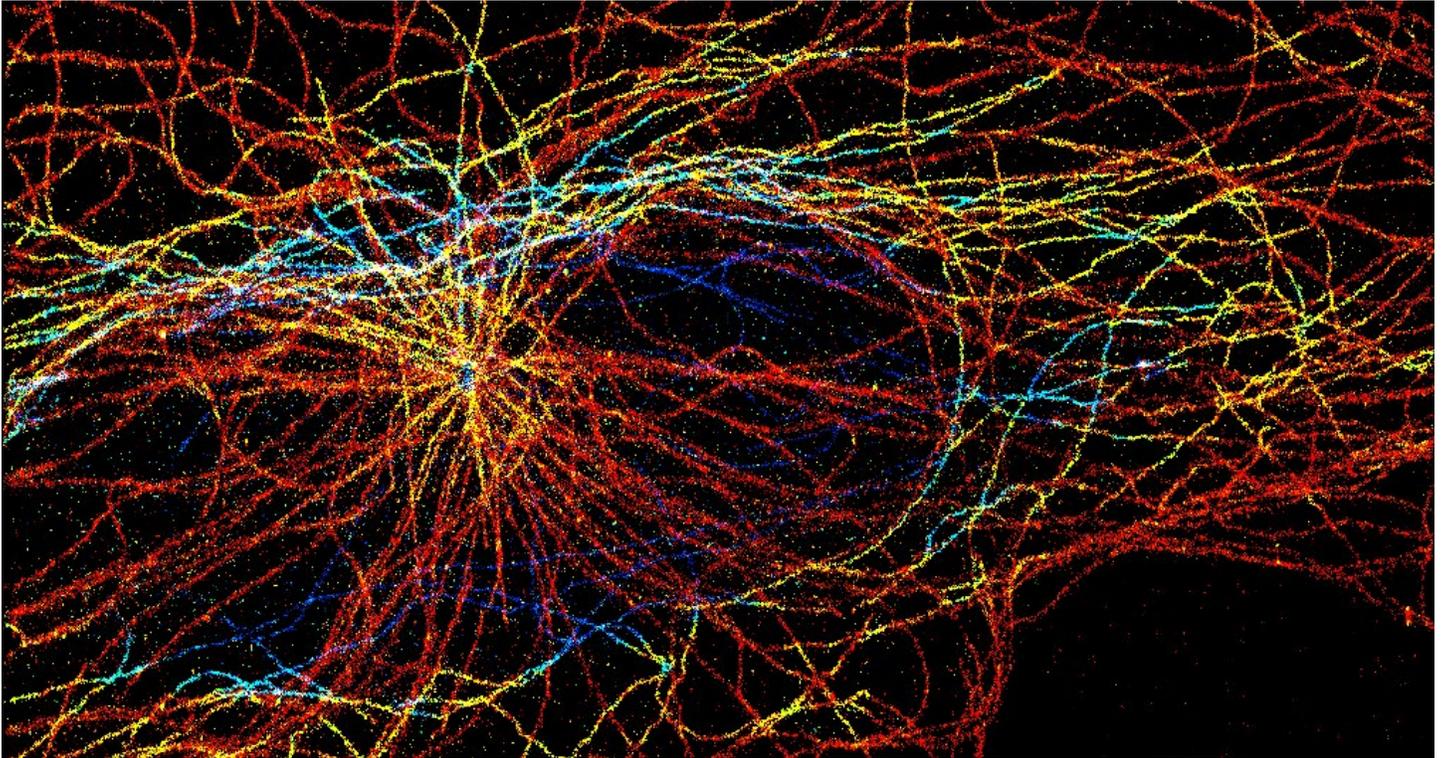


Breakthroughs

Feinberg School of Medicine Research Office

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This image depicts microtubules labelled with the dye Alexafluor-647 and was generated on the Nikon Stochastic Optical Reconstruction Microscope (N-STORM).

Next-Generation Imaging Advances with New Leadership, Big Ideas

Josh Rappoport, PhD, aspires to build Northwestern into a mecca for imaging technologies and collaborations.

As the director of the new Center for Advanced Microscopy at Northwestern University Feinberg School of Medicine, [Rappoport](#) has big plans for expanding the center by adding instrumentation, innovative imaging techniques, and talent.

“The idea is to have everything under one umbrella so that we maximize efficiency, integrate staffing, and have a single web-based portal for information and support,” says Rappoport, who arrived at Feinberg in March 2014. He is also a research associate professor of [Cell and Molecular Biology](#).

Rappoport’s goals for the center include enhancing advanced electron microscopy techniques, developing live fluorescence imaging, and collaborating with Nikon to develop super-resolution microscopy techniques. He also brings his experience in automated image processing and analysis to expand on computational imaging in the center.

Started in 2002, the facility has grown imaging at the medical school from a departmental core with three instruments to a university-wide imaging center with more than 15 instruments that caters to more than 180 labs.

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Advancing Next-Generation Imaging

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The center's management now consists of Dina Arvanitis, PhD, manager of the [Nikon Imaging Center](#), Lennell Reynolds, electron microscopy specialist, and Wilson Liu, MD, microscopy specialist. The growing team expects to add a new advanced electron microscopy specialist in the next few months.

The facility provides leading edge imaging technology from light, fluorescence, and in vivo imaging, including laser capture micro-dissection, digitally-controlled environmental chambers for live cell observation, computerized image analysis, and digital image manipulation. The center also serves as an instrument evaluation and testing site for new equipment, and as a learning center for staff, faculty, and students.

With the recent contract renewal of the Nikon Imaging Center, Rappoport and Arvanitis hope to expand on workshops offered to scientists, upgrade existing equipment, and add another laser scanner confocal, the most popular instrument in the facility.

"We hope to build the frequency of workshops and seminars that are offered to users," Arvanitis says. "When scientists have more familiarity with advanced imaging techniques and how to analyze their images, they can get more out of their data and experiments."

Since January the center has acquired three pieces of equipment and developed new industrial collaborations.

Nikon and ISS, a manufacturer of fluorescence and biomedical instrumentation, collaborated to create a microscope capable of performing fluorescence lifetime imaging microscopy (FLIM). FLIM allows scientists for the first time to decipher how molecular interactions and activities may direct normal and diseased biological functions.

In addition the center has acquired a Nikon structured illumination microscope (SIM) for live imaging. The center has built a new relationship with Okolab, a European manufacturer of incubators for time lapse experiments, to assess a microscope incubator that allows samples to be tested in different gas



Josh Rappoport, PhD, pictured here, serves as director of the state-of-the-art Center for Advanced Microscopy at Northwestern.

mixes at the same time.

"I think the key is to use our center as a conduit between the user base and the companies. We have the Nikon Imaging Center, and there are a wide variety of other companies that we have relationships with. To address campus needs, we work together with companies and users to develop and bring in leading-edge techniques and technologies," says Rappoport.

Rappoport plans to add correlative light-electron microscopy (CLEM). CLEM combines the capabilities of light microscopy and electron microscopy, providing scientists the ability to observe the biological structures and relationships in ultra-resolution with the same sample.

"Right now, we are really interested in doing electron microscopy and fluorescent microscopy on the same samples," says Rappoport. "By obtaining complimentary information from the different techniques, it allows us to do correlative studies."

Before arriving at Feinberg, Rappoport was a senior lecturer in molecular cell biology at the University of Birmingham in the United Kingdom, and co-director of the Birmingham Advanced Light Microscopy Facility. He earned his graduate degree from Mount Sinai Graduate School of Biological Sciences of New York University and completed post-doctoral studies at The Rockefeller University, also in New York.

His [lab](#) in England continues to investigate the process of endocytosis, or how cells internalize molecules, using live cell imaging strategies.

For Rappoport, coming to Northwestern gives him the opportunity to focus more on leading a core facility.

"I wanted to dedicate myself to a world-class facility in a leading medical research environment," he says. "I came to Northwestern to focus on what is most interesting and exciting for me, which is technique development and working together with a wide user base to develop and implement advanced technologies."

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