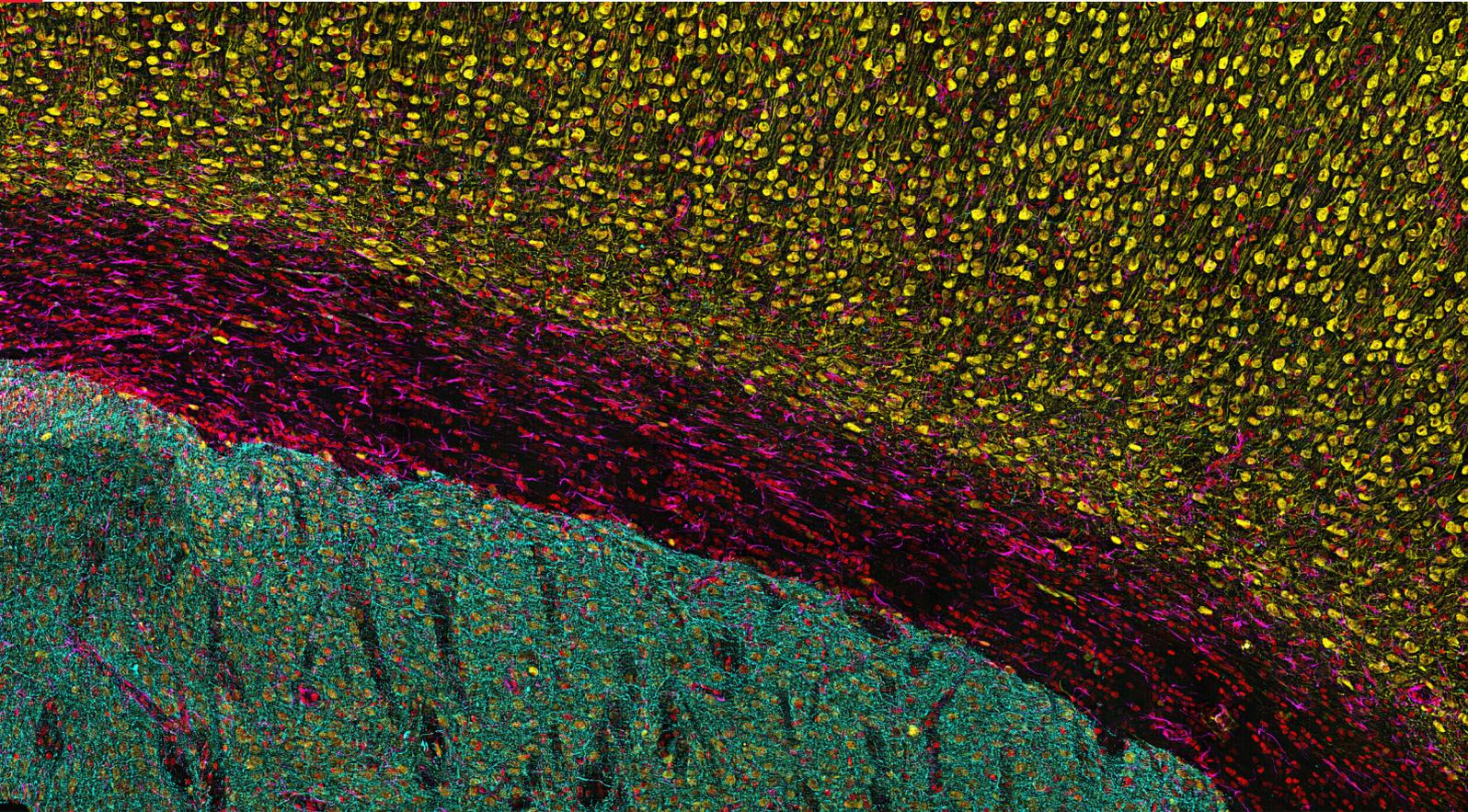


From Eye to Insight

*Leica*  
MICROSYSTEMS

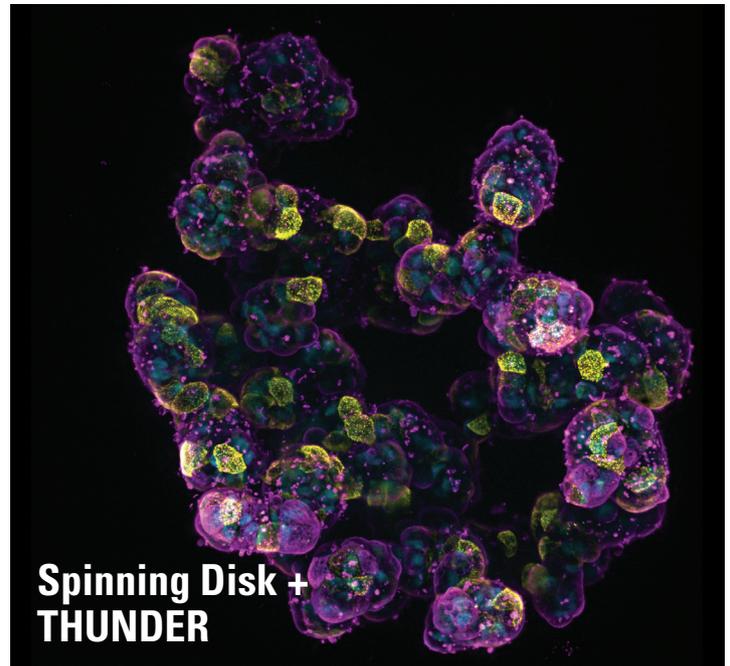
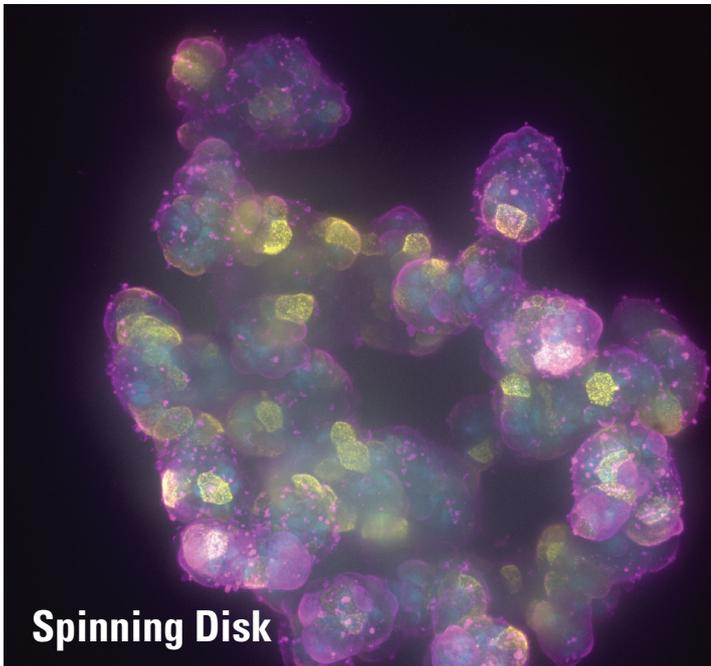


# THUNDER IMAGER CELL SPINNING DISK

Clarity Through Synergy



# THE POWER OF THUNDER AND SPINNING DISK



7-day old 3D cell culture of MDCK cells stably transfected with; Mx1-GFP (green), SPY555-Actin (yellow) and WGA-Alexa(TM) 647 (magenta).

*"Integrating CICERO from CrestOptics with THUNDER from Leica represents a significant advancement for microscopy services like MASTER, providing a versatile and efficient solution for real-time image acquisition. The combination of these systems enables high-speed imaging, even in thick samples. CICERO's flexibility enables its effortless adaptation to existing THUNDER systems, making it a scalable and easy-to-implement solution for facilities like ours, maximizing infrastructure investments without needing entirely new systems."*

**Edwin Hernández Garzón**

Facility Manager - MASTER Core Facility

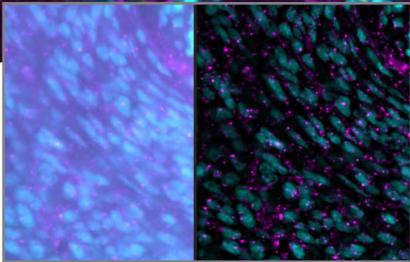
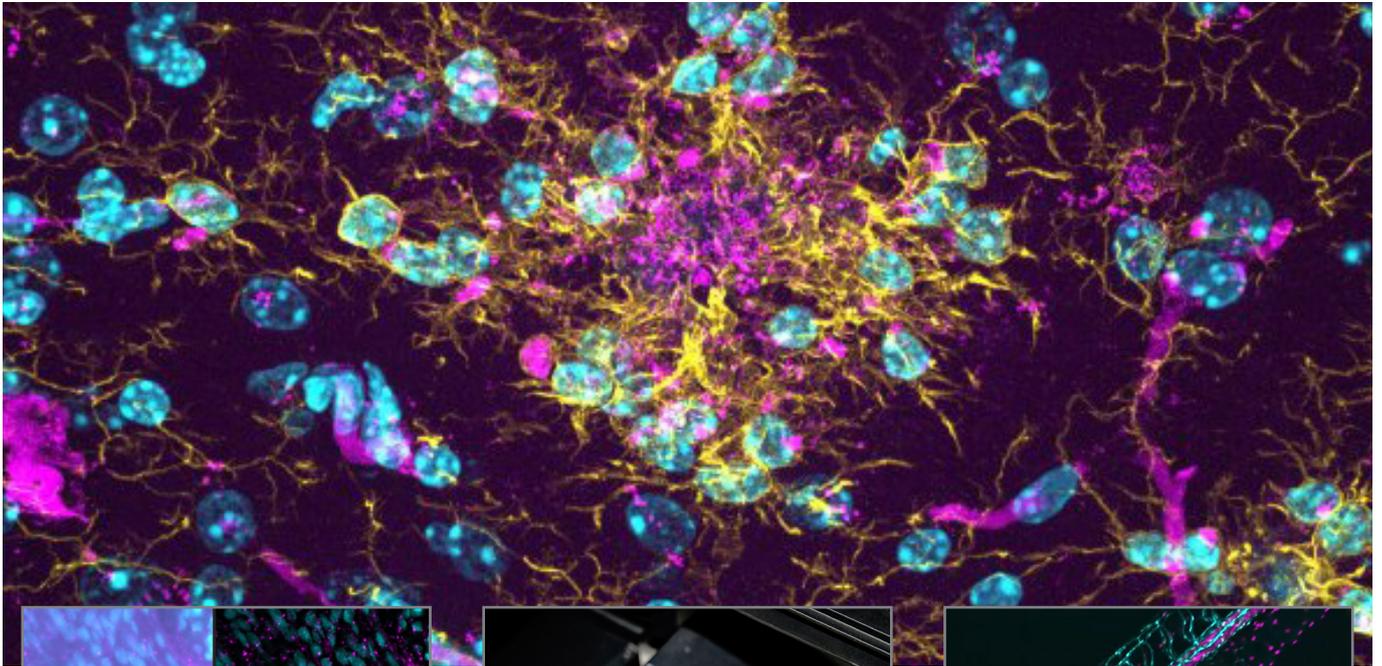
Centro de Investigaciones Interdisciplinarias de Alcalá (CIZA)

Consejo Superior de Investigaciones Científicas (CSIC)

**Front Cover Image:** Rat brain slide provided by EnCor Biotechnology Inc. (RBC101223) stained with Hoechst, CPCA-GFAP, Fox/NeuN and RPCA-TH.

# THUNDER IMAGER CELL SPINNING DISK

Struggling to navigate complex samples? Discover the power of combining THUNDER technology with the CrestOptics CICERO spinning disk confocal.



## COMBINE SPINNING DISK WITH THUNDER FOR GREATER CONTRAST

Get more convincing, high-quality data by combining the power of THUNDER with spinning disk confocal.

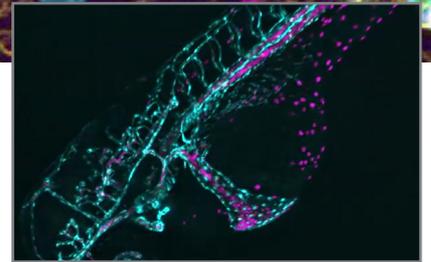
> [page 4](#)



## STREAMLINE WORKFLOWS WITH INTELLIGENT AUTOMATION

Boost your productivity by focusing on your experiment, rather than your system, with our intelligent automation concept.

> [page 6](#)



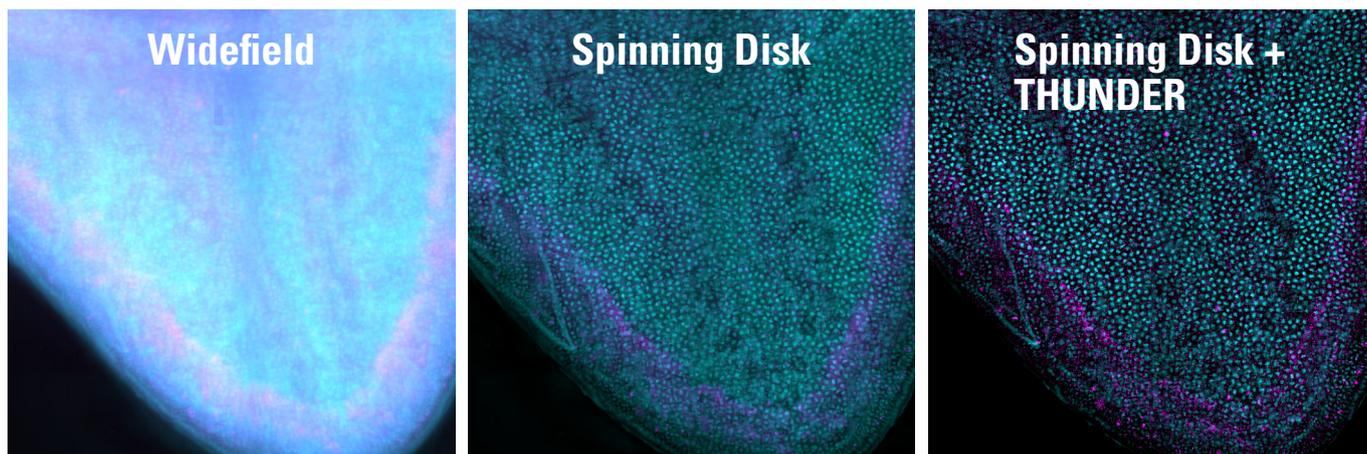
## FAST, VERSATILE, CONFOCAL IMAGING

Obtain more statistically significant data from diverse and challenging 3D samples faster with high-throughput spinning disk confocal.

> [page 8](#)

**Main Image Above:** Characterization of microglial morphology around brain plaques in app/ps1 mice. Sample courtesy of Patricia M. Tazo and Aroa S. Maroto, Silvia De Santis' laboratory, Instituto de Neurociencias CSIC-UMH, Alicante, Spain.

## COMBINE THUNDER AND SPINNING DISK FOR STUNNING RESULTS

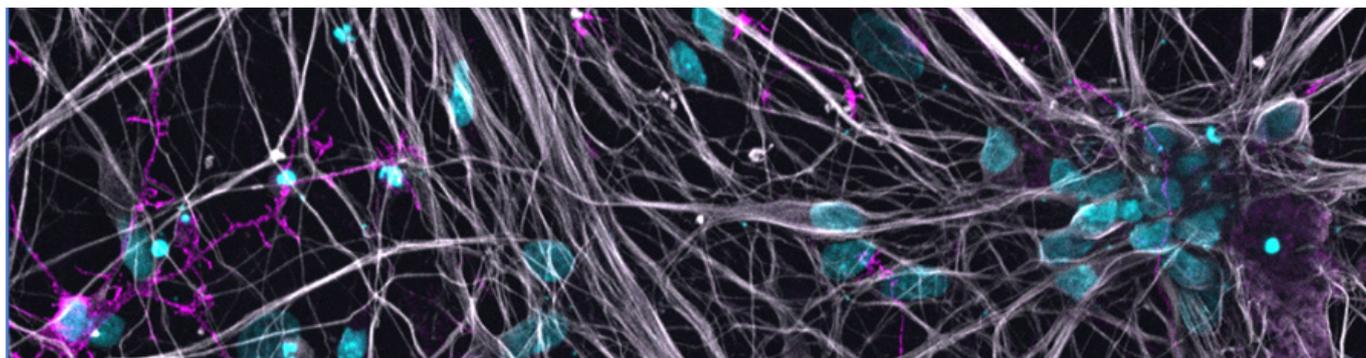


200  $\mu\text{m}$  thick *Planaria* (flat worm) stained with DAPI (cyan) and mRNA FISH staining (magenta). Sample courtesy of Shuchang Hu, Developmental Biology Unit, Hanh Vu's Group, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany.

### MORE CONVINCING, HIGH-QUALITY DATA

While spinning disk alone provides powerful optical sectioning, applying THUNDER takes your image clarity to the next level. Unlock even more details by eliminating residual out-of-focus light for greater contrast and resolution.

Extract more convincing high-quality data from dense, challenging 3D samples by applying THUNDER to your spinning disk confocal images.



Neuronal cell culture

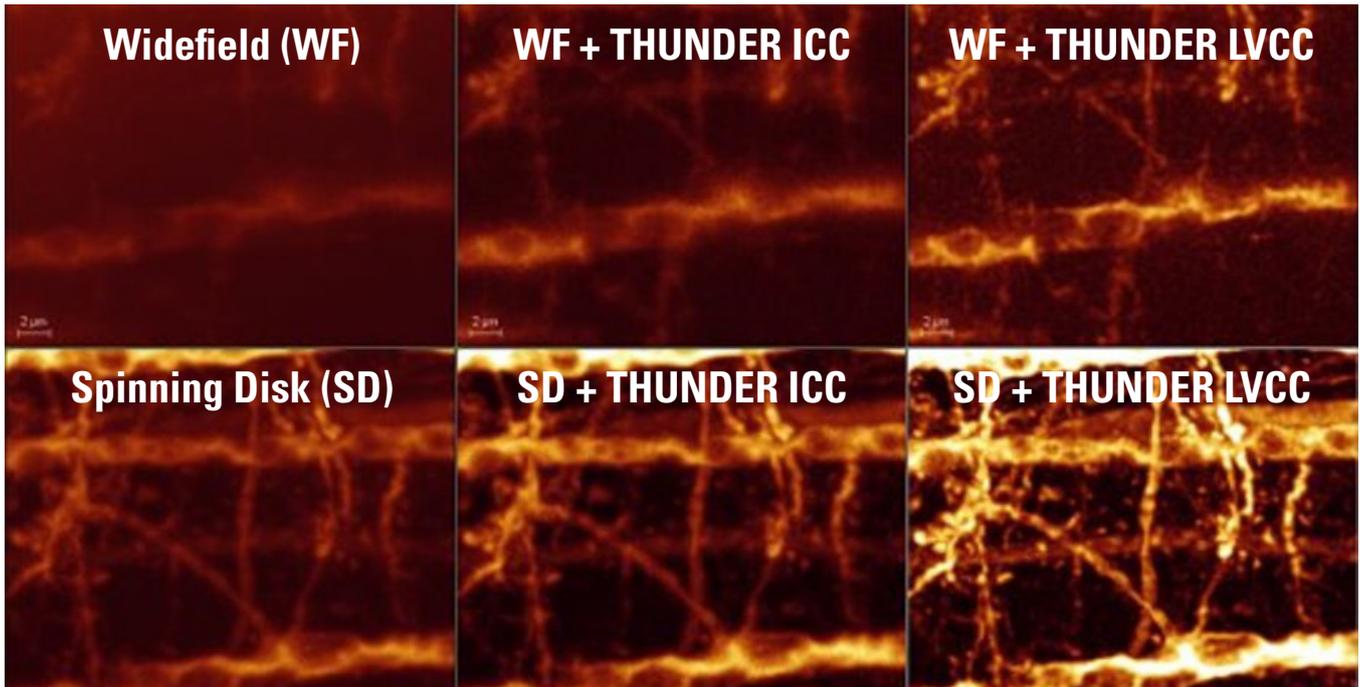
*"The system provides high-res images ready for analysis to obtain morphometric parameters of subcellular structures, such as dendritic spines in mouse cortical neurons. These tiny structures pose a significant challenge, as their small dimensions lie near the limits of optical resolution. Studying them is especially complex when placed in the context of mouse brain tissue, as a relatively large portion of tissue must be scanned at high resolution. The combination of spinning disk with THUNDER provides excellent signal-to-noise ratio images. This makes it possible to discriminate even the very thin necks that connect spines to the dendrite, precisely define the shape of each spine, and obtain the 3D parameters required for our studies."*

#### **Isabel Fernaud-Espinosa PhD**

Instituto Cajal, Madrid

Consejo Superior de Investigaciones Científicas (CSIC)

# HOW THUNDER ENHANCES SPINNING DISK CONFOCAL



Neuronal spines in mouse brain imaged in widefield (top) and spinning disk (bottom) with either THUNDER Instant Computational Clearing (ICC) or THUNDER Large Volume Computational Clearing (LVCC) applied.

The THUNDER Imager Cell Spinning Disk system allows users to combine classical spinning disk confocal microscopy with all the benefits of THUNDER.

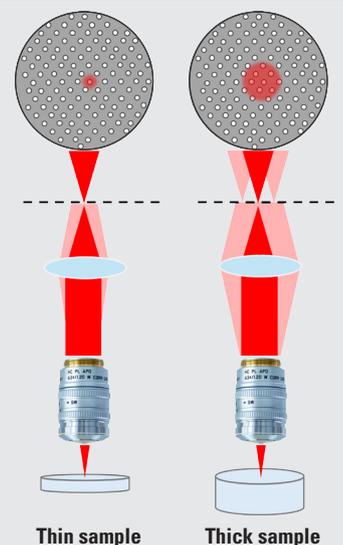
Choose from 2D or 3D THUNDER:

- > THUNDER 2D offers GPU-based Computational Clearing and helps to reduce pinhole crosstalk, for clearer images.
- > THUNDER 3D combines Computational Clearing with deconvolution, further improving contrast and resolution.

## What is pinhole crosstalk?

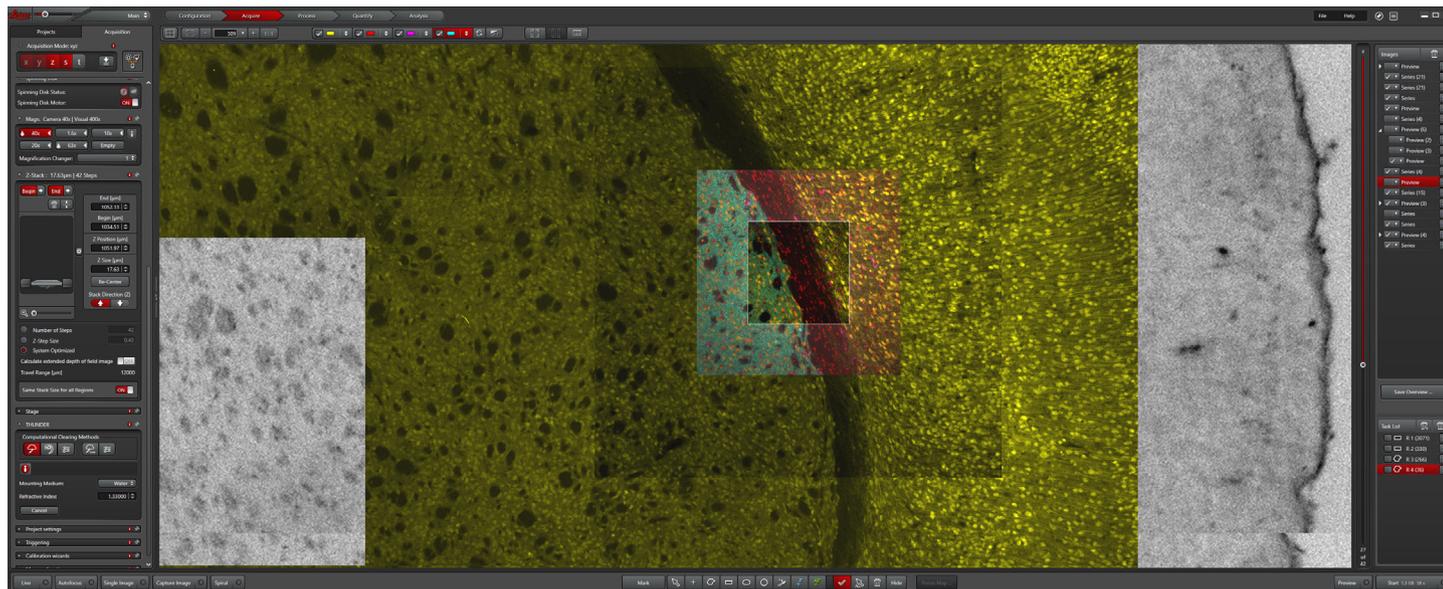
Pinhole crosstalk occurs when out-of-focus light from deeper regions of the sample passes through neighbouring pinholes, resulting in additional background signal in the image (Figure 1). This gets worse with thick samples.

Whilst pinhole crosstalk can be improved by increasing the inter-pinhole spacing, this reduces the light efficiency of the system. THUNDER removes this compromise by digitally removing the background signal that causes out-of-focus blur.



**Figure 1. Pinhole crosstalk** in thin (left) vs. thick (right) samples. In-focus light is shown in dark red, and out-of-focus light in light red.

# STREAMLINE WORKFLOWS WITH INTELLIGENT AUTOMATION



Flexible viewing tools allow you to switch between contextual overviews and high-resolution single-channel views, enabling full data exploration.

## AUTOMATED SAMPLE FINDER & ENHANCED NAVIGATOR INTEGRATION

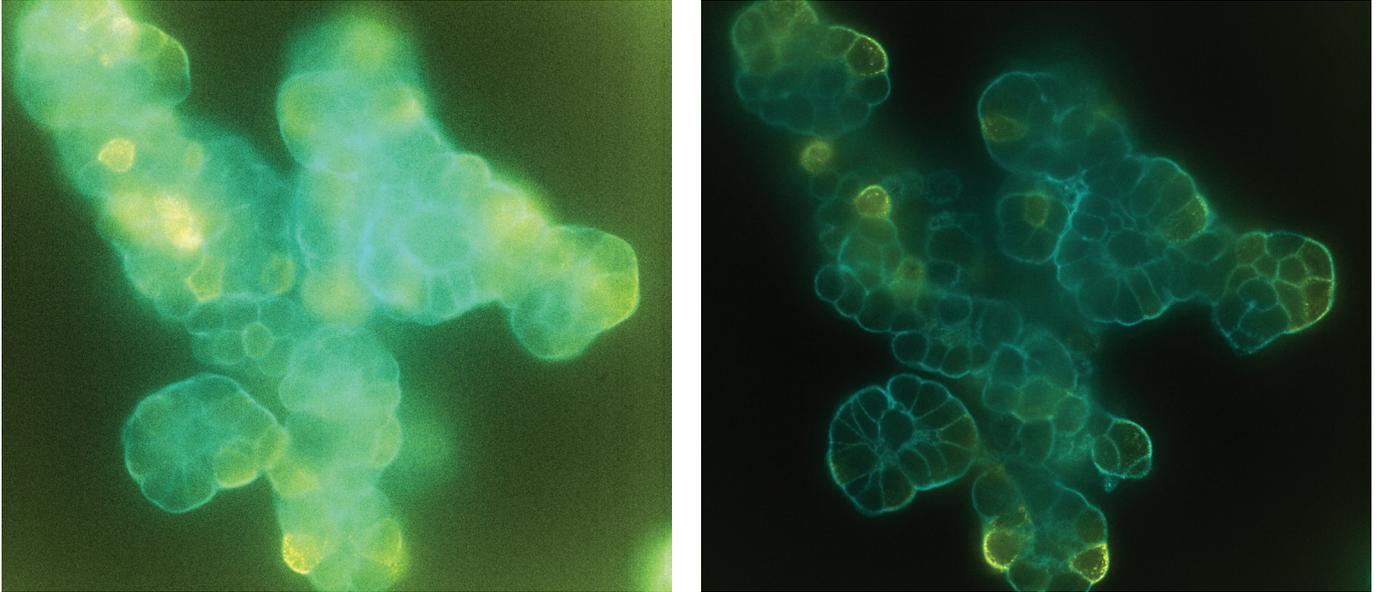
Spinning disk systems are commonly used to image large sensitive samples, which can be hard to navigate. Now you can create a rapid, in-focus, overview image of your entire sample at the click of a button with Sample Finder, then switch to multi-channel view mode with the fully integrated Navigator experience. This reduces the time required to set up your experiments, allowing you to spend more valuable time acquiring data from your sample.

### Benefits:

- > Easily pinpoint key regions of interest while preserving the spatial context of your data throughout your workflow.
- > Set up and perform complex multi-position experiments on a wide range of sample formats using templates for slides, dishes, multi-well plates and more.

Sample overview image of *Planaria* (flatworm). The prefocus automatically detects your cover slip surface, reducing effort and preserving sample integrity.





Single z-plane of a 3D cyst embedded in agarose. Spinning disk image acquired before (left) and after SmartCORR adjustment (right).

## MORE CONVINCING DATA WITH ADAPTIVE IMMERSION AND SMARTCORR

Extract better, more reproducible, data from your 3D samples in seconds. SmartCORR automatically optimizes your objective's correction collar settings to match your sample, dramatically improving image quality.

For many spinning disk applications, imaging samples in aqueous media is essential. For the clearest image quality, water immersion objectives are ideal as they minimize spherical aberrations. However, using water objectives often proves impractical due to evaporation challenges.

Now you never have to compromise on your choice of objective thanks to our patented Adaptive Immersion technology. An embedded sensor continuously monitors and maintains immersion throughout your experiments.

**Get the ultimate imaging platform by combining Sample Finder, THUNDER, Adaptive Immersion and SmartCORR with your spinning disk confocal system.**



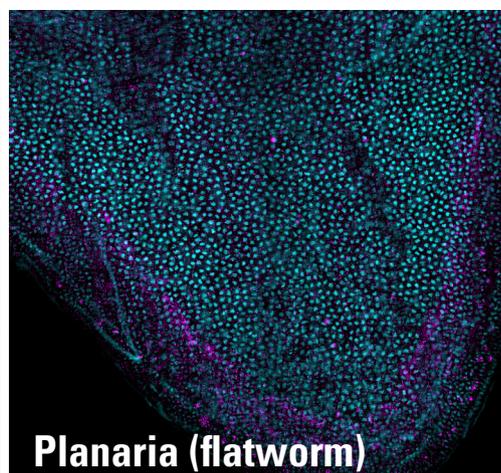
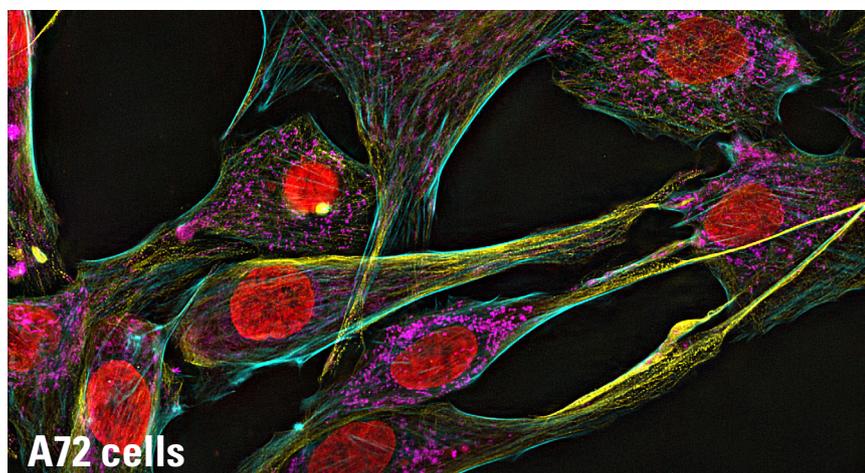
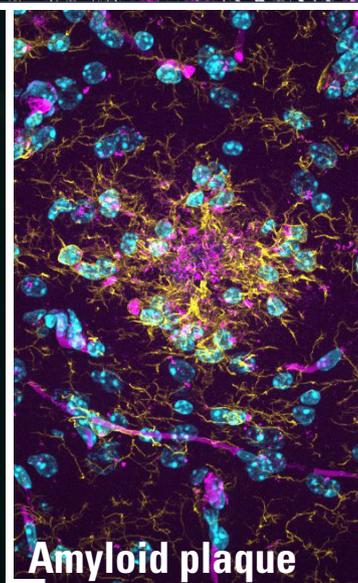
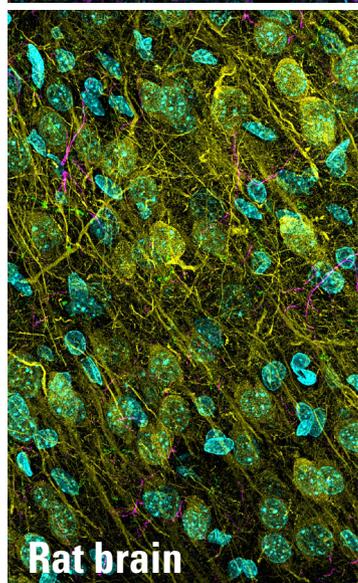
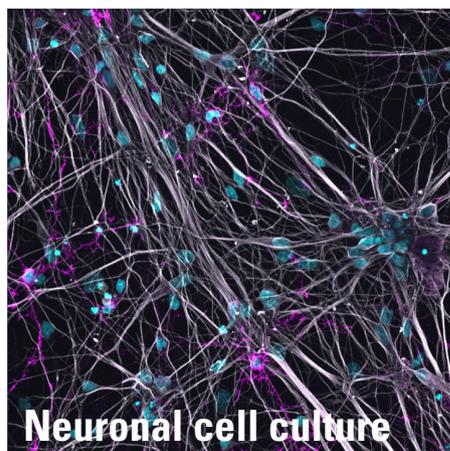
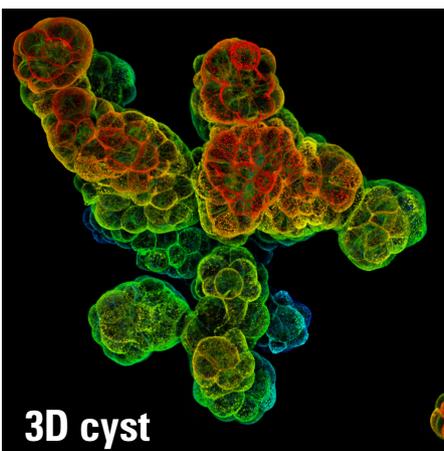
Adaptive Immersion in action.



Adaptive Immersion sensor cap.

## FAST, VERSATILE, CONFOCAL IMAGING

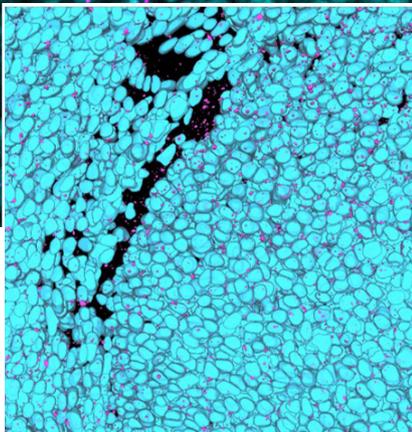
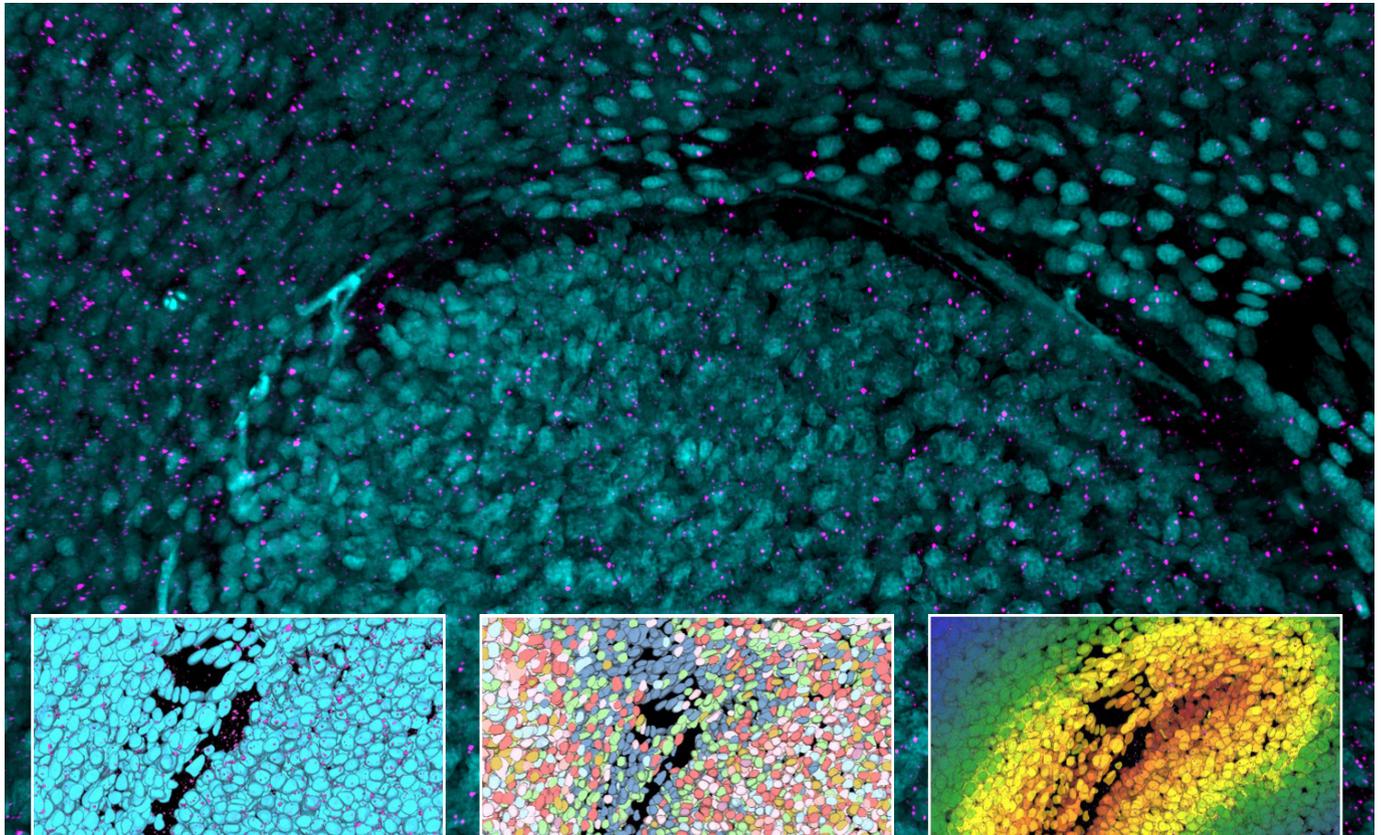
Get more statistically significant data from challenging thick 3D and live cell samples in less time with high-throughput spinning disk confocal. Image a wide variety of sample types with reduced phototoxicity - all in a simple-to-use and versatile platform.



# GO FROM IMAGE TO INSIGHTS

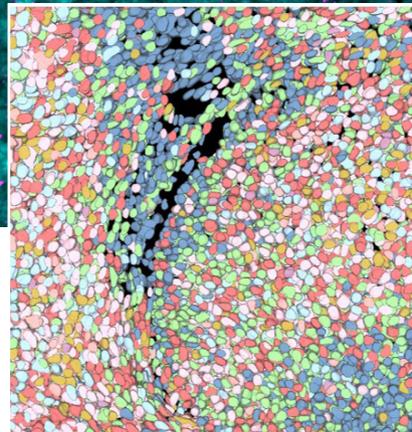
If you want to rapidly capture, accurately segment, and analyze image data, even when a low light dosage and high temporal resolution is required, the unique combination of THUNDER imaging systems with Aivia AI Image Analysis Software is the answer.

Aivia brings you state-of-the art, AI-powered image analysis tools to extract meaningful insights from your images.



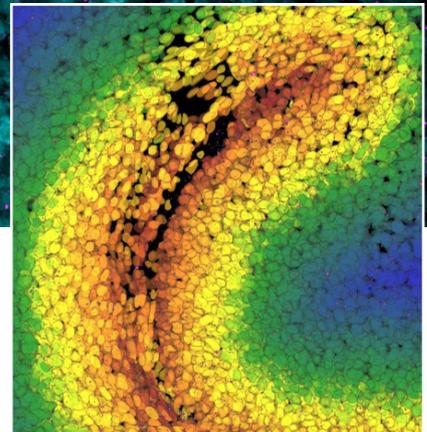
## ACCURATE AND ROBUST SEGMENTATION WITH AI

Segment diverse cell types, biological structures, and images acquired using different microscopy techniques, with high accuracy.



## PHENOTYPING MADE SIMPLE

Classify known cell phenotypes using your expert knowledge or discover unknown phenotypes using data-driven methodologies.

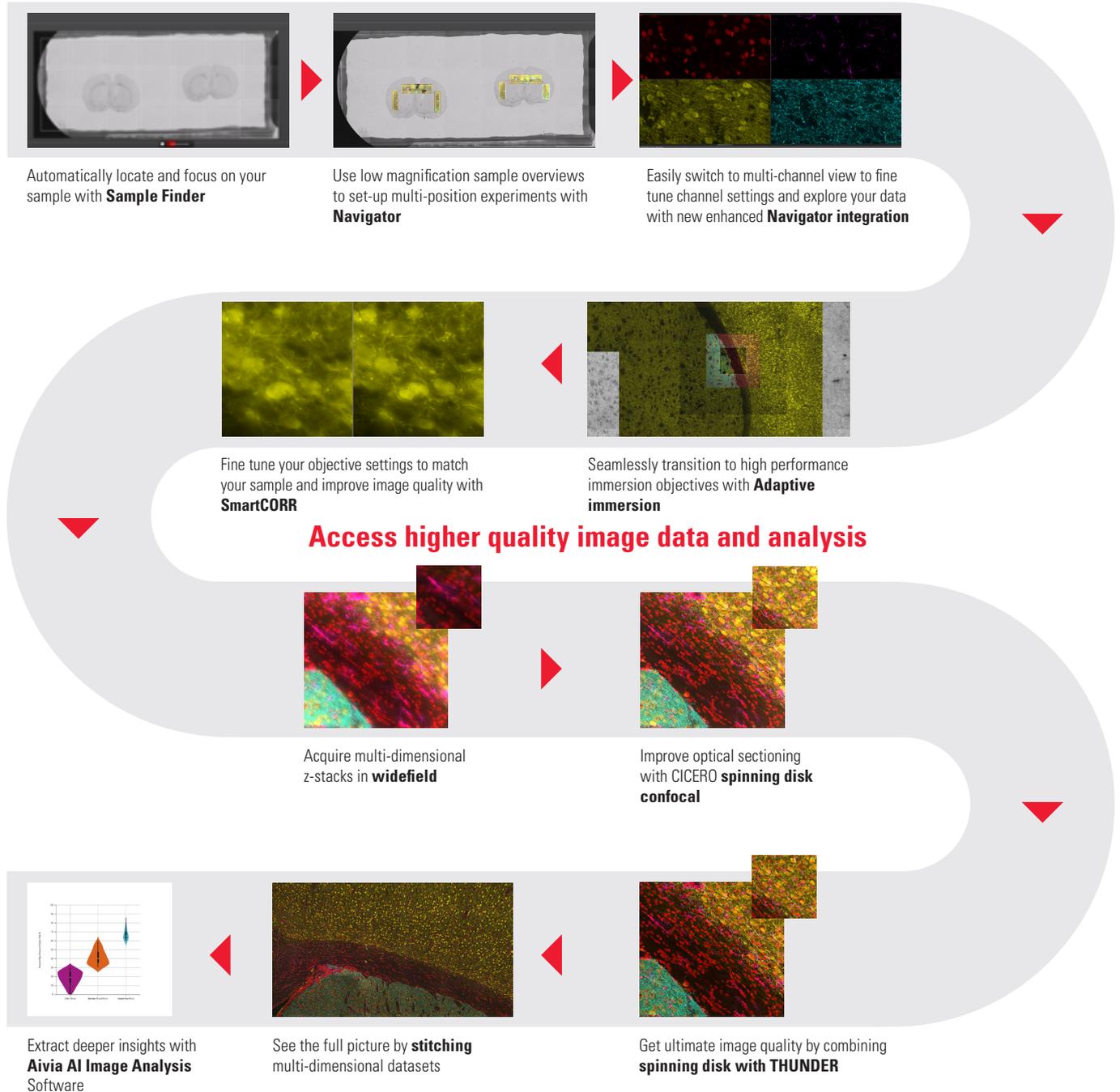


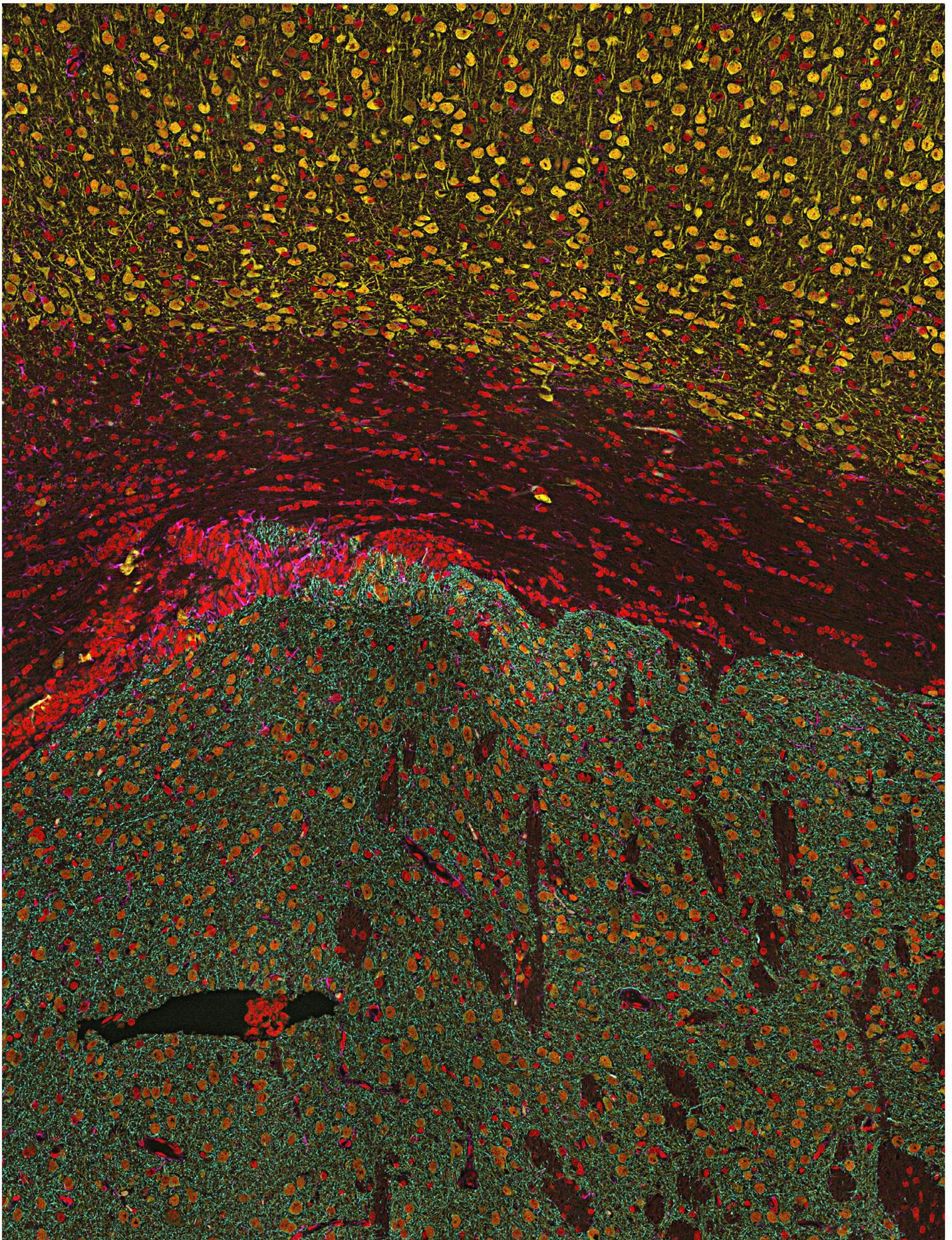
## EXPLORE COMPLEX DATA AND SPATIAL RELATIONSHIPS

Visualize cell phenotypes in spatial context and dive deeper into your data with multiple interactive charts.

# THE THUNDER IMAGER CELL SPINNING DISK WORKFLOW

Efficiently set-up your experiment using advanced automation





Rat brain slide provided by EnCor Biotechnology Inc. (RBC101223) stained with Hoechst, CPCA-GFAP, Fox/NeuN and RPCA-TH

## TECHNICAL SPECIFICATIONS

Spinning disk unit	CrestOptics CICERO
Imaging modes	Confocal and widefield
Pin hole size/pin hole spacing	50/250 µm
Disk rotation speed	15,000 rpm
Emission filters	440/40 nm 525/50 nm 600/50 nm Quad D/F/T/Cy5
Lasers	89-North LDI4
Laser type	Multimode diode lasers
Laser lines	405 nm 300 mW 470 nm 1000 mW 555 nm 1000 mW 640 nm 400 mW
Widefield bypass filter cube	90% notch filter powers down lasers for use in widefield mode
Laser safety	Installed system is class 1 laser safe
Field of view (FOV)	Up to 22 mm
Bypass mode	Manual - coded
Camera	Option of K8, Kinetix or Hamamatsu Fusion
Stand	DMi8 inverted microscope
Resolution	Diffraction limited
Software	Controlled within LAS X 3.10 and above
Optional extras	THUNDER (2D/3D) opto-digital technology 40 x and 63 x adaptive immersion objectives SmartCORR Sample Finder Enhanced Navigator Incubation

