**Live Microscopy Core**The Live Microscopy Core (LMC), directed by Christian I. Hong, PhD and managed full-time by Chet Closson, provides high resolution fluorescence microscopy for both fixed and live samples. The facility provides training and access to multiple laser scanning confocal microscopes, as well as widefield, stereo and dissection microscopes. Stage top incubation accessories are available for all microscopes to control temperature, CO2, and humidity during live time lapse imaging of living samples. Additional equipment available are Laser Capture Microdissection, multimode plate reader, real-time PCR systems, Li-Cor infrared imager, cryostat, and a dedicated image analysis workstation. The LMC is housed in an 800 sq ft lab space on the 3rd floor of the Medical Sciences Building. Access to the facility and equipment is available 24/7 via keycard swipe for approved trained users. For live imaging experiments, workspace is available for animal and/or tissue preparation directly prior to imaging, including a hood for anesthesia, surgical instruments, fiber optic lights, heating pads, and various perfusion pumps and imaging chambers.

**Equipment**

1. Zeiss LSM710 LIVE Duo Confocal Microscope. Equipped with two separate scanning units, the fast-speed line (LIVE) scanner (up to 120 frames/sec at 512x512) and the LSM710 high-resolution point scanner, integrated into the same microscope. Point Scanner: 6 laser lines (405, 458, 488, 514, 560, 633nm) and 4 detectors (3 spectral confocal fluorescence plus 1 transmitted light detector). LIVE fast line scanner: 3 laser lines (405, 488, 560nm) and 2 confocal fluorescence detectors. The Duo system allows the two scanners to be used in combination for complex, high-speed bleaching or photomanipulation experiments. Temperature-controlled environmental chamber encasing entire microscope.
2. Leica Stellaris 8 Confocal Microscope. Equipped with a White Light Laser (range from 440 nm up to 790 nm) as the excitation light source, an Acousto Optical Beam Splitter, and offers highly sensitive, prism-based spectral detection with computer-controlled adjustable bandwidth for all internal detection channels. The system includes a 405 nm laser and VIS laser excitation light sources, as well as 5 Power HyD® hybrid detectors which provide enhanced detection efficiency and photon counting. The Stellaris 8 allows researchers to select up to 8 single excitation wavelengths and separate at least 13 fluorophores in each experiment. The system includes a conventional and resonance scanner (Tandem) along with Dynamic Signal Enhancement and LIGHTNING software to deliver superb image quality at live-cell dynamic speeds and in super-resolution. Stellaris 8 comes with TauSense software that provides additional information for functional imaging (Tau-Contrast), removal of undesired signal contribution (Tau-gating) and enables separation of spectrally overlapping fluorophores with varying lifetime differences (ex: Alexa 555 and Alexa 594). Stage incubation system is included.
3. Leica DMi8 Widefield Fluorescence Microscope. Widefield microscope system equipped with a stage-top incubation chamber for live time-lapse imaging experiments in brightfield and fluorescence. Color camera for histology and phase contrast imaging, and high-sensitivity Hamamatsu ORCA-ER cooled CCD camera for fluorescence imaging. LED light source and 5 fluorescence filters (DAPI, GFP, YFP, Texas Red, CY5). Motorized stage enables image stitching of large regions at high magnification.
4. Leica MZ16FA Stereo Zoom Fluorescence microscope. Continuous zoom from 7x – 230x total magnification. Host computer drives 12-bit color camera to capture digital images in bright field, dark field, or fluorescence. Filters for UV and GFP fluorescence excitation or can accept user-defined filters. Stereo microscopy allows viewing specimens three-dimensionally, with great depth of field, in large fields of view.
5. Arcturus (Applied Biosystems) ArcturusXT Laser Capture Microdissection microscope**.** Automated collection of specific cells of interest directly from tissue sections, suitable for RNA, DNA, and/or protein analysis. Up to three slides can be mounted simultaneously, and regions to be collected can be defined under transmitted light imaging and/or fluorescence imaging. Objective lenses: 2X/0.06NA, 10x/0.3NA, 20X/0.45NA, and 40X/0.6NA. Fluorescence filters: Blue (EX 455-495nm, EM >510nm), Green (EX 503-548nm, EM >565nm), Red (EX 570-630nm, EM >655nm). An IR laser melts a microscopic region (7-micron diameter) of thermoplastic film that attaches to the desired tissue region(s) and provides the mechanism to capture. Optionally, a UV laser is used for surgical cutting (submicron cutting width) of surrounding tissues or the membrane upon which tissue is placed, to more strictly isolate the central region for IR capture. In addition to tissue sections, LCM can be performed on living cells, cell smears, or plant tissue.
6. Perkin-Elmer EnVision Multilabel Plate Reader**.**

High-speed plate reader for detection of luminescence, absorbance, fluorescence intensity, fluorescence polarization, HTS AlphaScreen, and time-resolved fluorometry. Includes plate stacker for up to 50 plates, plate shaker, and dispenser with 2 pumps for injection. Compatible with plates for 24-well up to 1536-well plates.

1. Li-Cor Odyssey CLx Infrared Imager**.** Infrared fluorescence detection and quantitative analysis of Western blots. Two IR lasers (680nm and 780nm) for simultaneous two-color excitation and fluorescence detection on individual blots. Can also be used to detect whole body fluorescence of anesthetized animals.
2. Leica CM1900 Cryostat**.** Microtome encapsulated in a cryochamber to cut frozen tissue sections up to 60 micrometers thick. Includes separate specimen cooling system, independent of chamber cooling, both adjustable from 0 to -35 degrees Celsius.
3. ThermoFisher QuantStudio 5 Real-Time PCR. Uses 384-well plates to allow more samples to run simultaneously with less reaction volume (5-20µL). Run time <30 minutes. Multiplexing up to 5 targets. OptiFlex® technology (featuring 5 coupled channels and white LED) and featuring six independent Veriflex® temperature zones. Thermo Connect cloud-based software to view and analyze data remotely via web browser.
4. ThermoFisher QuantStudio 3 Real-Time PCR. Uses 0.1mL 96-well plates. OptiFlex™
technology (featuring a bright white LED with 4 coupled channels) and 3 Veriflex™ zones. Run time <30 minutes. Multiplexing up to 5 targets. Thermo Connect cloud-based software to view and analyze data remotely via web browser.
5. ThermoFisher StepOnePlus Real-Time PCR. Uses 96-well plates, 10-40 µL reaction volume. Run time: 40 minutes (Fast Mode) or 2 hours (standard mode).
6. Image Analysis Workstation (Imaris). High-end workstation for image processing and analysis, with a license of Imaris (Bitplane) for automated analysis of large, complex 4D image files.