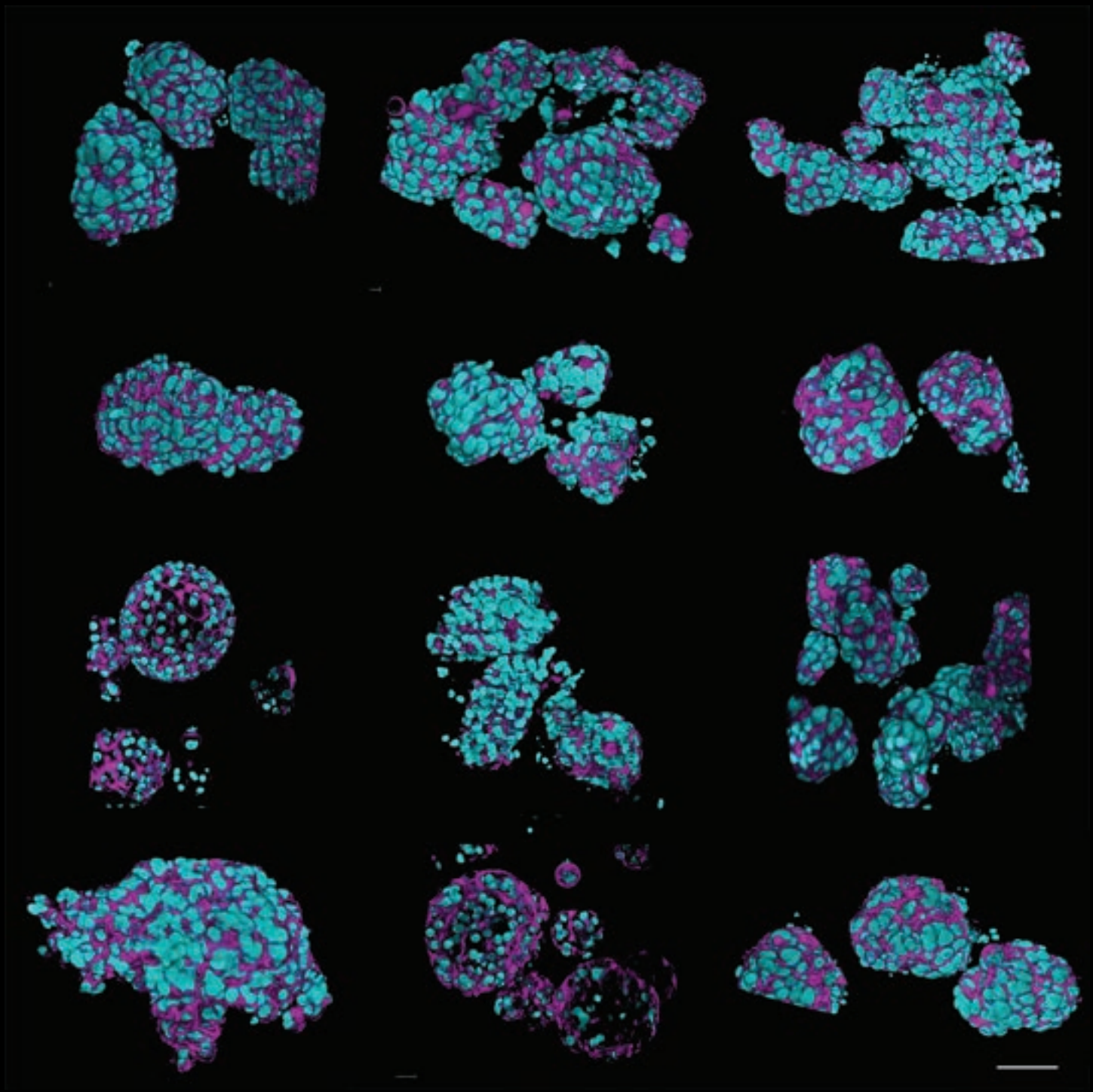
From Eye to Insight

Leica
MICROSYSTEMS

ESCAPE THE LIMITS

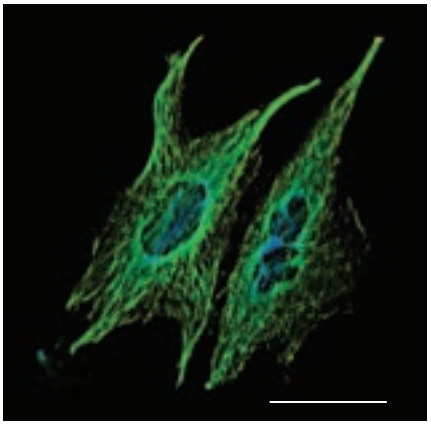
Viventis SCAPE: Single Objective Light Sheet Microscope for Fast Volumetric Imaging

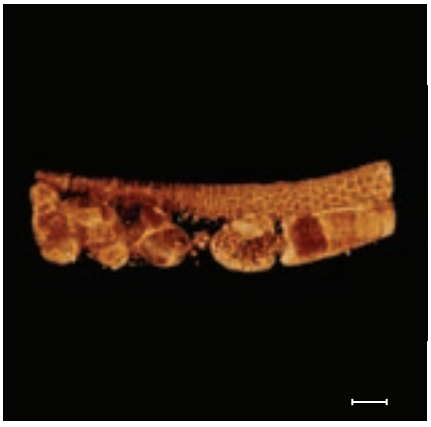


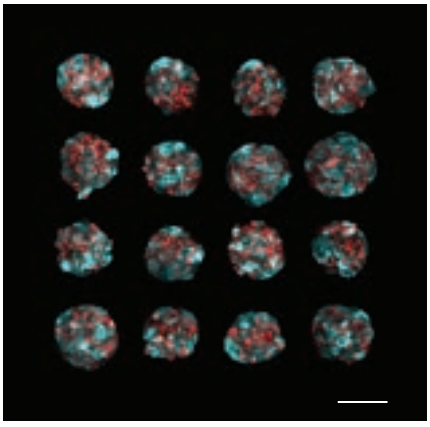
Viventis SCAPE

ESCAPE THE LIMITS OF 3D LIVE CELL IMAGING WITH SINGLE OBJECTIVE LIGHT SHEET MICROSCOPY

Benefit from gentle and fast volumetric imaging with standard sample carriers and explore new frontiers in live cell imaging.







ESCAPE to fast volumetric imaging

SCAPE scanning enables fast 3D imaging without moving the sample, allowing real-time tracking of rapid signaling processes or increasing throughput by capturing more samples in less time.

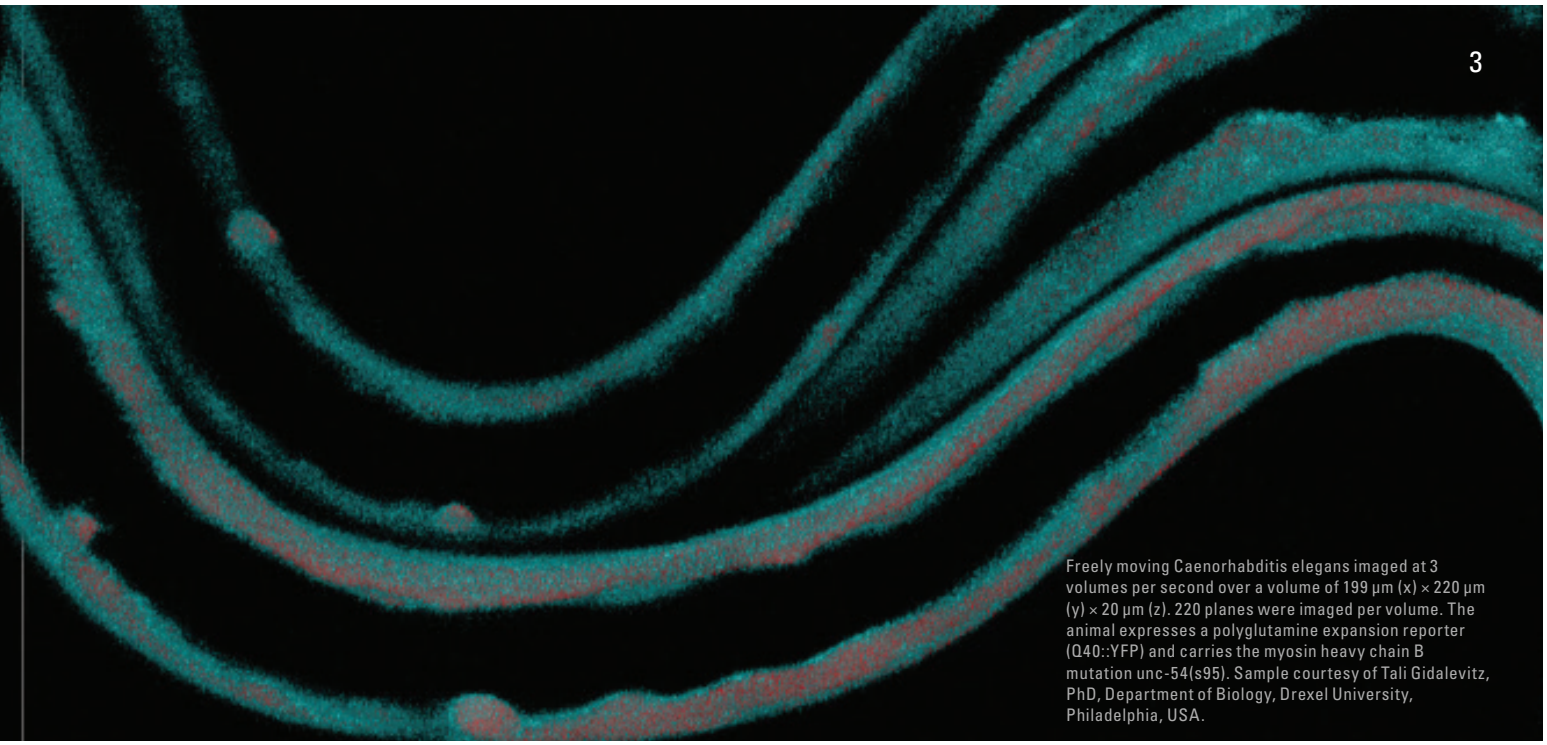
ESCAPE phototoxicity

Gentle light sheet microscopy enables you to perform fast or long-term volumetric imaging without harming your sample or altering your process of interest.

ESCAPE the need for special sample mounting

Experience the advantages of light sheet imaging without the need for special sample preparation, using standard flat-bottom sample carriers.

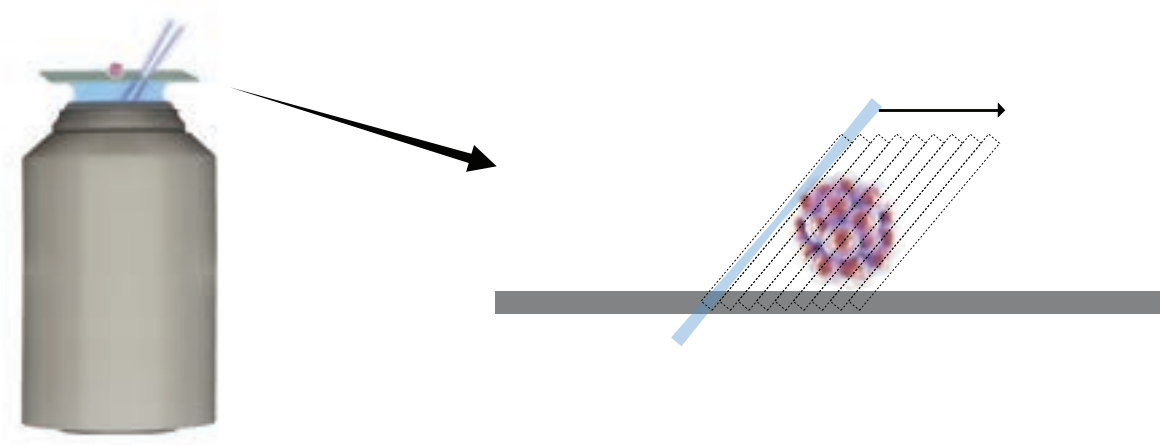
Title image: Patient-derived neuroendocrine tumor organoids labelled with DAPI (cyan) and phalloidin (magenta). Sample courtesy of Marina Cuenca and Heleen Jungen, Dayton lab, EMBL Barcelona. Scale bar, 50 µm.
Images 1 to 3 on page 2: Captions on back page.



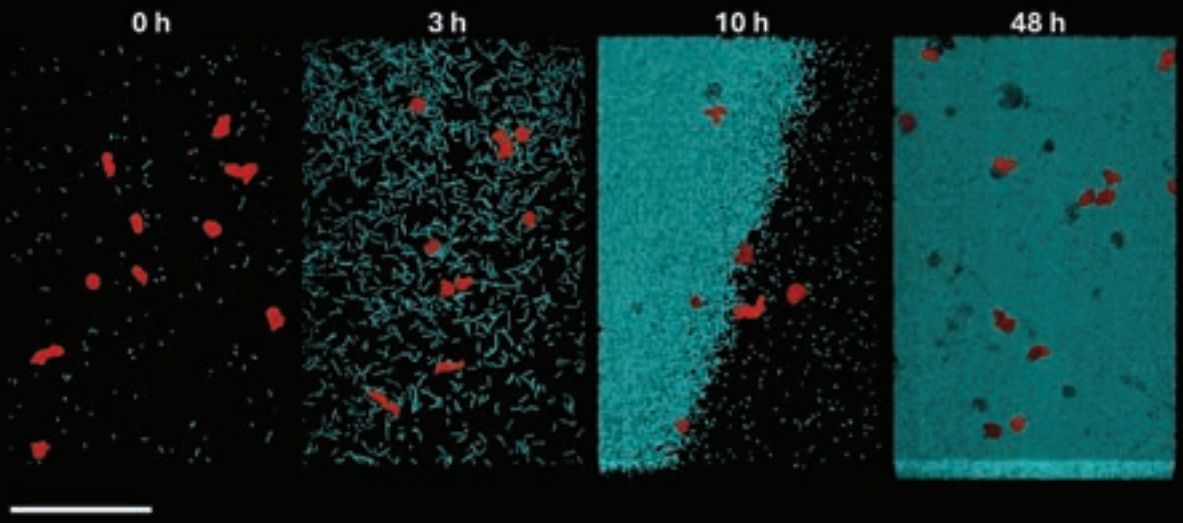
Freely moving Caenorhabditis elegans imaged at 3 volumes per second over a volume of 199 µm (x) × 220 µm (y) × 20 µm (z). 220 planes were imaged per volume. The animal expresses a polyglutamine expansion reporter (Q40::YFP) and carries the myosin heavy chain B mutation unc-54(s95). Sample courtesy of Tali Gidalevitz, PhD, Department of Biology, Drexel University, Philadelphia, USA.

ESCAPE TO FAST VOLUMETRIC IMAGING

Volumetric imaging without moving the sample – enabled by SCAPE scanning – delivers extremely fast 3D acquisition. It allows you to follow rapid signaling processes in all dimensions as they unfold, ensuring that all relevant information is captured. Alternatively, it supports higher throughput by enabling more samples to be imaged in less time.



Viventis SCAPE generates a volume by rapidly scanning an oblique light sheet through the sample. Without the need to move the sample, extremely fast volumetric imaging rates can be achieved.

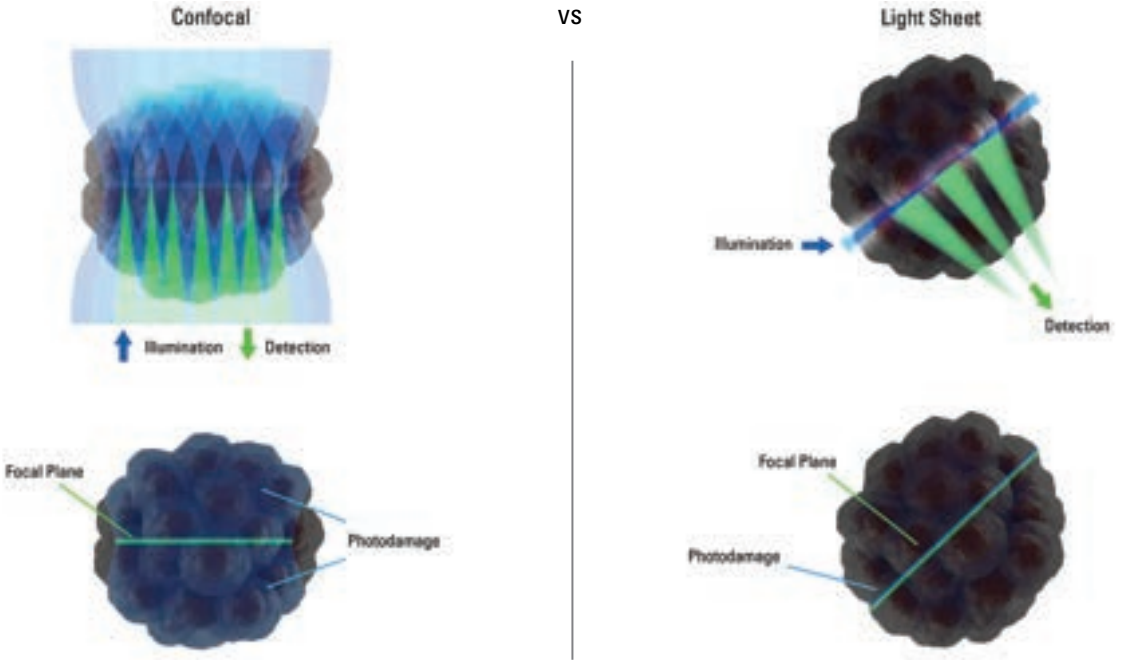


Live Dictyostelium discoideum amoebae (mCherry, red) and E. coli bacteria (GFP, cyan), imaged for 48 hours at a 10-second interval. More than 17,000 collected volumes. Image collage shows snapshots taken at the start of imaging, after 3 hours, 10 hours, and full 48 hours.
Sample courtesy of Vanessa Stürmer, van Gestel Lab, EMBL Heidelberg. Scale bar, 100 µm.

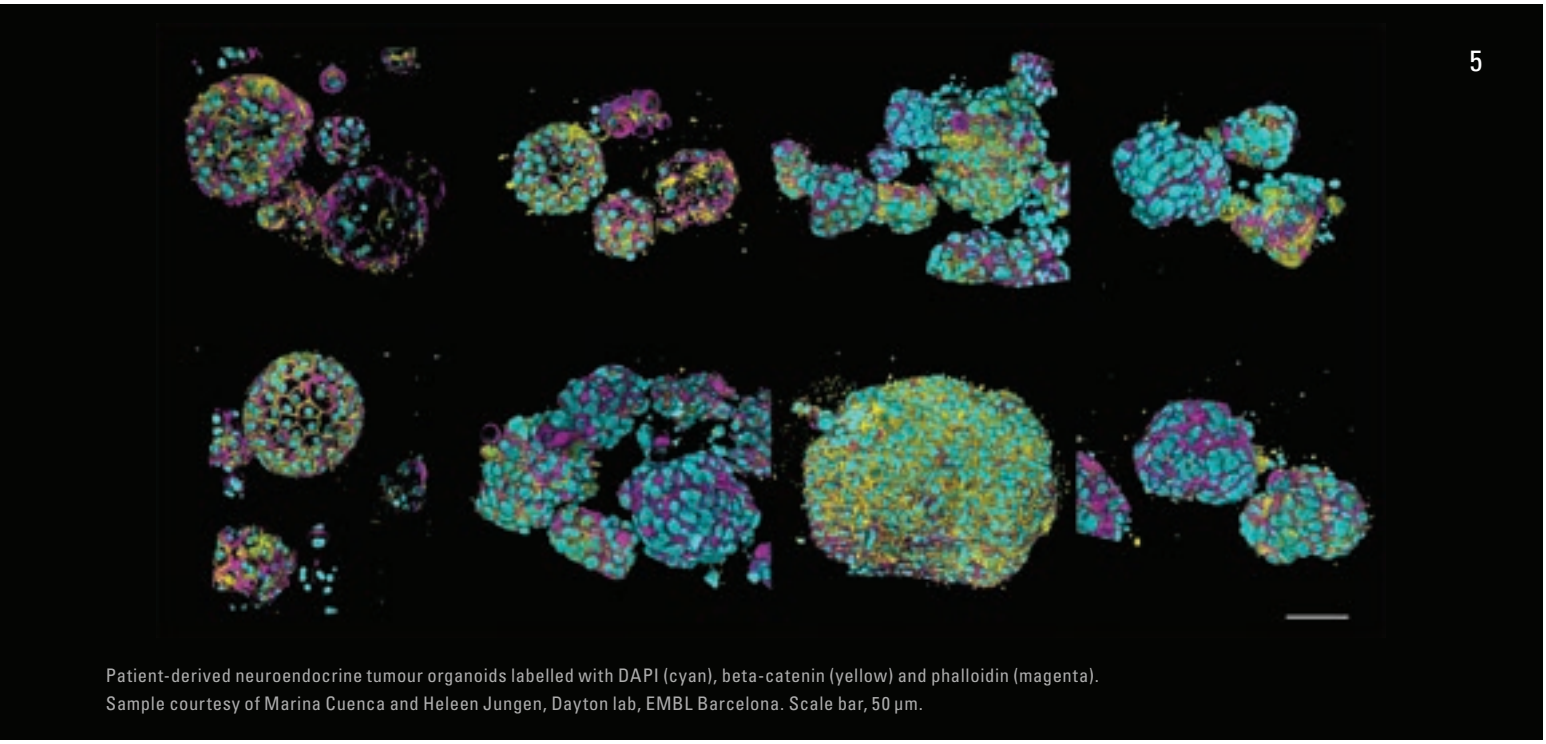
ESCAPE PHOTOTOXICITY

By illuminating only the imaging plane, light sheet microscopy minimizes light exposure outside the focal region, reducing phototoxicity and photobleaching. This gentle illumination approach enables rapid and prolonged volumetric imaging of light-sensitive samples.

Low endogenous expression of fluorescently tagged proteins can make it challenging to capture biological processes. Viventis SCAPE's gentle, high-sensitivity imaging allows you to follow these processes in 3D over extended periods, revealing dynamic events that might otherwise remain undetected.



In widefield and confocal microscopy, excitation light also illuminates regions above and below the focal plane, unnecessarily exposing out-of-focus volumes. In contrast, light sheet microscopy illuminates only the focal plane, reducing photodamage and preserving sample integrity. This selective plane illumination is especially advantageous for complex specimens that are much thicker than the focal plane, as it enables efficient optical sectioning with minimal light exposure.

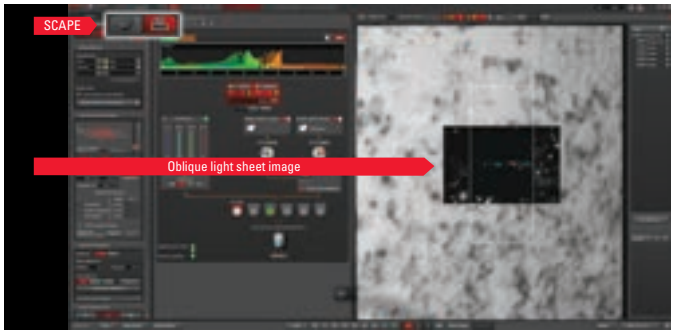


Patient-derived neuroendocrine tumour organoids labelled with DAPI (cyan), beta-catenin (yellow) and phalloidin (magenta).
Sample courtesy of Marina Cuenca and Heleen Jungen, Dayton lab, EMBL Barcelona. Scale bar, 50 µm.

ESCAPE THE NEED FOR SPECIAL SAMPLE MOUNTING

With its underlying OPM technology and inverted configuration, Viventis SCAPE enables imaging of samples mounted in standard flat-bottom carriers. This allows you to benefit from light sheet microscopy without requiring specialized sample preparation, making the technique more accessible and easier than ever.

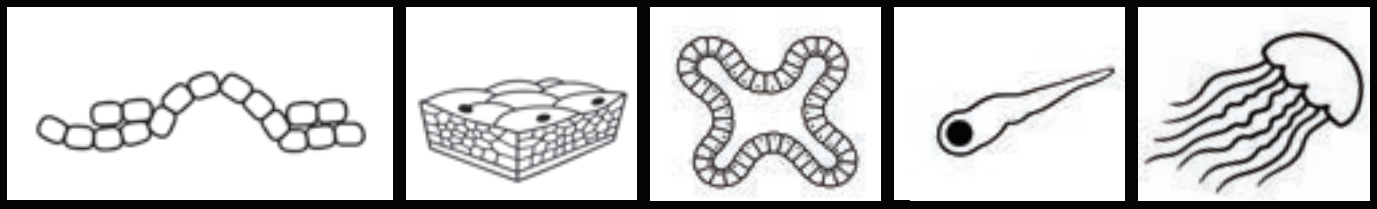
Viventis SCAPE supports multi-well plates with up to 96 wells. Combined with the high speed of SCAPE scanning for volumetric imaging, this enables higher throughput and faster time-to-results.



The Viventis SCAPE is equipped with a low-magnification objective that provides a quick widefield overview of the sample. In the software, simply load and select the desired sample carrier (e.g. dishes or multi-well plates) and run the overview scan (left image). This allows you to easily identify the sample you want to image and then switch to higher magnification and SCAPE acquisition (right image).

VIVENTIS SCAPE – APPLICATIONS

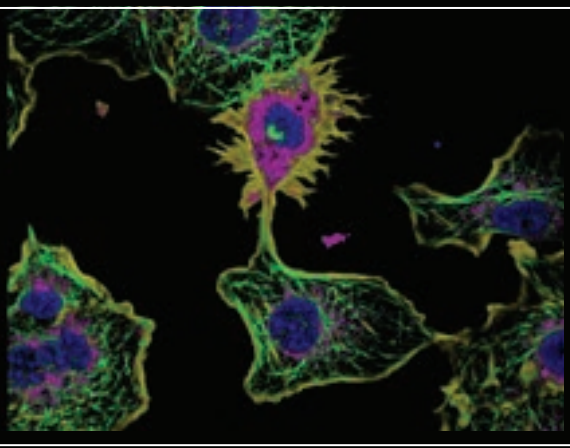
Viventis SCAPE can cover a wide range of applications, including 2D cell cultures, 3D tissue slices, 3D cell cultures, and small model organisms. While the accessible z-volume of the sample is defined by the objective's long working distance (620 µm), the accessible x-dimension is constrained only by the stage travel range. Large fields of view can be achieved through tiled acquisitions.



2D Cell Cultures | Tissue Slices | 3D Cell Cultures | Embryos | Small Model Organisms

~10 ~100 ~300

1



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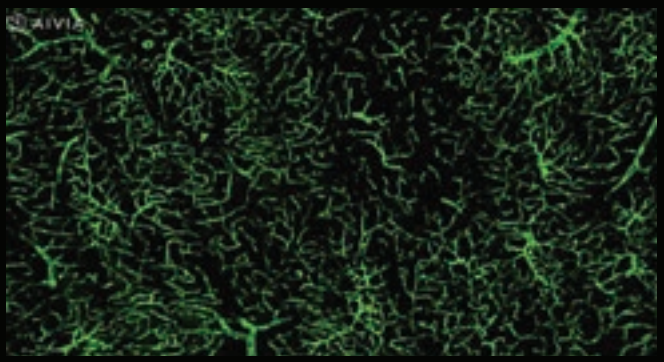

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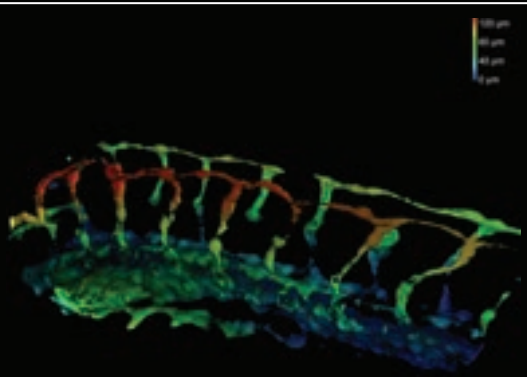

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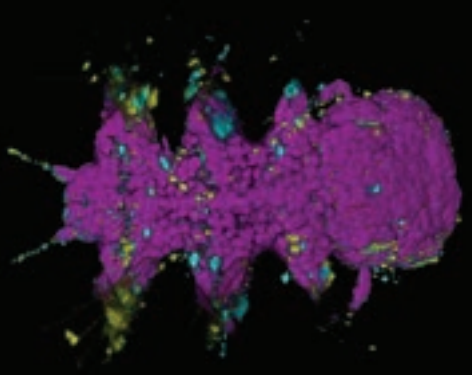
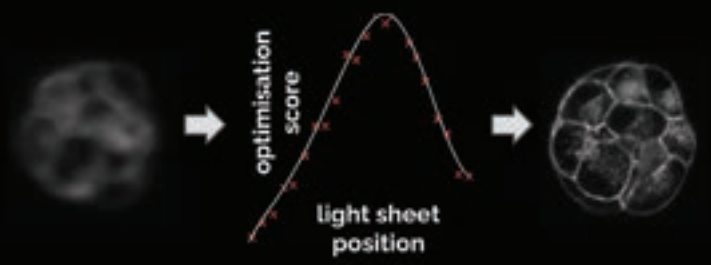


Images 1 to 4: Captions on page 8.

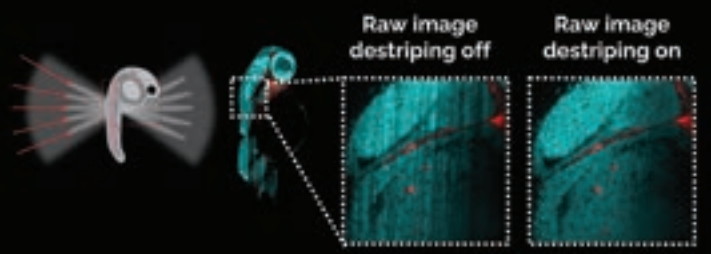
VIVENTIS SCAPE – DESIGNED FOR IMAGE QUALITY



Auto light sheet alignment for sharp, high-resolution images

Autoalignment

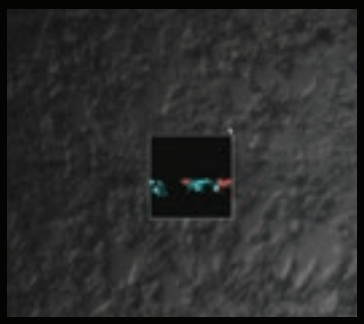
With a single mouse-click the optimal light sheet setting is used for the experiment.



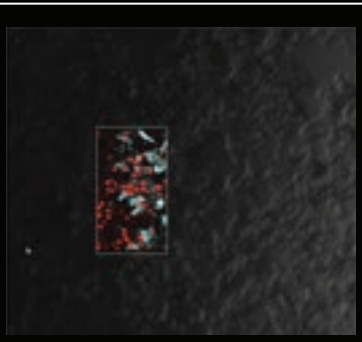
Beam pivoting to remove sample-dependent stripes

Beam pivoting

Light sheet imaging is prone to stripe artifacts caused by sample scattering. Viventis SCAPE is equipped with beam pivoting, which illuminates the sample from multiple angles, thereby reducing stripe artifacts for cleaner, more uniform images



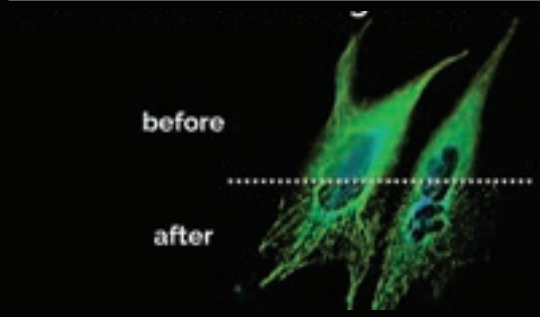
Navigation with oblique view



Navigation with Slice of Live

On-the-fly deskewing

Single-objective light sheet imaging produces an oblique view that can make navigation and analysis challenging. With Slice of Live, Viventis SCAPE transforms this oblique view into a familiar, conventional xyz-perspective – making sample navigation intuitive. Real-time deskewing and reslicing during acquisition ensure that your data are delivered in a familiar, widefield-like format, ready for immediate analysis.



SCAPE optimized computational clearing and LIGHTNING for enhancing contrast and resolution

Computational clearing

Viventis SCAPE-optimized computational clearing and LIGHTNING enable you to obtain images with enhanced contrast and resolution.

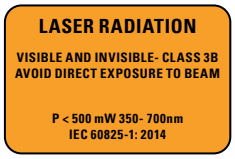
ACKNOWLEDGEMENTS

Page 2

1. U2OS cells temporarily transfected with EB3-mBaojin. Image stack shown with depth coding. Construct kindly provided by Kiryl Piatkevich Westlake University. 10.1038/s41592-024-02203-y. Imaging speed 1.5s/volume. Scale bar, 50 µm.
2. Snapshot from a time-lapse of ovulation inside live adult C. elegans. Sample courtesy of Jan Felix Geisler, Stephan Grill lab. Scale bar, 20 µm.
3. Fixed spheroids generated from T47D cell line expressing LifeAct-RFP (cyan) and H2B-GFP (red). Shown are snapshots from a multi-position imaging experiment. Scale bar, 100 µm.

Page 6

1. COS-7 cells stained with DAPI (blue), TOMM20–Alexa Fluor 488 (magenta), tubulin–Alexa Fluor 568 (green), and SiR-Actin (yellow). Scale bar, 50 µm. Sample imaged using Stop & Go mode and processed with LIGHTNING, adapted for Viventis SCAPE. Sample courtesy of Nicolas Schilling, Eliska Macickova & Urs Ziegler, Center for Microscopy and Image Analysis, University of Zurich, Switzerland.
2. Zoomed-in view of mouse brain slice labelled with Claudin-GFP followed by rendering using AIVIA. XYZ size of a single volume captured: 200 × 350 × 99 µm. 1,187 tiles were acquired covering a total area of 7.92 mm³. Scale bar, 200 µm. Sample courtesy of Urs Ziegler, Center for Microscopy and Image Analysis, University of Zurich, Switzerland.
3. 2-day old zebrafish embryo labelled for endothelial cells (fli1a:EGFP) to show the vasculature. Mosaic stitched image stack shown in depth coding. Sample courtesy of Matthew A. Benton, Developmental Biology Unit, EMBL, Heidelberg, Germany. Scale bar, 100 µm.
4. Platynereis dumerilii, fixed whole-mount 6-day old larvae. DAPI signal shown in yellow and two different RNA-FISH signals in red and cyan. Scale bar, 50 µm. Sample courtesy of Luca Santangeli, Arendt lab, EMBL Heidelberg, Germany. Scale bar, 50 µm.



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Leica Microsystems CMS GmbH | Ernst-Leitz-Strasse 17–37 | D-35578 Wetzlar (Germany)
Tel. +49 (0) 6441 29-0 | F +49 (0) 6441 29-2599

https://go.leica-ms.com/viventis-scape