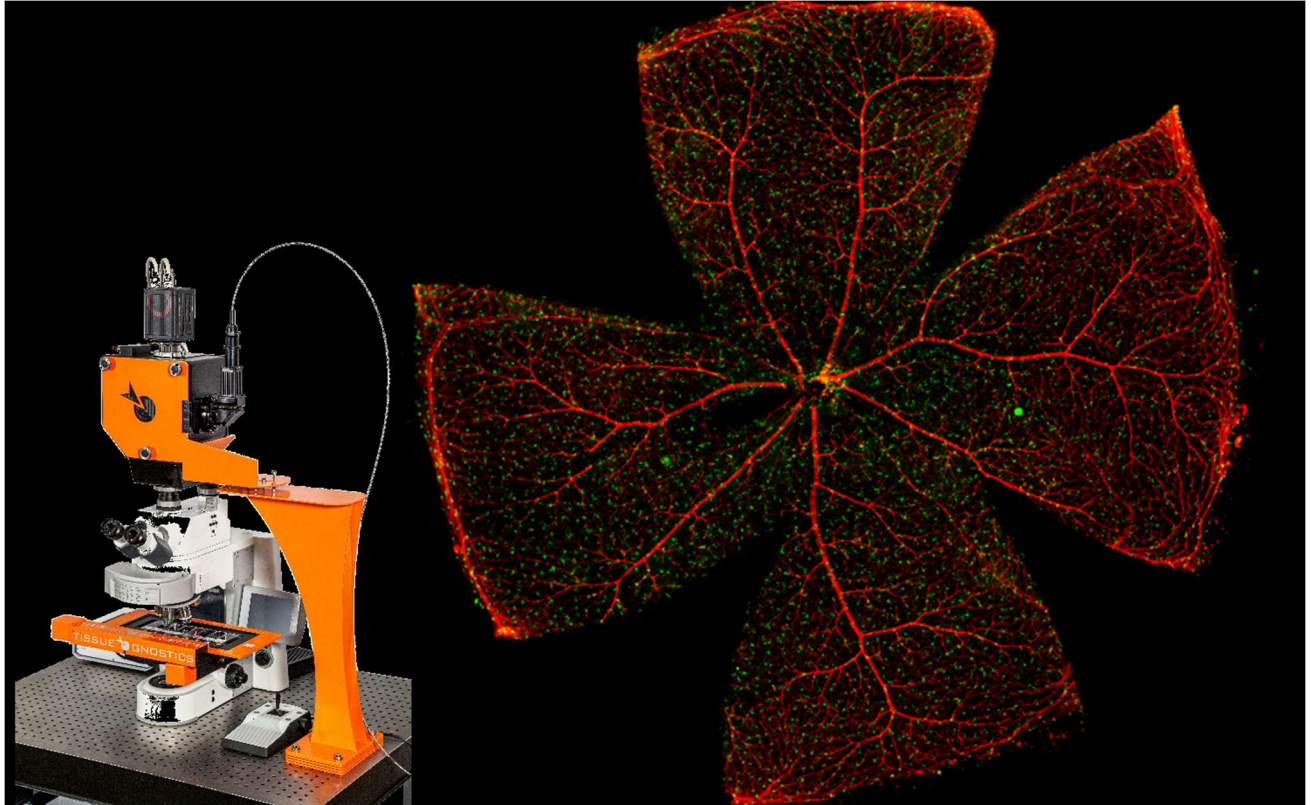


What is Whole Slide Confocal Imaging?

TissueGnostics



Whole slide confocal image of retina, acquired by TissueFAXS Q+

Whole slide imaging, sometimes known as virtual microscopy or digital pathology, involves the scanning of a tissue section on a slide to create a digital reconstruction of the entire tissue section by stitching the single fields of view together. It has an enormous impact on pathology as many diseases rely on the visual diagnosis of slide specimens. Visual examination can be carried out on digital slides instead of using physical samples, without compromising the accuracy of results. This enables the flexibility associated with fully-portable digitized information, and the possibility to easily implement telepathology as well as automated image recognition procedures.

Whole Slide Imaging with Confocal Microscopy

Traditionally, whole slide imaging has been performed with slide scanners that use a camera to take multiple images of different sample areas that can then be reconstructed to form the digital

image of the full specimen. As long as the scanning speed of the microscopy technique of choice is sufficient, whole slide imaging methodologies can be used with a variety of different microscopy techniques and imaging methods.

One possibility is to use confocal microscopy for acquiring whole slide images of IF processed tissue sections. Confocal microscopy has several advantages over fluorescence widefield optical microscopy techniques for examining pathological specimens as it enables the use of spatial filtering techniques to eliminate contributions from out-of-focus light or inhomogeneities in sample thicknesses that would lead to image degradation.

How Does Whole Slide Confocal Imaging Work?

There are a variety of strategies for scanning confocal microscopes, including single-beam and multi-beam approaches. This can be used to cover larger areas of the specimen of interest in the XY plane but also to profile samples vertically. This makes it possible to image sub-micrometer-thick slices through the sample that can later be vertically restacked, giving a full three-dimensional whole slide confocal image. The ability to visualize volumetric spatial reconstructions of tissue means that confocal imaging can be used to display even complex cell nuclei where there are signals of different colors arising from multiple targets of interest. As scan times can be relatively long, the automated nature of whole slide confocal imaging is highly appealing, making the technique much more practical for recovering a wealth of information on cell structures.

Whole Slide Confocal Imaging with TissueGnostics

TissueGnostics offers the [TissueFAXS Q](#) series, which is perfectly designed for performing whole slide confocal imaging. At the heart of the unit is a spinning disk system which can be used for both confocal imaging and widefield imaging by letting the light path bypass the disk. By combining this with a highly sensitive sCMOS camera, it is possible to perform whole slide confocal imaging on up to 120 slides at a time.

The TissueFAXS imaging software is what drives all hardware components, which together produce high resolution Z-stacked images, and can enable extended focus on whole slide confocal images. These virtual slides can then be used for context-based quantitative analysis using TissueGnostics [StrataQuest](#) software.

As [StrataQuest](#) comes with compatibility for a growing number of Apps, the TissueGnostics platform allows you to take full advantage of the power of virtual microscopy. From automated, high-throughput slide imaging, to data organization and distribution and ultimately, automated analysis for speeding up and enhancing your research, TissueGnostics' platforms offer ample opportunities to realize the full potential of whole slide confocal imaging.

How Tissue Cytometers Work?

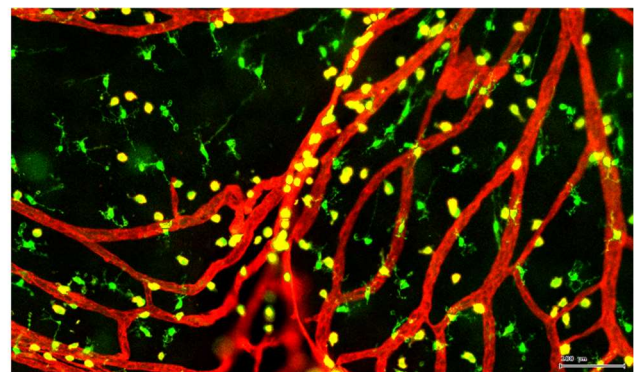
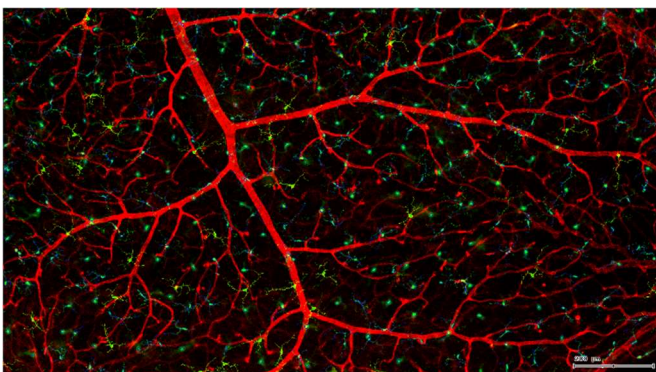
Tissue cytometry applies the basic imaging principles of flow cytometry to the tissue sections on slides. The TissueFAXS platform – currently the best-in-class tissue cytometer available – is based on high-end imaging hardware comprising a microscope, scanning stage, fluorescence excitation devices, cameras for detection, software enabling scanning automation, and quantification software.

Varied sample types can be used, including cell culture monolayers on various substrates, cryo-cut sections, paraffin-embedded tissue, and so on. Standard staining protocols apply to each, using several markers to achieve the same phenotypic characterization typical of flow cytometry but within the native tissue environment. The benefits of this are multifaceted.

So, what do these differences mean in practice and when might you consider deploying tissue cytometry instead of conventional flow cytometry?

Benefits of Tissue Cytometry

Tissue sections comprise a great variety of cells including epithelial cells, muscle cells, nerve cells, blood vessels, tissue infiltrating leukocytes and maybe tumor cells at various differentiation stages. In a single cell suspension, much of this morphological detail and diversity is lost. Tissue cytometry provides a better indication of **critical cellular and spatial interactions** in their normal context. Tissue cytometers are not only assessing basic properties such as cell diameter or shape and are instead quantifying multiple molecular marker expressions across a whole slide. This way they can also provide a much greater depth of insight into the functional characterization of single cells and their interactions with other morphological substructures.



Blood vessels were shown in red, optic neurons were shown in green.



Optic neuron analysis.

Neurons were identified and separated into different populations by length from 0-500um, shown in scatter plot. The table shown the overview results, including nerve fiber mean intensity, mean length, cell counts, percentage and density..

Interested in Tissue Cytometry?

TissueGnostics is the industry-leading manufacturer of tissue cytometry solutions for histology and precision medicine applications. We offer a range of TissueFAXS tissue cytometers for whole slide and high-resolution confocal imaging with a choice of configurations and built-in automation systems to support easy onboarding in any setting.

Want to learn more? Contact a member of the TissueGnostics team today.



TissueFAXS Plus cytometer.

Suitable for bright field and fluorescent imaging and analysis, can upgrade to multi-spectral and 3D structure cytometer.



TissueFAXS Q+ cytometer.

High-Speed Confocal Imaging System.

For more information about automated tissue cytometer from TissueGnostics, please contact us today.

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