

National Technology Center for Networks and Pathways

Title of Grant: Fluorescent Probes and Imaging for Networks and Pathways

Grant Amount: \$13.3 million over five years

Principal Investigator: Alan Waggoner, professor of biological sciences at Carnegie Mellon University and director of the Molecular Biosensor and Imaging Center

Center Director: Alan Waggoner

Center Co-Director: Simon Watkins, professor of cell biology and physiology at the University of Pittsburgh and director of the Center for Biologic Imaging

Cores:

Technology Development

■ **Fluorescent Probe Development**

- ◆ **Carnegie Mellon University — Alan Waggoner**
Build a toolkit of multi-color molecular biosensors to elucidate cellular networks and pathways.

■ **Imaging**

- ◆ **University of Pittsburgh — Simon Watkins**
Integrate the fluorescent probes with cells, reagents and detectors to create new imaging methods.

■ **Informatics**

- ◆ **Carnegie Mellon University — Robert Murphy**
Develop tools to extract information from fluorescence microscope images and integrate this information with other networks and pathways databases.

Training and Dissemination

- Train students, visiting scientists and the international scientific community in using fluorescence-detection technologies through training programs and Web-based resources.
- Disseminate materials, techniques and applications to the scientific community through technology transfer activities, an up-to-date web site and scientific workshops that will bring together technology experts and cell biologists.

Driving Biology Projects

Collaborate with four scientists to receive real-time feedback on the function of the probes and to develop know-how, materials and methods for using the probes.

① **John Lazo, University of Pittsburgh**

Lazo will use the fluorescent probe and imaging technology to identify drug targets that will disrupt key elements involved in the cell cycle, thereby allowing scientists to curb cell division to improve cancer treatment or to promote cell division to advance regenerative medicine.

② **Brooke McCartney, Carnegie Mellon University**

McCartney will conduct live cell imaging experiments using the new fluorescent probes to understand the role a colon cancer tumor suppressor protein plays in a dynamic cellular pathway used within cells to regulate processes during animal development, and to maintain daily cell functions, including the regulation of cell division.

③ **Garry Nolan, Stanford University**

Using a technique called multi-color, multi-dimensional flow cytometry, Nolan will simultaneously measure the activity of kinases, molecules that play a critical role in the cellular pathways involved in the development of leukemia.

④ **Ehud Isacoff, University of California, Berkeley**

To gain deeper insight into the activity of neurons, Isacoff will use the new fluorescent probes to image the molecular-scale changes that occur at synapses, the communication junctions between neurons.