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2010-07-28: Getting a better picture of disease

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Getting a better picture of disease

Mark Niedre (left), Assistant Professor of Electrical & Computer Engineering, and student Niksa Valim (right) work with a microscope that can track tumors in a laboratory at Northeastern. *Photo: Mary Knox Merrill*

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Mark Niedre, assistant professor of **Electrical and Computer Engineering**, has been awarded a four-year, $1.3 million grant from the National Institute of Biomedical Imaging and Bioengineering to develop a high-resolution fluorescence imaging system that could help researchers study the progression of diseases and the efficacy of their treatment.

Niedre will lead a team of researchers including Electrical and Computer Engineering professor Dana Brooks, an expert in biomedical image processing and Harvard Medical School professor Bakhos Tannous, an expert in brain-tumor biology.

The major goal of research will be to develop an imaging system that has improved resolution compared to current systems, as well as to give researchers the ability to image an array of bio-molecular targets simultaneously.

Three-dimensional laser imaging of animals is currently used as a technique for studying disease biology, but the quality of the images is limited by the fact that light scatters strongly in biological tissue, essentially blurring the image.

Niedre proposes to address the problem using high technology, ultra-fast lasers combined with a technique known as time gating to help remove this scatter and improve the image.

Overcoming the second challenge—visualizing multiple molecular targets—is especially critical to helping researchers get a complete picture of how a disease like cancer progresses and how it responds to new drugs and other therapies.

In a fluorescent imaging system, researchers can "see" the genes and molecules they are interested in studying using fluorescent labeling. When excited by laser light, labeled targets re-emit light in a second color that the researchers can detect, but current technology allows them to image only one or two targets at a time. Niedre and his team hope to develop technology to study five or more targets at once in a live animal.

"We really want to tackle the problem of high-throughput imaging," noted Niedre. "The idea is that you can look at an array of four or five molecules that will help you understand how cancer develops, spreads, or responds to a new treatment.

"It is important to study these processes in live animals, since the situation is much more complex than, say, just looking at cells in culture."

The team will first use the new imaging system to study the development and progression of brain tumors and other cancers in mice, which could lead to improved treatments in humans. The system could also be used to study how disease responds to new therapeutic drugs, which could help researchers to optimize new clinical therapies.

For more information, please contact Samantha Fodrowski at 617-373-5427 or at s.fodrowski@neu.edu.

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