UF experts to advocate research beyond genes

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GAINESVILLE-Two University of Florida scientists are among a handful of international researchers who will influence the direction of a new field of study that goes beyond genes and into the mechanisms of life itself-the proteins produced by genes to carry out all body functions.

Ronald L. Hayes, Ph.D., and Kevin K.W. Wang, Ph.D., of the Evelyn F. and William L. McKnight Brain Institute at UF have been called by the National Institutes of Health to help assess the state of the art in proteomics-the study of the full set of proteins encoded by human genes.

Proteins are the cell's workhorses and the ultimate physical embodiment of the information encoded in DNA, the master molecule of heredity.

The UF researchers, recognized for their efforts to identify the nature of traumatic brain injuries through proteins in the bloodstream, said they will stress that investment in proteomics research will provide quick returns in the form of inexpensive tests to detect and evaluate diseases. Presentations begin Dec. 9 at the NIH headquarters in Bethesda, Md.

"The summit will increase the knowledge base of the National Institute of Neurological Disorders and Stroke. We look at this as an opportunity to influence policy," said Wang, an associate professor of psychiatry and neuroscience at the UF College of Medicine. "Experts from around the world will discuss state-of-the-art approaches and their own successes. The institute needs to be convinced that proteomics research is productive. We're going to propose that use of biomarkers-distinctive indicators of a biological event-is a short-term, achievable goal. A long-term goal is to use proteomics to understand disease mechanisms."

Wang and Hayes believe analysis of proteins released into the blood stream by brain cells after an injury could serve as biomarkers to reveal the nature of the injury.

"Right now, there is a need to provide physicians with a simple tool to assess traumatic brain injury, as well as strokes," Wang said. "Proteomics can provide that tool."

The UF researchers are among about 20 experts from as far away as the Royal Institute of Technology in Stockholm, Sweden, who will plot a direction for proteomics research. Wang will specifically talk about integrated proteomics-based approaches to the discovery of novel biomarkers for traumatic brain injury.

"The workshop deals with assessing the state of the art in the new field of proteomics and its potential to assist in studies of the nervous system," said Samir Hanash, M.D., Ph.D., a professor of pediatrics at the University of Michigan, who will co-chair the workshop. "The experts who will be present have either expertise in nervous system studies or in the field of proteomics itself. Bringing the two

groups together in a sort of summit is intended assist in developing an agenda for the field of neuroproteomics."

Wang said standard diagnostic tests, usually involving blood analysis, enable health-care professionals to assess injuries to the heart, kidney or liver. No such tests exist for traumatic brain injury.

"When someone receives a bang on the head, many times we don't know the extent of the damage without an MRI scan," Wang said. "But if we were able to draw a blood sample and assess the damage, we would know whether to send a person home or provide further treatment. With a more severe injury, when patients are hospitalized, we would be able to continually monitor how they respond to treatment."

Wang believes a biomarker test could cost about $100 per application, compared to $1,000 for a brain scan.

Traumatic brain injury is a "scandalously ignored health problem," Hayes said, with about 1.5 million traumatic brain injuries occurring annually in the United States.

However, Hayes said the scientific community is proceeding cautiously into the field of proteomics because of the complex nature of proteins.

As is the case for DNA and RNA, proteins are synthesized like "beads on a string," but with various combinations of 20 different amino acids making up the beads rather than the four molecules of RNA or DNA. Thus, whereas RNA and DNA carry a code rich in information, they are chemically simple. Proteins, by contrast, are chemically complex and diverse, which enables them to perform many different jobs.

"Proteins are changeable, slippery beasts," said Hayes, who is a professor of neuroscience, psychiatry, neurosurgery, and clinical and health psychology. "Any given protein will interact with other proteins to change structure. It morphs to many different types. I remember the first proteomics meeting I ever went to-the sign on the door said, 'Genes were easy.'"