

Researchers demonstrate effectiveness of contrast agent Cytate in detecting prostate cancer

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Prostate cancer accounts for approximately 29 percent of cancer occurrences among men. According to "CA: A Cancer Journal for Clinicians," in 2007 it was responsible for 27,000 deaths in the United States. Early detection is important to reducing the death count.

Current noninvasive detection methods, which include digital exams, blood tests and ultrasound, have limited accuracy. "There is a need to develop a noninvasive technique for early detection of prostate cancer with higher accuracy and resolution," said Dr. Robert R. Alfano, Distinguished Professor of Science and Engineering and Director of IUSL.

Cytate is dye-peptide conjugate consisting of Indocyanine Green (ICG), an FDA-approved near-infrared dye, and a somatostatin receptor ligand. Somatostatin is a small cyclic neuropeptide that is believed to regulate the production of other hormones and perform an important role in the cancer development. Previous studies had shown that Cytate could target somatostatin receptor-rich pancreas tumors in animal model because of its high affinity for the receptors.

The researchers performed ultrafast time-resolved fluorescence polarization measurements on Cytate solution as well as on cancerous and normal prostate tissue sample that were stained with Cytate. In addition, they conducted fluorescence imaging of two small pieces of

Cytate-stained normal and cancerous prostate tissue sandwiched between larger pieces of normal prostate tissue.

While the latter technique reveals which sections of tissue indicate presence of cancer, the former how the molecules of Cytate around the stained areas are behaving, explained Dr. Wubao Wang, a senior researcher at project leader at IUSL.

The time-resolved fluorescence polarization study found the ratio for peak fluorescence intensity between the cancerous and normal tissue was around 3.57.

"Somatostatin receptors are over-expressed on cancerous cells relative to normal cells, so they adsorb more of the Cytate," Professor Alfano added. "Cytate essentially is a smart reagent that attaches to cancerous cells. It is an excellent contrast agent because its absorption and fluorescence spectra line in the near-infrared 'tissue optical window (800 nanometers – 1 micron)."

The next step in the investigation is development of an optical probe called the "photonic finger" that can perform imaging of the prostate from inside the body, he said. The project's ultimate goal is to develop reliable cancer detection techniques based on imaging as an alternative to biopsies.

The yet-to-be-developed probe unit was inspired by Dr. G. Nagamasu, a deceased urologist who was a personal friend of Professor Alfano. However, Professor Alfano added that before this can happen, a proven method needs to be developed for injecting Cytate into the patient.

Source: City College of New York

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