

VICTOR CHANG
CARDIAC
RESEARCH
INSTITUTE
**INNOVATION
CENTRE**



Micro Imaging Facility



Micro Imaging Facility

The Victor Chang Cardiac Research Institute Innovation Centre's Micro Imaging Facility specialises in three-dimensional imaging and subsequent analysis. The facility houses Lightsheet, Micro-CT and high-content microscopes that reduce imaging time from hours to minutes, revolutionising the field.

These state-of-the-art microscopes acquire three-dimensional datasets of small specimens (0.1 mm up to 30 mm) for the purposes of anatomical phenotyping, gene and protein expression analysis, and live embryo and tissue imaging.

Based at the Victor Chang Cardiac Research Institute, the facility provides unprecedented real-time insight into the formation of organs, while helping researchers detect heart and other birth defects.

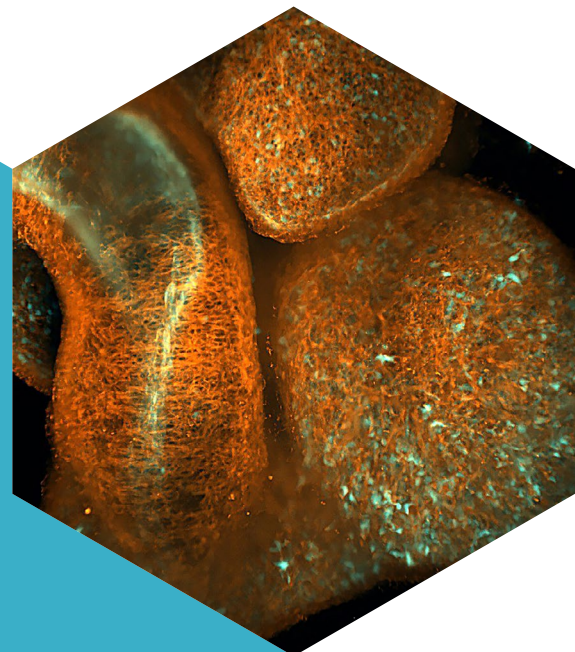
SkyScan 1272 Micro-CT (Bruker)

This X-ray based system produces high-resolution, three-dimensional isotropic datasets from fixed biological samples. It is designed for rapid 3D imaging of specimens between 0.5 mm and 75 mm.

Acquisition of high-contrast structures such as bone, as well as contrast-enhanced micro-CT methods, are possible. The three-position, 16 Mp cooled CCD camera makes it possible to image up to 209 megapixel (14450 × 14450 pixels) and detect sample detail as small as 0.4 micron.

An automatic sample changer allows automatic acquisition of datasets from as many as 16 samples in 8–16 hours. The system excels in capturing fine internal anatomical detail of small, fixed biological samples, such as mouse and zebrafish embryos, but can also image adult samples.

- Generates high resolution 3D datasets of internal anatomy
- Contrast enhancement for object detail to 0.4 micron
- 20–100 kV X-ray source
- 6-position automatic filter changer for energy selection
- GPU-acceleration and InstaRecon® for fast 3D reconstructions
- Maximum scanning diameter of 75 mm with an integrated micro-positioning stage
- 3D volume and distance measurements, surface and volume rendering



Lightsheet Z.1 LSFM Microscope (Zeiss)

The Z.1 excels at rapid 3D data acquisition, producing multi-channel fluorescence datasets of living or fixed, stained and optically cleared samples between 0.1 mm and 5 mm with efficient stitching, fusion and deconvolution algorithms.

The system supports continual culture and repeated imaging of living embryos, tissue explants and embryoid bodies over several days with limited photobleaching. Typical imaging speeds vary between 10–40 frames per second.

The 4-axis sample positioning system allows imaging from any perspective, and multiview acquisitions increase axial resolution. The system features two illumination objectives and uses ultrafast pivot scanning to reduce shadowing effects. Solid-state lasers provide excitation lines at 405, 445, 488, 515, 561, and 638 nm, with simultaneous two-channel detection.

Perform fast imaging of cellular dynamics in embryos and tissue like cell migration, heart morphogenesis, blood flow, vascular development or calcium imaging.

Benefit from reduced photobleaching and phototoxicity when live imaging 3D cell cultures, spheroids and cysts, tissue, embryos, and organotypic cultures to analyse cell migration, expression patterns and cell proliferation.

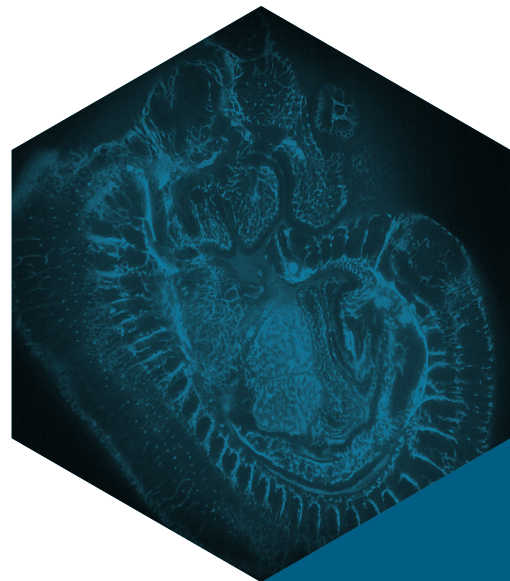
- Capable of imaging optically cleared samples
- Two illumination objectives with ultrafast pivot scanning
- 4-axis sample positioning and multiview acquisitions
- Temperature, O₂ and CO₂ environmental control of the sample chamber
- Solid-state lasers for excitation at 405, 445, 488, 515, 561, and 638 nm
- Simultaneous two-channel detection via 2× PCO. Edge 16-bit sCMOS cameras
- 5× dry, 10× water, 20× water, and 20× clearing objectives
- 2.5× system optical zoom for magnifications of 2×–100×

Opera Phenix high-content microscope (PerkinElmer)

High content screening platform for imaging the structure and molecular contents of cells.

Rapidly image multi-well trays in multiple channels using wide-field or spinning disk confocal detection. Powerful Harmony analysis software provides means to distinguish and quantify many cellular and sub-cellular parameters.

- 6–1536 well format
- Microlens-enhanced Nipkow spinning disk with dual-view confocal optics
- Two large format sCMOS cameras with simultaneous acquisition for increased throughput
- Environmental control for live cell imaging
- Digital phase contrast for label-free cell tracking
- Custom-designed high NA water immersion objectives
- Harmony software for semi-automated acquisition and analysis



The power of discovery

The Victor Chang Cardiac Research Institute Innovation Centre is heralding a medical research revolution.

Proudly supported by the NSW Government, the Innovation Centre gives researchers access to state-of-the-art equipment and cutting-edge technologies, including two MRI scanners, a series of mass spectrometers, micro-CT, iPSC automated robotics and a cryo-electron microscope.

The Victor Chang Cardiac Research Institute Innovation Centre is pushing the boundaries of knowledge by facilitating a new era of collaboration between researchers across the state and the Asia Pacific, transforming the landscape of cardiovascular research.



Enquire about the Micro Imaging Facility

Dr Scott Page, BSc, PhD
Head, Micro Imaging Facility

E s.page@victorchang.edu.au

Level 7, Lowy Packer Building
405 Liverpool Street
Darlinghurst NSW 2010
Australia

www.victorchang.edu.au/Innovation-Centre