

Cellular Imaging

Research Administration
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Fred Hutch's Shared Resources are catalysts for lifesaving discoveries. This uniquely centralized program of 15 specialized core facilities and scientific services drives advances by integrating dedicated experts and cutting-edge technologies across the entire research pipeline, from basic science to clinical trial.

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Zeiss LSM 780 Confocal and Multi-Photon with Airyscan Confocal and multi-photon microscope

Excitation sources

- Lasers: 405 nm, argon (458, 488, 514 nm), 561 nm, 594 nm 633 nm, Coherent Chameleon pulsed 690 to 1064 nm (2p excitation)

Objectives

- 10x/0.45 (air), 20x/0.8 (air), 40x/1.3 (oil), 40x/0.8 (water), 40x/1.1 (water), 40x/1.2 (water), 63x/1.4 (oil), 100x/1.45 (oil)

Detectors

- Spectral detection, gallium arsenide phosphide (GaAsP), PMT

Capabilities

- Confocal imaging of up to eight channels
- Z-stack acquisition
- Time-lapse, live-cell imaging
- Large area acquisition with automatic image stitching
- Spectral unmixing
- Multi-point imaging
- Fluorescence recovery after photobleaching, or FRAP
- Fluorescence resonance energy transfer, or FRET
- Multi-photon imaging

Recommended uses

- Tissue sections
- Adherent cells
- Fly and worm embryos
- Adult worms
- FRAP/FRET
- Deep imaging of thick specimens
- Live imaging
- Imaging of unconventional fluorescent dyes
- Separation of spectrally close dyes
- Background removal

General information

Confocal microscopy uses optical methods to remove out-of-focus signal, thereby providing high-contrast images of thick fluorescent specimens. The benefits of multi-photon imaging include deeper sample penetration, excitation of molecules that are not readily excited with conventional visible-range lasers, and increased viability of certain types of specimens during time-lapse imaging. The Zeiss LSM 780 NLO is a state-of-the-art confocal and multi-photon microscope that offers outstanding versatility and sensitivity, and it is the Cellular Imaging shared resource's workhorse for imaging the broadest range of specimens, including cells, tissue sections, biopsies, fly embryos, embryonic and adult worms, and more. The system is equipped with a filter-less spectral detector (Zeiss QUASAR detector), allowing users complete freedom in setting up detection bands. The system is also ideal for the acquisition of spectral scans and the separation of spectrally overlapping signals.

Specifications

- Zeiss Observer Z1 inverted microscope stand
- Five lasers in the visible range providing up to seven excitation lines (405, 454, 488, 514, 561, 594 and 640 nm)
- Freely tunable spectral detection system (QUASAR detector), allowing the imaging of virtually any dye in the visible spectrum (410 to 720 nm).
- GaAsP photomultipliers with extremely high sensitivity
- Coherent Chameleon Vision II ultrafast pulsed infrared laser, which has a broad, continuous tuning range (680 to 1080 nm) and allows two-photon and multi-photon excitation of a variety of dyes and fluorescent proteins.
- Dedicated, extremely sensitive GaAsP BiG non-descanned detector, which achieves efficient collection of two-photon signals
- Wide range of superb Carl Zeiss objectives available for virtually all imaging needs.
- Advanced ZEN acquisition software with automated features such as large area acquisition (tiling) and multi-point visiting
- Photoactivation and photobleaching (FRAP) experiments possible
- Stage-top incubators providing controlled temperature and atmosphere for live cell experiments can be used.