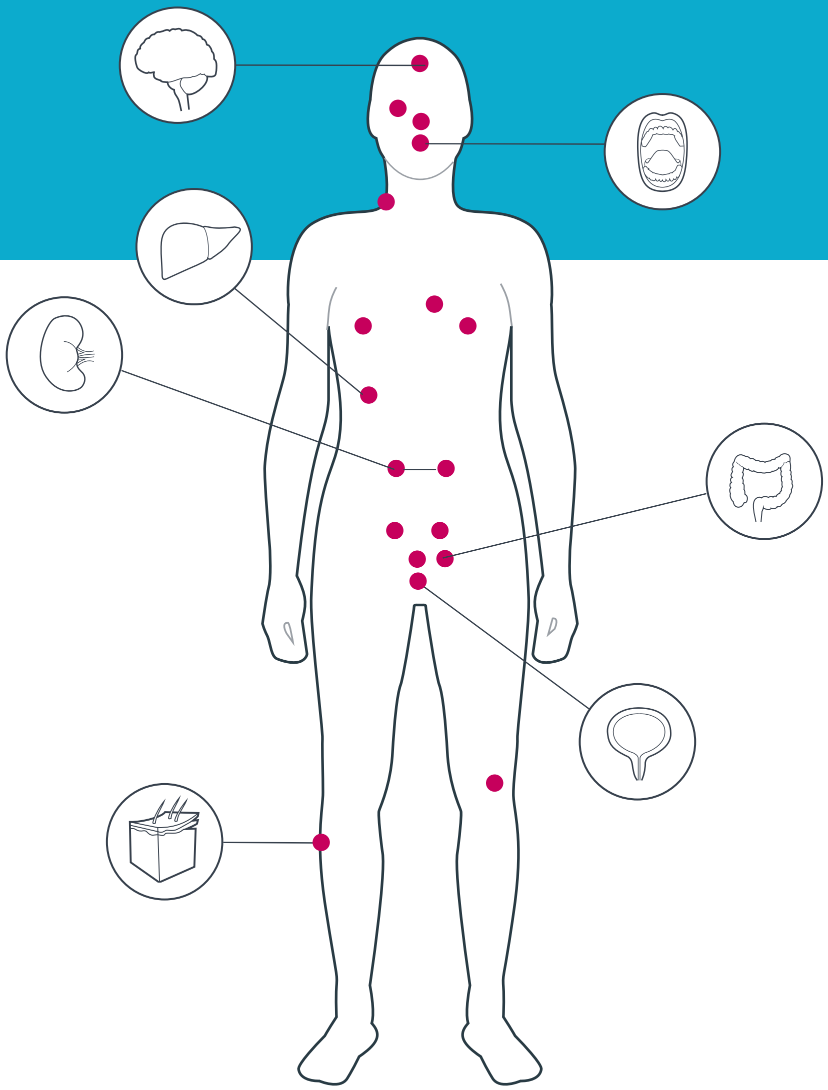
DISCOVERY

Translate your expertise into novel discoveries with AI-powered image analysis

VISIOPHARM®

What's your greatest discovery?

We enable scientists to conduct tailored research with flexible image analysis software



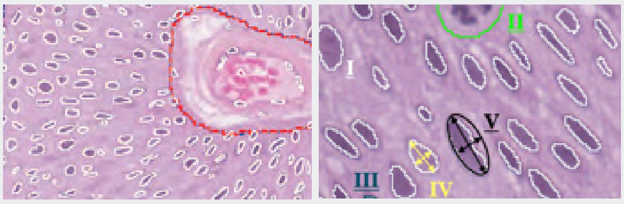
Selected customer stories and applications:

Bladder cancer

AI-assisted patient grading

Bladder cancer expert **David Berman** recognized that the human eye alone was not reliable for all aspects of his research. Currently, bladder cancer grading is performed subjectively using criteria established by the WHO in 2004. His team used Discovery to build an automated cancer grading tool based on quantitative nuclei features (QNFs). External validation of the algorithm showed that QNFs can be used to accurately identify patients with early or late recurrence.

Recommended Quickstart APP: Nuclei morphology APP



Left: Detected tumor (blue), stroma (red) and nuclei (white). **Right:** Nuclear segmentation and morphometric features analyzed; (I) area, perimeter, and form factor; (II) mitotic figure; (III) solidity and convexity; (IV) lesser and largest diameter; (V) major and minor axes, ellipticalness, and eccentricity.

Source: Slotman et. al., 2023. Quantitative Nuclei Grading: An Objective, Artificial Intelligence-Facilitated Foundation for Grading Noninvasive Papillary Urothelial Carcinoma. Laboratory Investigation.

Prof. David M. Berman
Principal Investigator and Professor
Queen's University Canada

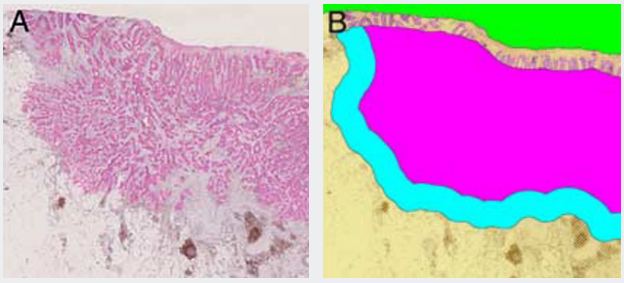
Colorectal cancer

Immuno-oncology advances through T cell infiltration

At the Zealand University Hospital in Denmark, **Dr. Anne-Marie Kanstrup Fiehn** harnessed Discovery to decode the immune landscape of colorectal cancer. Her team developed algorithms to map IHC-stained immune cells across the tumor core and invasive margin, reducing subjective interpretation and enabling high-resolution monitoring of the tumor microenvironment.

Recommended Quickstart APPs:

- Tumor segmentation
- Immune cell quantification



A: Original CRC image, B: fully automatically processed with division into tumor core (pink) and invasive margin (cyan).

Source: Fiehn et. al., 2022. Development of a Fully Automated Method to Obtain Reproducible Lymphocyte Counts in Patients With Colorectal Cancer. Published in Applied Immunohistochemistry & Molecular Morphology.

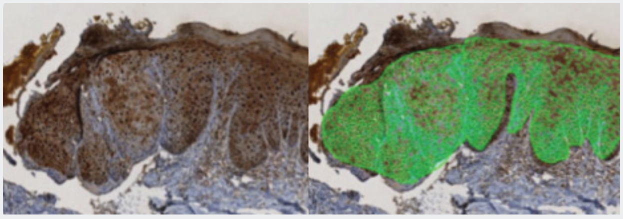
Oral cancer

Developing a digital oral cancer predictor

Proteocyte developed a quantitative biomarker-based risk score (qBRS) for oral cancer. The test, Straticyte®, is offered by Proteocyte to find pre-cancerous lesions with a high-risk of progression to oral cancer. With a sensitivity and negative predictive value of 96.2%, the APP is validated as a laboratory-developed test (LDT) by Proteocyte and already applied to assess patient's risk. The algorithm is the only one of its kind that can distinguish high-risk oral lesions probably from those with no or little risk by quantifying biomarker expression.

Recommended Quickstart APPs:

- Nuclei positivity
- Nuclei staining intensity



IHC staining of S100A7 biomarker in cases with:
Left: STRATICYTE Medium Risk **Right:** Annotated dataset.

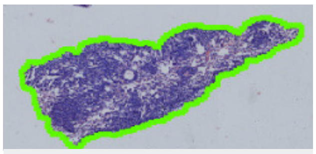
Source: Straticyte: Take charge of your health. Proteocyte.com.

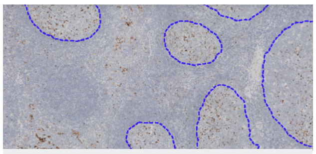
Kenneth P.H. Pritzker
M.D., BSc (Med), FRCPC
Co-Founder of Proteocyte AI

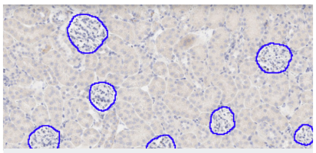
Quickstart APPs

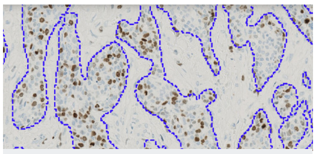
Annotate automatically with the click of a button

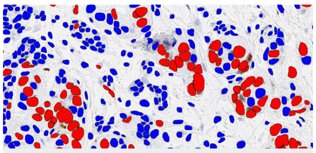
No matter what tissue you are studying, our software allows you to build customized Analysis Protocol Packages (APPs) that automate tissue image analysis, without needing to code. The Discovery platform comes with several APPs that provide a starting point for more advanced interrogation. We refer to these quickstart APPs throughout this brochure.

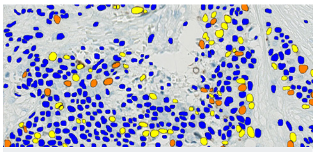

Outline tissue APP

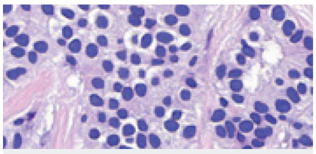

Germinal center mapping APP

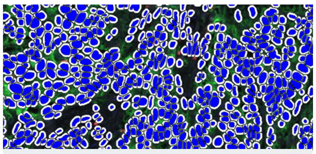

Glomeruli mapping APP

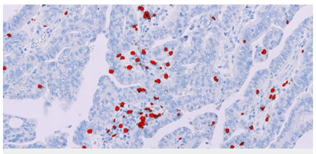

Tumor segmentation APP

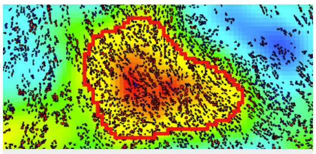

Nuclei positivity APP


Nuclei staining intensity APP


Nuclei morphology APP


Cell segmentation APP


Immune cell quantification APP


Hot Spot APP

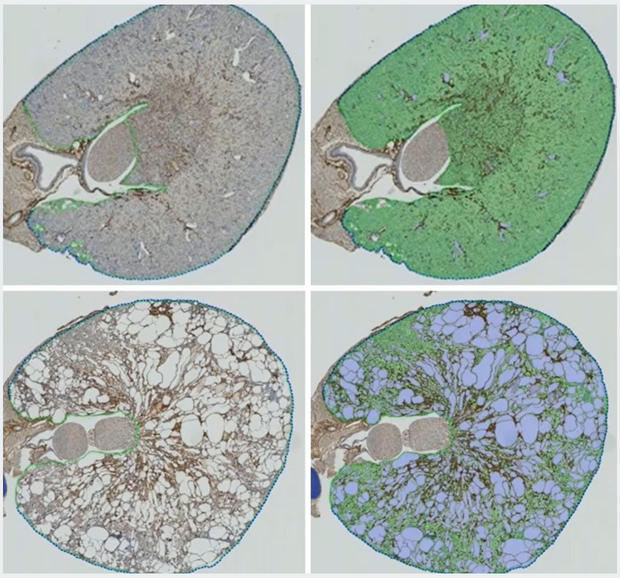
Nephrology

Counting the cysts and exploring druggable targets

Autosomal dominant polycystic kidney disease (ADPKD) is associated with mutations in the PKD1 gene, which encodes the polycystin 1 protein.

The disease results in kidney failure in most patients caused by the accumulation of fluid-filled kidney cysts. **Novalix**, a CRO, established a PKD1-inducible knockout mouse strain to study the formation of these cysts.

The challenge with analyzing kidney tissue is that its components are often intertwined. Using Discovery, they were able to segment different parts of the kidney to accurately and reproducibly quantify cysts, blood vessels, and ultimately, fibrosis. Such research opens the door to evaluating therapeutic approaches, in addition to explaining the pathophysiology of disease.


Fully automated detection of cysts (blue), fibrosis (brown) and remaining kidney tissue (green) in an intact kidney (upper row) and a kidney of an PKD1$^{flox/flox}$ mouse kidney (bottom row).


Florence Anquetil-Besnard,
Histology Project Manager
Novalix

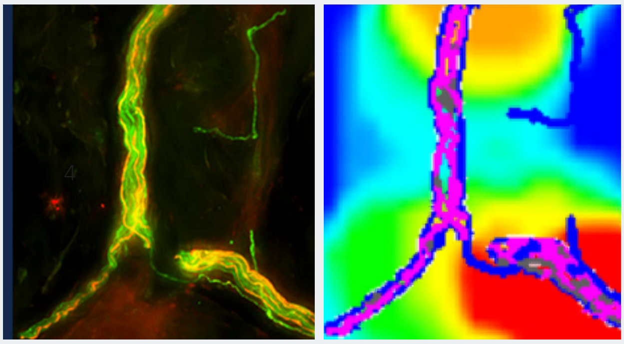
Recommended Quickstart APP: Glomeruli mapping APP

Neuroscience

Turning biomarker research into risk identification

Synucleinopathies like Parkinson's disease, dementia with Lewy bodies, and some other rare neurodegenerative diseases are characterized by elevated levels of phosphorylated alpha-synuclein (P-SYN) in cutaneous nerves. **CND Life Sciences** partnered with Visiopharm to develop an objective way to measure P-SYN objective quantitation protocol.

This is what led to NerValence, an algorithm developed on the Discovery platform to detect and quantify P-SYN deposition years before symptoms arise, and used exclusively at CND Life Science's CLIA-certified laboratories, creating novel capabilities for clinical trials.



Left: Nerve bundle (green) dual IHC with protein gene product 9.5 (PGP9.5) and intra-axonal P-SYN (red).
Right: Heatmap display of cutaneous nerve fiber exhibiting elevated deposition of P-SYN with brighter colors indicating larger deposits.

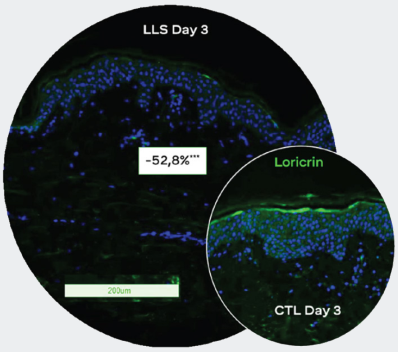
Source: Optimizing clinical trials for biopharma companies. CND Life Sciences. www.cndlifesciences.com/biopharma

Dermatology

Reliable evaluation of skin product efficacy

Using Discovery, **Chanel**, a luxury fashion house, was able to quantify the efficacy of a newly developed skin-care product. This product is intended to exfoliate the skin, which results in a reduction of the proteins corneodesmosin, loricin, and kallikrein 7.

They should decrease with an effective product, but take different amounts of time to do so. Chanel was able to measure these changes in an animal-free skin model and visualize them, strengthening claims surrounding efficacy of the product.



Big circle: tissue treated by the product showed a 52.8% decrease in loricin after 2 days of treatment (LLS) compared to the control (CTL, small circle); Poster on our website.

Source: Richard et. al., 2024. Long-term skin tissue maintenance for the benefit of product efficiency. Presented at Skin Aging and Wellness, 2024. Poster available on Visiopharm website.

> With Visiopharm, the process is intuitive: start with an image, add annotations, ... proceed to train and validate. But what is also really nice [are the quick start APPs] – it's like entering a magical world where you can pick an existing APP created by someone else, make minor adjustments to fit your needs, and then all of a sudden you have your own customized app ... reliable and efficient.
>
> Florence Anquetil-Besnard, Histology Project Manager at Novalix

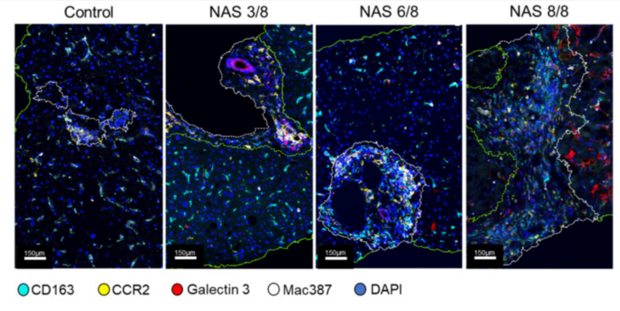
Explore our
customer stories
in more detail

Hepatology

Moving into spatial biology

Dr. Heather Stevenson-Lerner and her team used Discovery to investigate the role of macrophage diversity across fibrotic liver diseases. Her goal: to better stratify patients and guide precision medicine approaches. Dr. Stevenson-Lerner has now integrated her Discovery analysis into Phenoplex, Visiopharm's complete spatial biology workflow enabling high-plex, spatially resolved analysis.

Dr. Heather Stevenson-Lerner
Professor, Department of Pathology
University of Texas Medical Branch



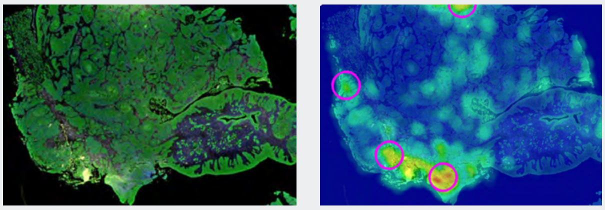
Multispectral images highlighting hepatic macrophages from patients with different liver diseases but with similar levels of fibrosis with B) tissue segmentation. This analysis was then used to phenotype macrophages using Visiopharm software.

Source: Saldarriga et. al., 2020. Multispectral imaging enables characterization of intrahepatic macrophages in patients with chronic liver disease. Hepatology Communications.

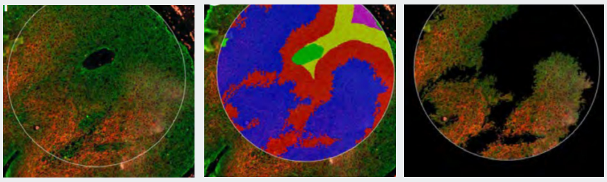
Built for the multiomic future

Automated AOI selection, NanoString, Bruker Spatial Biology

Discovery enables automated and AI-augmented selection to guide areas of illumination (AOI) expanding spatial profiling capabilities on the GeoMx DSP (Digital Spatial Profiler). AOI selection can involve distinct spatial regions, allowing for deeper profiling, while automation allows the user to select hotspots more efficiently.

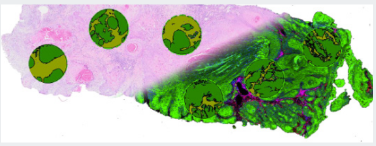


Using automated hotspot detection to select regions of interest based on biomarker expression.



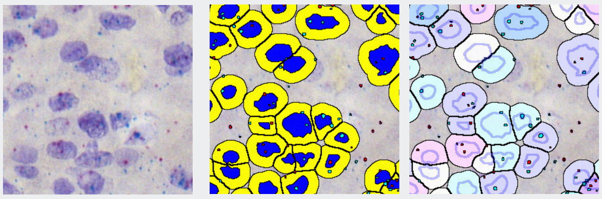
Creating AOIs from biomarker hotspots: Left: Original image with hotspot circle outlined, **Middle**: DL based segmentation of non-tumor (green) and tumor segmented in highest biomarker expression (blue) and margins around this (red, yellow, pink), **Right:** different tumor regions can be used as different AOIs to inprove spatial information.

Use Tissuealign™ to incorporate serial sections such as H&E with GeoMx DSP.



RNAScope™, ACD, a Bio-Techne brand

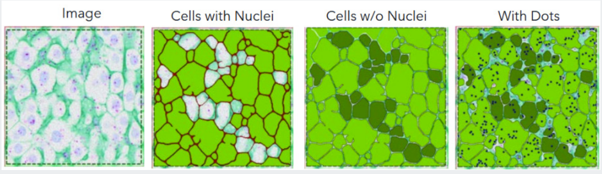
Discovery accurately assigns transcript dots to specific cells and compartments, enabling precise quantification at the single-cell level.



Dual probe ISH spots are reliaby detected and accociated with the detected nucleus or the simulated cell body.

HCR™ RNA-ISH assay, Molecular Instruments

Enhancing RNA-ISH spot detection with dual-channel staining and AI analysis. Watch the webinar featuring Molecular Instruments using Discovery on our website.



AI-optimized segmentation based on membrane stain enable accurate RNA transcript assignments to classified cells.

Source: Winkowski et. al., 2024. Enhancing cellular specificity of RNA-ISH spot detection using dual-channel staining and AI-based analysis methods. Presented at SITC 2024. Available on Visiopharm's website.

DISCOVERY

Visiopharm's Discovery platform bridges the gap between expert domain knowledge and scalable, objective analysis on human or animal tissue with AI-powered software. Researchers can use Discovery to study the biology of disease, identify druggable targets, or develop companion diagnostics. Without having to code, the platform allows users to develop customized algorithms tailored to their research. That means you are in the driver's seat and AI serves as a powerful extension—not replacement—of human knowledge to advance precision medicine.

LOAD IMAGES

- Import annotations from other platforms
- Integrates with Proscia, HaloLink, Pathcore, and others

DEFINE ANALYSIS

- Use quickstart APPs for standard tasks
- Tailor analysis and define outputs analysis and define the outputs

ANALYZE IMAGES

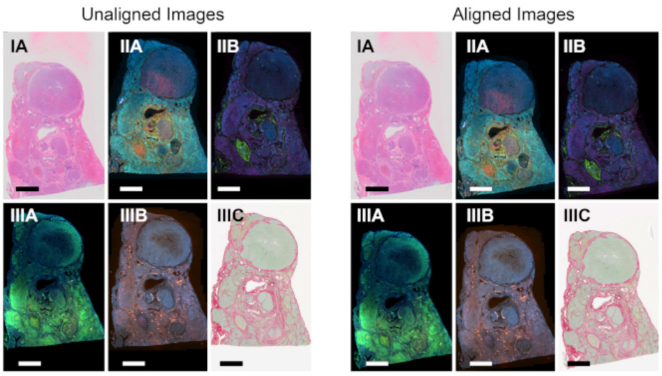
- Use batch processing for walk-away analysis
- Re-use and enrich APPs
- Adjust the degree of automation suited to your needs

EXPLORE RESULTS

- QC your results with interactive QC your results with interactive data.
- Export your data for publication and downstream analyses

Tissuealign™

Create multimodal datasets by aligning and combining images from any scanner to work with them as a single layered image. This allows communication of information, such as spatial biomarkers, between aligned images. Tissuealign™ is built on Visiopharm's clinically approved (CE-IVD) virtual double staining technology.

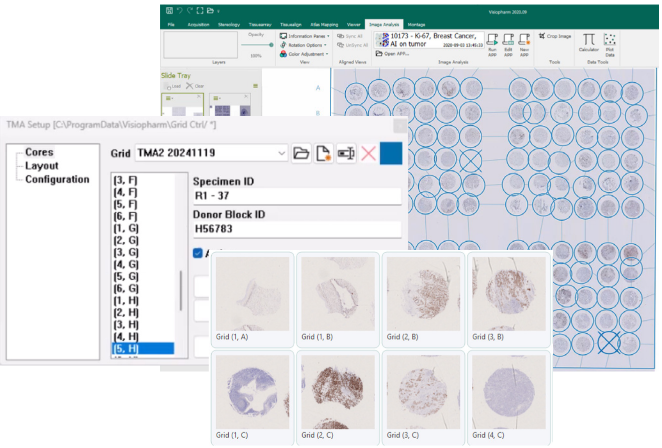


Aligning across modalities for joint analysis.

Source: Molina et. al., 2020. Visualization, Quantification, and Mapping of Immune Cell Populations in the Tumor Microenvironment. Journal of Visualized Experiments.

Tissuearray™

Streamline high-throughput tissue microarray (TMA) analysis with Tissuearray's automated workflow, designed to efficiently manage hundreds of tissue cores simultaneously. Tissuearray™ reads block designs from tissue microarrayers like ISENET Galileo, links IDs to individual TMA cores, and automatically aligns all cores within linked sections—ensuring precise organization based on block design data.

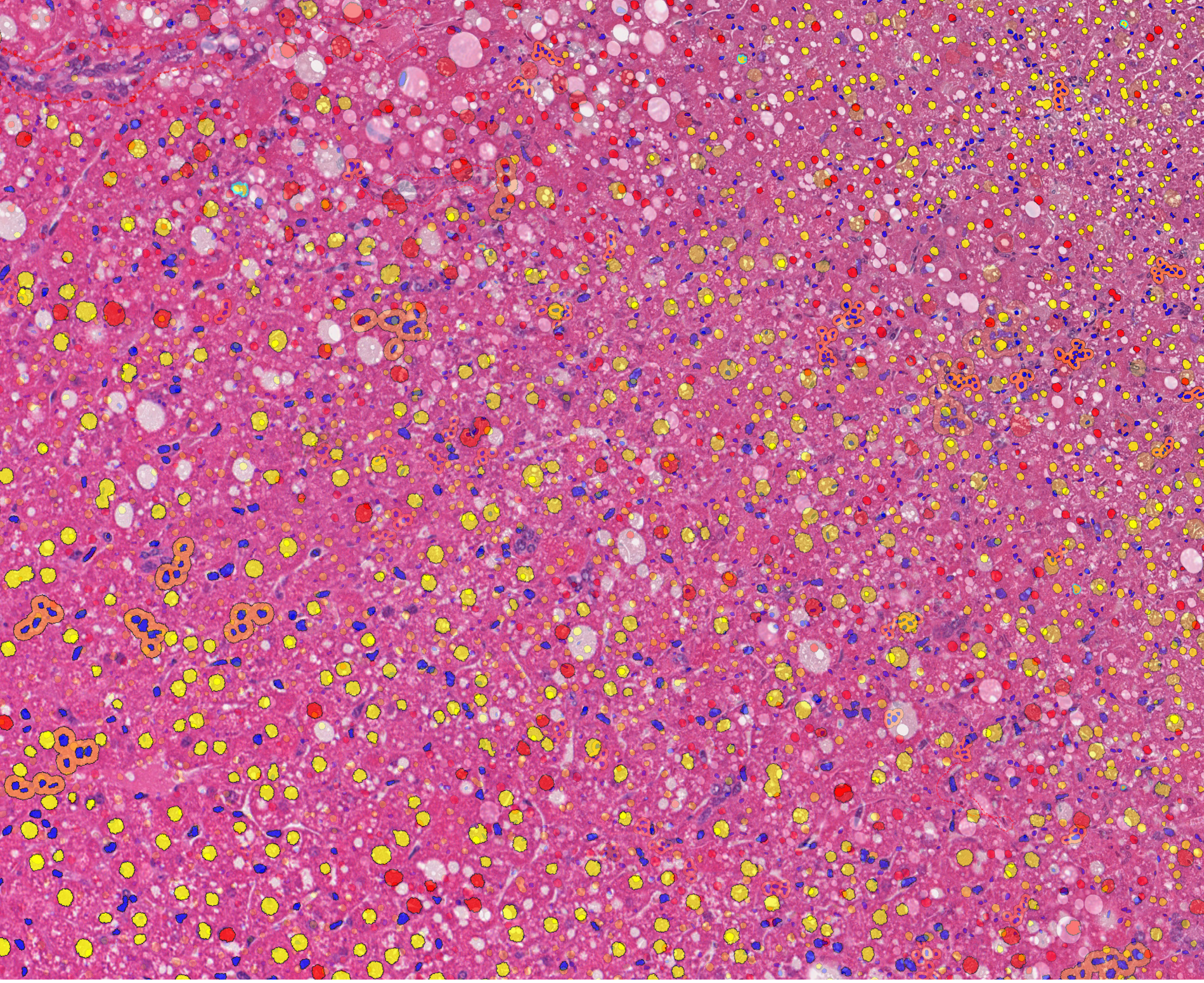

TMA Setup [C:\ProgramData\Visiopharm\Grid Ctrl/ *]

Grid: TMA2 20241119

Specimen ID: R1 - 37

Donor Block ID: H56783

Recommended Quickstart APP: Cell segmentation



Visiopharm

We are a leading provider of AI-driven precision pathology software for research and diagnostics. In research, we are a technology leader providing tools that help scientists, pathologists, and image analysis experts produce accurate data for all types of tissue-based research. In diagnostics, we are a leader within clinical applications, with no fewer than nine diagnostic algorithms cleared under IVDR for EU customers. These applications provide diagnostic decision support and can be easily activated and integrated into existing lab workflows.

Founded in 2002, we are privately owned and operate internationally with over 750 customer accounts in more than 40 countries. Our company's headquarters are located in Denmark's Medicon Valley, with legal entities in Sweden, the UK, Germany, the Netherlands, and the United States, and local representation in France and China.

VISIOPHARM®

Visiopharm A/S
Agern Allé 24
2970 Hørsholm, Denmark
visiopharm.com

Stay curious

Contact us