

SOUTHWESTERN NEWS

Media Contact: Worth Wren Jr.
214-648-3404
worth.wren@utsouthwestern.edu

UT SOUTHWESTERN TO GET POWERFUL ELECTRON MICROSCOPE

DALLAS – Sept. 12, 2001 – To focus at the molecular-level on the mechanics of human cells with a clarity rarely possible, UT Southwestern Medical Center at Dallas will install a \$1.6 million state-of-the-art electron microscope and related equipment, officials said today.

The custom-crafted cryo-electron microscope, paid for with Texas Permanent University Fund money, is part of a new strategy to propel UT Southwestern cell-research capabilities to a level matched by just a handful of other U.S. universities, said Dr. Richard Anderson, chairman of cell biology.

UT Southwestern also has landed the talents of Dr. Masahide Kikkawa, an internationally respected Japanese scientist skilled in using the latest cryo-EM technology to focus on cell components of less than 1 billionth of a meter in size, Anderson said.

Kikkawa and the cryo-EM are expected to become a catalyst for further research breakthroughs at UT Southwestern in basic cell biology, cellular aging and death, cancer, diabetes and obesity, cholesterol, and other research fronts, Anderson said.

The cutting-edge instrumentation brings the ability to view, analyze and computer-simulate individual molecules, clusters of molecules and other sub-cell structures, Anderson explained. That resolution, he said, is more than three times the whole-cell magnification now possible with standard electron microscopes, which typically focus down to about three nanometers, or three-billionths of a meter.

“It’s a great leap forward to be able to use cell biology, genetics, biochemistry and other disciplines to reveal how the genes, proteins and other functional components interact,” Anderson said, noting that electron microscopes costing \$200,000 to \$400,000 have sufficed for most of these investigations.

“But it’s another major stride to be able to see the actual subnanometer-size structures and the functional organization of these structures at sites in the cell where these processes take place,” he said. “That’s the beauty of this cryo-electron microscope and related technology.”

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College of Medicine, Stanford University, the University of Colorado at Boulder, and New York University School of Medicine in utilizing cryo-EM technology.

Cryo-EM uses an ultra-fast freezing technique coupled with high-powered energy filtration, a special prism that gives the electron beam a laser-like focus, new computerization and other technical enhancements to deliver three-dimensional views of cell components with a vivid resolution unequaled by standard electron microscopes, Anderson said.

“UT Southwestern has developed great scientific strength in structural biology, focusing on the techniques of X-ray crystallography and nuclear-magnetic resonance spectroscopy,” said Dr. Robert Alpern, dean of UT Southwestern Medical School.

“Acquisition of a cryo-electron microscope will allow us to extend this expertise further. To accomplish this, we performed an extensive search for an outstanding cell biologist with such expertise, and we were delighted to be able to recruit Dr. Kikkawa,” Alpern said.

Anderson said Kikkawa is one of the cryo-EM research stars in the cell biology lab of the renowned Dr. Nobutaka Hirokawa at the University of Tokyo’s Graduate School of Medicine.

Kikkawa, scheduled to join the UT Southwestern faculty by October, will supervise the 2002 installation of the \$1.6 million microscope in its remodeled niche in the Department of Cell Biology. Another \$200,000 to \$300,000 will be spent on additional instrumentation, remodeling and related startup needs, Anderson said.

Kikkawa’s focus is on the cell’s biological motors, including the molecular complexes that interact with micro-structures in the cell to move proteins or other microscopic cargo around inside the cell and from cell to cell, Anderson said.

“Dr. Kikkawa was the ideal person to bring in with this new instrumentation,” Anderson said. “He not only is a superb microscopist, but has a strong background in cell biology. When you want to acquire cryo-EM technology, you require someone with the knowledge and skills of Dr. Kikkawa.”

Said Kikkawa: “I was impressed by the attitude which is shared by the people at UT Southwestern. The attitude is to be good people, to love science and to help each other.”

He said he wants to use the cryo-EM technology to supplement UT Southwestern’s

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existing X-ray crystallography work at the cell's atomic level as well as the work with standard electron microscopes at the whole-cell level.

"People don't realize that cell biology has a huge future in understanding how the human genome works," Anderson said.

"Yes, scientists have mapped the genome. Now the real work is beginning, determining how it accomplishes what it does, how the mechanics of genetics work," he said. "We're rapidly approaching a sort of impasse where we have so much information about what's interacting with what, and we can draw all these diagrams and so forth, but we don't really know at the cellular level what's going on."

And that's where the new microscope will prove invaluable, enabling scientists to confirm or reject what's actually happening at the sub-cell level, Anderson said.

Toward maximizing cell research in every discipline and the long-term investment return from the new microscope, UT Southwestern has created its own center to provide an expanding array of imaging services for research and clinical needs, he said. The center is under the direction of Dr. Chris Gilpin, assistant professor of cell biology. Also new is The Imaging Society, which sponsors seminars and other activities to bring together cell biology interests from across the campus, he said.

"You don't know how this all is going to work out, but you have to have the technology available," Anderson said. "As soon as new technology is available, people find uses for it. You can't ask the questions unless you have the instrumentation."

With the new microscope and Kikkawa, Anderson added: "We'll have the instrumentation. We'll have the talent, and we'll attract and develop more talent."

UT Southwestern is reviewing two cryo-EM models for the purchase, and once chosen, the microscope will require about a year to construct, he said.

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