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New retrieval method makes studying cancer proteins easier

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A Purdue University researcher can better retrieve specific proteins needed to study how cancer cells form by using a newly developed technique and synthetic nanopolymer.

W. Andy Tao, an assistant professor of biochemistry, said proteins can be mapped and analyzed to find ways to inhibit the processes that lead to cancer. But first those few proteins must be fished out of a sea of thousands of others.

Tao developed and patented the polymer-based metal-ion affinity capture, or PolyMAC. The synthetic nanopolymer isolates proteins and peptides that have undergone a process called phosphorylation that is highly associated with cancer, and a patented technique allows Tao to retrieve those proteins. Obtaining the information on these proteins is important for studying how to inhibit the processes that lead to cancer.

"You really want to capture these particular proteins, but there are so many different types of proteins around them," said Tao, whose findings were published in the early online version of the journal *Molecular & Cellular Proteomics*. "The target proteins are a thousand times lower in amount than other proteins. They are difficult to study without the capturing step."

Normal cells grow, divide and eventually die. But cancer cells continue to grow and do not die. Tao said phosphorylation - in which a type of enzyme called a kinase attaches to and catalyzes a protein on a cell - is

thought in many cases to be responsible for creating cancer cells.

Tao's nanopolymer is water-soluble and has titanium ions on its surface, which bind with phosphorylated proteins and peptides contained in a solution. The polymer also has a chemical group attached that is reactive and attached to small beads, which allow Tao to retrieve the polymers.

"Once you put the nanopolymer in the solution, you have to retrieve them, so we put a handle on the polymer so we can grab on to it and fish it out of the solution," Tao said.

In laboratory tests, Tao's nanopolymer and retrieval technique isolated about twice as many proteins that had been phosphorylated by an enzyme highly expressed in certain leukemia cells but absent in metastatic breast cancer cells.

Tao is now seeking opportunities to get the polymer and technique into wider use to aid in the development of new cancer drugs.

"This technique is very useful and can be used widely in research for cancer as well as infectious diseases," Tao said.

Provided by Purdue University