'Male' enzyme new breast cancer hope

By Joseph Hall
SCIENCE REPORTER

An enzyme once thought to exist only in males may hold a key to properly diagnosing, and even curing, breast cancer, University of Toronto researchers were to reveal today.

The presence of prostate specific antigen (PSA) in a breast tumor may allow women to forgo painful, prolonged bouts of radiation and chemotherapy after removal surgery, Dr. Eleftherios Diamandis was to tell a meeting of the American Association for Cancer research in Toronto today.

The discovery of prostate specific antigen in breasts happened by accident, Diamandis says, when one of his graduating students mistakenly tested some breast tumor extracts two years ago while experimenting with a new prostate cancer screening method.

"What we found is that women who are producing this marker relapse much less frequently than women who don't produce it. And women who have this marker respond better to hormonal treatment," Diamandis says.

"So this marker will tell us which women are likely to respond if you give them (hormonal treatment) and of course which women will not do very well because they are not producing this marker."

Women who do not create the prostate specific antigen in their tumor cells must be treated more vigorously with harsher post-operative treatments like chemotherapy, Diamandis says.

First found a decade ago in males with prostate cancer, prostate specific antigen has long been used as a blood screening test for that disease.

"It was considered until our finding a male-related protein, and people thought that in females there was no way that you could find this thing," says Diamandis, deputy chairperson of clinical biochemistry at the U of T.

"As the name implies, prostate specific antigen ... was thought to be an absolute specific protein for the prostrate only."

After it was accidentally discovered in breast tissue, tests showed the molecule was also present in normal breast tissue as well as breast milk and amniotic fluid.

"All this knowledge is coming together to tell us that PSA is actually a physiological molecule present in the normal breast and that the breast tumors that are losing the ability to produce this protein are actually the very bad ones," Diamandis says.

"So the presence of the protein in the breast tumors is actually a very good thing because it shows the cells are not very malignant, and that the patient is destined to do very well if the tumor cells still have the ability to produce this physiological protein."

He says the prostate specific antigen was found in 30 to 40 per cent of breast cancer tumors tested and that the women who produced it were very often better able to recover than their counterparts.

Diamandis, whose original study looked at the relative recovery success of 178 women in comparison to the PSA levels in their tumors, is now examining some 600 breast cancer patients in a joint U of T, U.S effort. The new study will follow the survival success and treatment requirements of the patients over seven to eight years.

Gene gun fights cancer in live cells

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evolved from a design used for vaccinations.

While the gun has so far been used solely on rodents, it does not appear to cause them excessive pain, Yang says, adding that broken cell membranes reclose within minutes.

Human trials are awaiting U.S. Food and Drug Administration approval.

The gun, which has a barrel and a trigger, is pressed against the body and blasts high-pressure helium through cartridges coated with microscopic gold particles. It smashes them at near super-sonic speeds through cell membranes in the skin.

Once inside the cell, the DNA strands migrate to the nucleus, where natural DNA is busy manufacturing the proteins specific to skin functions.

"Cytokines and the genes coding for it are cellular immune modulators which ... sometimes activate different immune cell systems," Yang says.

"In the vicinity of the tumor (these work to) generate either a short-term inflammatory response or ... tumor specific killing response."

While the gold particles — each about one millionth of a metre in diameter — are fired into skin cells nearest the tumor, they need not actually enter the malignancy to be effective, Yang says.

"Limited numbers may reach the tumor cells, although the great majority are only reaching the (normal) skin cells which secrete the cytokines," Yang says.

"And then this secreted or released cytokines can stimulate and augment the immune response surrounding the tumor, which ... later on kills or later on prevents further tumor growth."

Gold is used because it is biologically inert and will not react with the tissue it has invaded, Yang says.

"Gold also has a very high physical density and according to the laws of physics, when it's accelerated at high speed it creates higher momentum and therefore would penetrate deeper into the target tissue and you have to use less shock waves as a propelling force."

More than 5,000 cancer specialists are gathering at the Metro Toronto Convention Centre until tomorrow for the association's three-day convention.