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UF delves into roles of protein in disease

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Two UF researchers are exploring the possibilities in the field of proteomics.

As a befuddled new graduate played by Dustin Hoffman contemplates his future in the 1967 film "The Graduate," a family friend offers a bit of advice.

Summing up the young man's choice of profession and future prospects, the friend leans close to whisper: "Just one word - plastics."

Thirty-five years later, two University of Florida researchers will address a group of international scientists Monday looking into today's most promising fields of study for understanding diseases and how they operate.

And their advice: "Just one word - proteomics."

Say what?

Proteomics is the study of proteins, the cell's workhorses and the ultimate physical embodiment of the information encoded in your DNA.

With the sequencing of the three billion chemical letters of the human genetic code, scientists are now working with a finite set of possible proteins, and that has been a real advantage to researchers like Kevin K.W. Wang, associate professor of psychiatry and neuroscience, and a close collaborator with Ron Hayes, director of the Center for Traumatic Brain Injury Studies at the McKnight Brain Institute.

"All the hype of the human genome proved to be somewhat disappointing, in that it didn't provide an immediate solution to a number of human diseases," Wang said Thursday.

The UF researchers are among 20 experts who will gather at the National Institutes of Health to assess the potential of proteomics to assist in studies of the nervous system.

Wang and Hayes, recognized for their efforts to identify the nature of traumatic brain injuries through proteins in the bloodstream, will stress to the group that investment in proteomics research will provide quick returns in the form of inexpensive tests to detect and evaluate diseases.

"We feel that proteomic technology is particularly timely now to apply to brain injury biomarkers," Wang said.

He explained that standard diagnostic tests, usually involving blood analysis, enable doctors to assess injuries to the heart, kidney or liver.

No such tests exist for traumatic brain injury, although about 1.5 million such injuries occur annually in the United States.

"When someone receives a bang on the head, many times we don't know the extent of the damage within an MRI scan," Wang said. "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. And if the patient were hospitalized, we could continually monitor how well they responded to treatment."

Wang and Hayes have been studying proteases, enzymes that digest proteins and that become hyperactivated in brain injury. Because they are hyperactivated, Wang explained, these proteases cleave cellular proteins into a signature "fingerprint" that seems to be a long-lasting image.

"We see this as an opportunity to use those 'fingerprints' to monitor head injury," the researcher said.

He believes that a biomarker test (for such proteins released into the bloodstream after a head injury) could cost about \$100 per application, compared to \$1,000 for a brain scan.

Still, Hayes warned, "proteins are changeable, slippery beasts."

The professor of neuroscience said the scientific community is proceeding cautiously into the field of proteomics because of the complex nature of proteins.

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.

"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," Hayes said. "The sign on the door said, 'Genes were easy.'"

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