



Cancer-fighting compounds

Longtime K-State chemist helps detect cancer and discover new drugs

By Marcia Locke

Duy Hua has had a long, illustrious career in organic chemistry and drug discovery. After 39 years at Kansas State University, he is set to retire this summer. But he has a couple of important cancer research projects to finish up first.

Hua, a university distinguished professor of chemistry, is an expert in medicinal and synthetic organic chemistry. He makes chemical compounds for detecting and counteracting diseases.

Hua has been involved with the Johnson Cancer Research Center since he arrived at K-State in 1982 when the center was still new. He and now-retired biology professor Jean-Pierre Perchellet studied several new anti-cancer compounds produced by Hua. Their work earned them a four-year grant from the National Cancer Institute, a part of the National Institutes of Health.

Over the years, Hua's work evolved to mainly support the development of drugs for heart and Alzheimer's diseases, viral infections and cancers. He is currently working on two cancer-related NIH grants.

For a \$1,371,000 NCI grant led by Jun Li, professor of chemistry, Hua is helping develop a breast cancer diagnostic device that electronically detects and profiles specific enzymes that are prevalent in people with breast cancers. The technology could work for other cancers as well.

For this project, Hua has designed special short peptides, which are chains of amino acids. Amino acids are molecules that combine to form proteins. His team attaches gold chips

to one end of the peptide chain and iron-containing molecules called electron reporters to the other. This generates a sort of molecular electronic current that is detectable in a blood sample. Some enzymes found in breast cancer cells can cut the peptide. If this occurs, the electrical current is cut, signaling the presence of breast cancer cells.

Hua's second NIH grant, for \$1,213,260, is for developing metallic nanoclusters as catalysts to alter complex molecules, including anti-cancer drugs. Sometimes, drugs can be altered slightly to offer new benefits. Catalysts are used to cause reactions that change molecules in a controlled manner. Hua's catalysts contain two metals — usually gold and copper or gold and palladium. The gold pulls electrons away from the other metal, which enhances the metal's reactivity. These nanoclusters react with various molecules faster and with less energy than other catalysts.

"We have developed new chemistry that we hope medicinal chemists can use in the future to create new medicines," Hua said.

Throughout the years, Hua has mentored many undergraduate and graduate students, including at least 35 recipients of Johnson Cancer Research Center awards. He appreciates how much the program benefits both the students and his laboratory.

"We train the students, teach them how to carry out research, and in return, they're able to contribute to our research and make important, useful discoveries for science and medical research," Hua said. "Students and I enjoy working together. And, to receive the awards, they have to be excellent students."

He is grateful for the center's support in his early years, which helped sustain his laboratory when his grant funding was down.

"Through all the years, the center was extremely helpful, and I think it had a big impact and supported a lot of young people at the university," Hua said.

\$1,340,709 was invested in promising cancer studies in the past 5 years.