Boosting Brain Power

UT Arlington researchers unlock clues to the human body’s most mysterious and complex organ

INQUIRY
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IN THE GENES A system that electronically detects a gene mutation implicated in 90 percent of pancreatic cancers could aid in the diagnosis and treatment of the often deadly disease. p. 5

SERIOUS GAMING Nursing students benefit from video game-like computer simulation technology that may one day transform training in the health care industry. p. 18

LIFE AND LIMP A cutting-edge neural interface aims to give amputees more control over their prosthetic devices. The research focuses on military veterans who have lost limbs in combat. p. 22
addition to this, we can place a magnet on the skin of the thyroid cancer area to help retain the core-shell nanoparticles in the cancer tissues."

Thyroid cancer is typically hard to treat because as the tumor cells spread, the small tumor lesions become difficult to pinpoint. Yang's system should greatly improve the specificity and sensitivity of cancer detection because it's more efficient at finding these lesions than present methods.

"This research is very important to public health because it would overcome several limitations of current detection and treatment methods for thyroid cancer," Yang says. It would also help patients avoid some of chemotherapy's severe complications—hair loss, weakness, nausea, hypertension—due to the low doses of drugs it uses and its high specificity. Additionally, because the materials being employed are biodegradable, they "simply melt away" after use.

The two-year grant is the first UT Arlington has received from the Cancer Prevention and Research Institute of Texas. Voters approved a constitutional amendment in 2007 establishing CPRIT and authorizing the state to issue $3 billion in bonds to fund groundbreaking cancer research and prevention programs and services in Texas. The institute has awarded more than $380 million in grants.

The award enables Yang and his colleagues to continue work that started with a National Institutes of Health grant and a National Science Foundation CAREER grant. In addition to delivering cancer treatments, their fluorescent biomaterials could potentially be used to build temporary stents in arteries and even regenerate tissue.

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Electrical engineering Professor J.-C. Chiao received the 2011 O'Donnell Award in Engineering from the Academy of Medicine, Engineering, and Science of Texas. Dr. Chiao is the first UT Arlington recipient of the award, chosen by a panel of Texas Nobel laureates, and one of five rising Texas researchers honored for his work that combats cancer and other diseases.

**What research projects were you recognized for?**
I was nominated for several projects: a study on prostate cancer metastasis, a sensor implant that helps people suffering from gastroesophageal reflux disease, an RF MEMS (radio frequency microelectromechanical system) millimeter-wave camera that can see through clothes to detect weapons, a gastrostimulator that helps patients with gastroparesis digest food, a wireless pH sensor that monitors the freshness of produce, and a closed-loop implant system that inhibits pain. I was surprised that I was chosen for these practical applications.

**What challenges do you face in marketing these devices?**
Cost is a big issue. I believe we should use cost-effective mass-production manufacturing methods to make them. They should also be wireless, ready to be integrated into telemedicine networks, and possibly battery-less.

**What's the motivation behind your research?**
It's fun, plus I have a deep curiosity. When doctors mention they have a problem to solve, I listen and try to figure out solutions. UT Arlington provides an excellent collaborative environment and gives me the freedom to explore.

**How do you see your research evolving?**
As electrical engineering has been integrated with physics and chemistry, I think that the next research frontier is the fusion of applied biology in electrical engineering. A lot of biology students in my lab work closely with electrical engineering students. I believe the interdisciplinary research will create novel ideas and tools to address the increasingly complex issues in medicine.

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Thyroid cancer can be hard to treat because as the tumor cells spread, the small tumor lesions become difficult to pinpoint. Jian Yang's fluorescent biomaterials show promise in finding the cancer and delivering medicine with high precision.