

Scientists see breast cancer gene activity from outside the body

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Center in Philadelphia have used PET imaging to see hyperactive cancer genes inside breast tumors in laboratory animals, marking the first time such gene activity has been observed from outside the body. This technology might someday help physicians to detect and classify cancer, enabling them to find cancerous breast tumors as early as possible, and determine the appropriate treatment.

Reporting in the *Journal of Nuclear Medicine*, scientists led by Eric Wickstrom, Ph.D., and Mathew Thakur, Ph.D., used a DNA “probe” – a modified nuclear medicine agent – to detect the hyperactivity of CCND1, a common breast cancer gene. The gene is copied thousands of times in most breast cancer cells. The high concentration makes CCND1 copies easier to image with the genetic PET probe. The research team found a much higher concentration of the cancer gene activity in estrogen receptor-positive breast tumors in mice than in normal tissue.

“Less than one-fourth of lumps found in mammograms are really cancer,” notes Dr. Wickstrom, professor of Biochemistry and Molecular Biology at Jefferson Medical College of Thomas Jefferson University. “Our new technique will let us see what is really going on in a suspicious lump. We will see if a lump is malignant or something safe.”

“Patients with benign lumps could avoid invasive procedures if active cancer genes could be identified from outside the body,” says Dr. Thakur, professor of Radiology and Radiation Oncology at Jefferson Medical College. “Observing the cancer gene activity of a breast tumor

will permit physicians to determine the best way to treat it.”

The new technique to visualize sites of cancer gene activity, which the investigators call radiohybridization imaging (RHI), might help physicians find out whether lesions found in mammograms are cancerous or non-cancerous without a biopsy. The genetic imaging agents are intended to find cancer gene activity as quickly as possible and guide the choice of therapy based on which genes are most active.

The American Cancer Society estimates that approximately 40,000 women in this country will die from breast cancer in 2007. Yet, clinical examination and mammography can miss almost half of the breast cancers in women under 40, approximately one-quarter of cancers in women ages 40 to 49 and one-fifth of cancers in women over age 50.

“When suspect lumps are discovered, biopsies are necessary to determine if the lumps are cancerous,” Dr. Thakur points out. “However, more than three-fourths of the lumps are found to be benign.

Mammography, an invaluable screening technique, sees shapes but not gene activity. Genetic PET scanning is a minimally invasive, sensitive and specific technique that might detect cancers with high efficiency in adult women and young women without breast compression.” The researchers expect that RHI will be tested in clinical trials in suspected cases of breast cancer.

Dr. Wickstrom, Dr. Thakur, and their co-workers have found that RHI works for detecting the activity of other cancer genes in other types of tumors as well. “Early detection saves lives,” Dr. Thakur says. “Several other cancers show characteristic activated genes that we might be able to use for early diagnosis, such as pancreatic cancer, prostate cancer, lymphoma, and colon cancer.” The investigators are also exploring genetic agents designed for magnetic resonance imaging and fluorescence imaging.

Source: Thomas Jefferson University

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