MedicalXpress

Researchers unlock the protein puzzle

July 23 2014, by Michele Mcdonald

By using brightly hued dyes, George Mason University researchers discovered an innovative way to reveal where proteins touch each other, possibly leading to new treatments for cancer, arthritis, heart disease and even lung disease.

George Mason researchers unraveled the mystery of deciphering the contact points where proteins touch each other. "One protein interlocks with another protein like adjacent pieces in a jigsaw puzzle, and this sends a signal down the line to the next protein," says Lance Liotta, co-director of the Mason-based Center for Applied Proteomics and Molecular Medicine.

The mystery is in the "hot spots" where proteins interlock. Researchers know which proteins connect but couldn't pinpoint where it happens. Until now, thanks to Mason's newly published approach.

Dyes—the type used in common copying machines and textiles—are mixed with proteins. The dye paints the proteins everywhere except where the proteins are connected to one another. Then the proteins are disconnected but the dye remains, excluding the blank spot where the proteins were "kissing."

Finding ways to break up interlocking proteins could be used to locate new drug targets, says Virginia "Ginny" Espina, a professor with the center. Pharmaceutical companies could use the Mason-developed process to create drugs that break up the protein-to-protein connection or stop it from happening altogether, she says.

The team tackled a complex interaction of three proteins, called interleukin signaling, that leads to painful inflammatory arthritis and other diseases including inflammatory bowel disease. They created two inhibitors—a peptide and an antibody—that broke up the protein connection in a test tube. "Both inhibitors made these proteins fall apart and they couldn't send out a signal for inflammation," Liotta says.

Until the Mason-led advancement, researchers have struggled to figure out where proteins make contact. "It seems very easy but, in reality, it's not," says Alessandra Luchini, a professor with the proteomics center who created the experimental method.

Researchers have used computer modeling and crystalized proteins but couldn't show proteins making contact in real time, she says. "Using this tool, we now can study the protein exactly as it's found in nature," Luchini says.

And as it turns out, the printer dyes not only paint a pretty picture, but they are the perfect size to color the proteins—and they stick. The Mason team is using blue, red, purple and orange dyes.

Provided by George Mason University