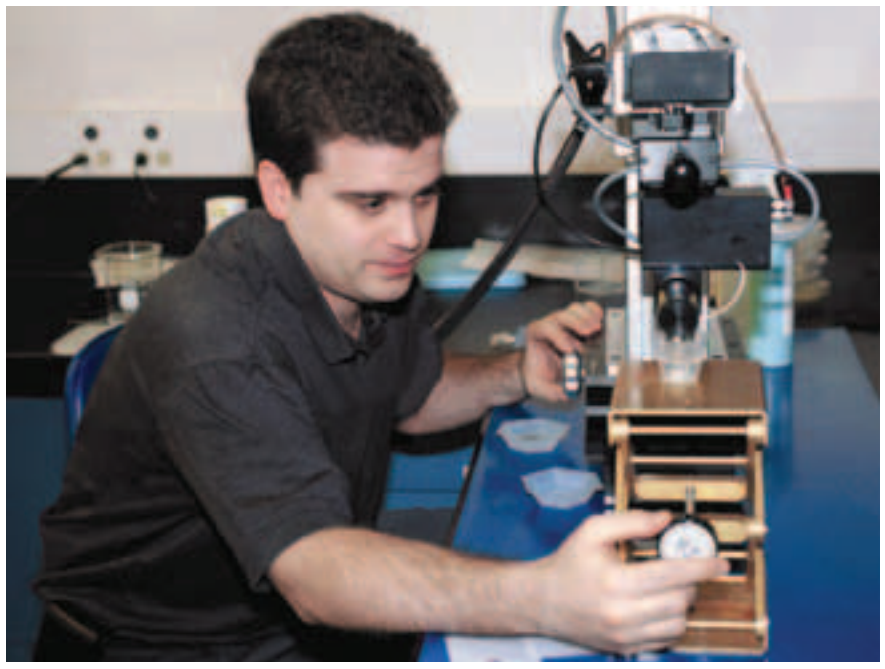
Medical Engineering

Sounds good at Ryerson University

Ultrasound set to detect and fight cancer

By Mark Sunderland



If there is one word in our medical word bank that evokes terror, it is probably "cancer." Everyone knows it and many people are personally acquainted with it. It can strike the rich, the poor, the young and the old – and even those who claim to be a picture of health can suddenly discover that the malicious little crab has been secretly clawing at their body parts.

Canada's leading cancer research is exemplified by Dr. Michael Kolios (right), Associate Professor of Physics at Ryerson University in Toronto (ryerson.ca), and his research relating to the medical applications of ultrasound technology.

Ultrasound produces high frequency sound waves that are bounced off internal tissues or organs to create echoes that can reveal their substance. Patterns of the echoes are transmitted to the monitor of an ultrasound machine to form images (sonograms) of the matter that create the echoes.

Ultrasound is already known as a medical tool and because there is no ionizing radiation generated by ultrasound it is the preferred image modality for diagnosis and monitoring of pregnant women and their unborn.

The research now is in the development of new applications and how the collected data can be analyzed to enhance the spectrum of diagnosis.

To support this research, Dr. Kolios has received three grants totaling more than $500,000 from Canadaís major funding agencies for health and science research in the past year. Cross-appointed with the University of Toronto's Medical Biophysics Department, Dr. Kolios has already made an impressive contribution to medical physics. He has published more than sixty abstracts and papers relating to ultrasound.

Collaboration for the new of research will include co-applicants for the funding and Ryerson Professors of physics Drs. Bill Whelan and Carl Kumaradas, and Dr. Gregory Czarnota, a radiation oncologist at the Sunnybrook Health Sciences Centre.

The thrust of the research will be to determine how ultrasound imaging can enhance the effectiveness of cancer treatments. To understand and correct the behavior of a cancerous tumor, an oncologist needs to know, in plain terms, how big it is, how hard it is and how fast it is developing. If this information can be collected quickly, accurately and non-invasively from a patient whose stamina for examination is already under par, the probability of effective therapy will be greatly enhanced.

A process to be explored involves the use of laser beams to produce a more detailed ultrasound image of a tumor. Known as photo-acoustic imaging, laser beams can differentiate between types of soft tissue in the human body whereas conventional ultrasound images have only limited contrast. So the ability to sharpen the contrast by a non-invasive means as it relates to the characteristics of a cancerous tumor will have a significant impact on treatment.

Dr. Kolios is currently working with researchers at Princess Margaret Hospital and Sunnybrook Hospital to develop this method of monitoring apoptosis (cell death) in cancer patients. If it is developed successfully, it will be the first non-invasive tool to enable doctors to use ultrasound for checking the progress of cancer treatment without having to remove and analyze the cells.

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