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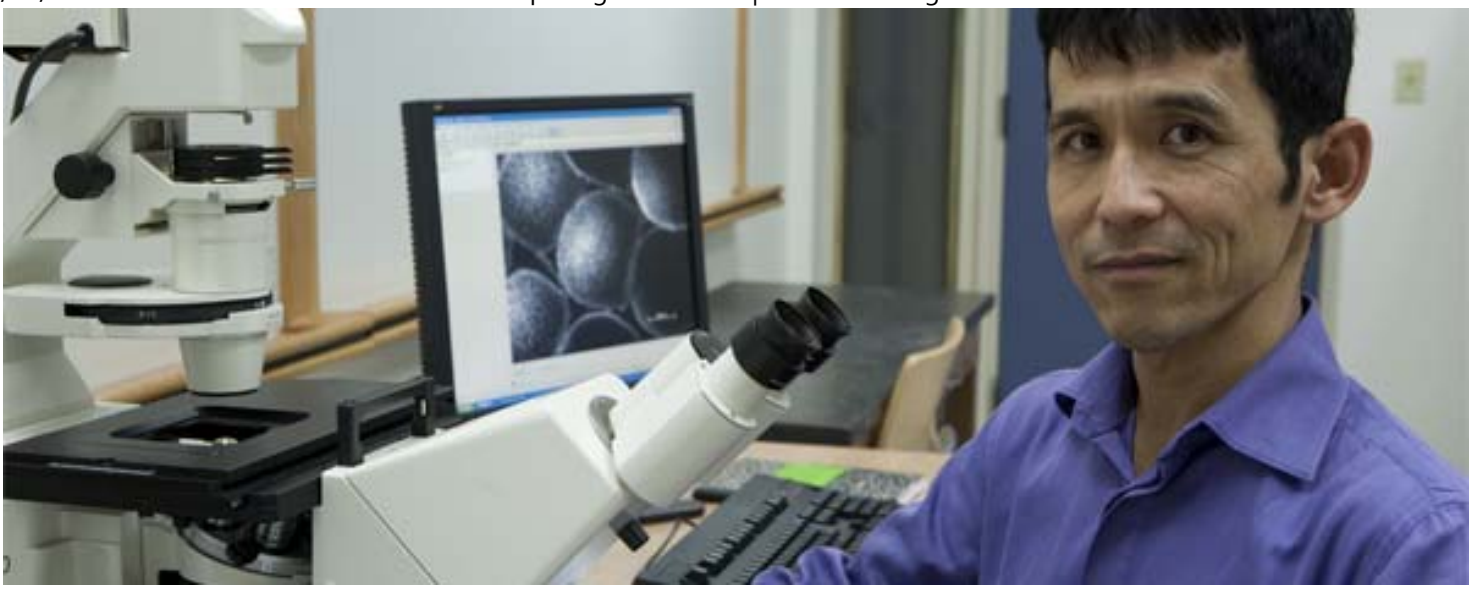
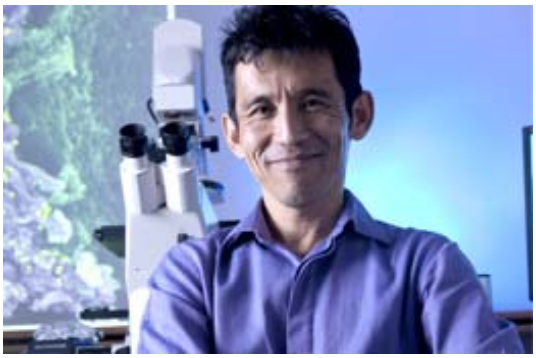
Propelling Proteomics



A visionary UM scientist hopes to do for proteomics—the study of proteins—what the mapping of the human genome did for genomics.



Akira Chiba, a professor of development and neuroscience in the Department of Biology

Visualizing Living Systems

Until recently, it wasn't possible to watch living proteins at work. Yet today, says Akira Chiba, a professor of development and neuroscience in the Department of Biology at the University of Miami's College of Arts and Sciences, "We can study proteins as they bind and signal with each other to form complex signaling networks." The photon-based microscope that Chiba's colleague Daichi Kamiyama helped design will allow the biologists to study how individual proteins interact with one another in their natural environment—as intact cells that have not been dissected.

These insights are made possible by fluorescence lifetime imaging microscopy, which takes three-dimensional images of living tissue at least 50 times faster than anything else previously found in a lab. Kamiyama played a major role in the microscope's development while working as a researcher at the University of Illinois at Urbana-Champaign before joining Chiba at UM as a research assistant professor.

Analyzing Protein Pairs

Chiba notes that he and Kamiyama have used the new microscope "to demonstrate that the binding of two interacting proteins can be visualized directly within the intact brain of a fruit fly. It's a remarkable achievement that we now propose to repeat for 10,000 different protein pairs in the first 24 months of our project." UM's Center for Computational Science will provide memory space and assist in data analysis.

By the end of the current project, funded by a $2.6 million NIH stimulus grant, the team hopes to have created a map of protein interactions, shining new light on the dynamics of the molecules of life and transforming the field of proteomics. “Now we have direct access to the protein network,” Chiba says, “and that should help improve medical strategies.”

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