

Optical Biology Core (OBC)

Rahul Warrior, PhD
Director

Mission and Leadership



MISSION

OBC is a matric of 4 cores that provide access to cutting-edge imaging and sorting capabilities

To fulfill this mission, **OBC** operates the:

- **Self-Use Facility (SUF)** offers confocal, lightsheet and two photon microscopes for deep tissue, whole tissue, and fluorescence lifetime (FLIM) and Super Resolution imaging
- **Laboratory of Fluorescence Dynamics (LFD)** is dedicated to the development and application of advanced fluorescence microscopy techniques for studying molecular dynamics and interactions in biological systems.
- **Non-Linear Optical Microscopy (NLOM)** Laboratory specializes in multiphoton microscopy-based imaging with large fields of view and rapid scanning for diagnosing skin cancers and other skin conditions and monitoring skin therapies. NLOM focuses on collaborative equipment use, development and protocol design
- **Flow Cytometry Facility (FCF)** operates a suite of multi-parameter flow cytometers equipped for fluorescence activated cell sorting and/or analysis

LEADERSHIP



Rahul Warrior, PhD
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Michelle Digman, PhD
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Self-Use Facility (SUF)

Walk-up use of suite of microscopes

- 4 confocal microscopes with training on advanced imaging techniques such as Airyscan imaging, Spectral Imaging and 2-photon microscopy
- Single plane illumination microscope (SPIM) able to analyze both live sample and cleared tissues. The Z1 has four laser lines (405 nm, 488 nm, 561 nm, 633 nm) and a custom chamber for organically cleared samples
- Super Resolution Lattice SIM with SMLM capabilities and 60nm resolution with SIM2 for live super resolution (255fps/60nm)

Laboratory for Fluorescence Dynamics (LFD)

A national research resource center for biomedical fluorescence spectroscopy with over 12 instruments for dynamic imaging

- The LFD designs, tests, and implements advances in the technology of hardware, software, and biomedical applications
- Dynamic imaging modalities include: metabolic Imaging, NADH metabolism, OXPHOS/Glycolysis, Bioluminescent immune reporters and fluorescence metabolic reporters

Non-Linear Optics Microcopy (NLOM) Laboratory

Develops biophotonics technologies for basic research and pre-clinical/clinical applications via nonlinear optical microscopy (NLOM)

- NLOM for optical coherence tomography, diffuse optical spectroscopy and imaging, spatial frequency domain imaging, laser speckle imaging, Coherent anti-Stokes Raman Scattering (CARS) and FLIM to enable multi-photon deep tissue imaging

Flow Cytometry Facility (FCF)

Self use of suite of cytometers

- 4 multi-parameter flow cytometers including one equipped for fluorescence activated cell in a BSL2 cabinet featuring downstream applications of single cell cloning and single cell analysis.
- Access to: High-end workstations for data analysis, including advanced 3D/4D analyses and cell sorting analysis

All four components of the OBC provide:

- Letters of support, training and research consultation
- Grant preparation: Assistance with study design, data processing, analysis strategies and letters of support
- Imaging and Flow Cytometry Workshops offered multiple times throughout the year for Faculty, Students, Staff and visiting scholars

More information regarding all services can be found at: <https://cancer.uci.edu/optical-biology-core>

Self-Use Facility and Laboratory of Fluorescence Dynamics

- Extensive training sessions on the use and capabilities of the newly installed LSM 980 microscope and other instruments and Image analysis software
- Participants, from Community College and high schools in OC participated in a program to foster scientific interest. The main aim was to expose students to technology driven science research. Students were given lectures on the basics of microscopy, optics, imaging methods, biophotonics and computational data analysis. They selected specific research topic and performed experiments, implement experimental design and use advance computational methods to test their hypothesis. In addition, they attended lectures by a group of faculty members, postdocs and students.
- LFD and OBC partnered to host Hand-on workshop on Advanced Dynamic Imaging. > 50 researchers from around the world attended a 4 days workshop at UCI in October that included lectures and training on Image Correlations, FLIM, super-resolution and Deep tissue imaging

Non-Linear Optics Microcopy (NLOM) Laboratory

- FlowJo™ Software v10 Training: Intro/Refresher (2h), Comp (1h), QC/Norm samples (1h), and Height parameter using algorithms (2h)
- BD Biosciences flow cytometry lunch and learn: Fundamentals of flow cytometry panel design & Breaking barriers with BD FACSDiscover™ S8 Cell sorter: Increase experimental capabilities and discover what was previously impossible

Flow Cytometry Facility (FCF)

- Lectures and hand-on activities on the imaging resources in our lab offered as part of the on-campus workshop in Advanced Fluorescence Imaging and Dynamics, the Annual Short Course on Multiscale Biophotonics and the course on Modern Imaging and Cancer offered by Cancer Research Institute at UCI
- Regular hands-on training on the use and capability of the Leica SP8 Falcon/CARS in our lab

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Thank You
