Changes in progenitor cell population in breast may be overlooked factor in breast cancer

December 17 2012

The DNA mutations that accumulate over time as women age are not the sole contributor to the higher frequency of breast cancer in women over 50, Mark LaBarge, PhD, a researcher at Lawrence Berkeley National Laboratory (LBNL) reported on Dec. 17 in a presentation at the American Society for Cell Biology Annual Meeting in San Francisco.

Changes in the populations of progenitor cells in breast tissue may be a powerful and until now overlooked factor in breast cancer and aging, he said.

According to U.S. breast cancer statistics, over 75 percent of the 200,000 women diagnosed each year are 50 years of age and older.

The popular hypothesis that accumulating gene mutations drive the connection between aging and cancer breaks down on closer study, according to Dr. LaBarge, because the same sets of mutations commonly detected in cancers in older women are often found in cancers in younger women.

By analyzing a wide sample of normal epithelial breast cells taken during noncancer surgeries of women ages 16 to 91 years old, the LaBarge lab discovered that the aging process results in decreased proportions of myoepithelial cells, which are thought to suppress malignant growth, and a simultaneous increase in multipotent progenitors including faulty

luminals and few myoeps. These are thought to be the etiological roots of some breast cancers.

The mammary gland is a network of ducts composed of two layers of epithelial cells — the inner milk-producing luminal cells and the outer luminal-supporting myoepithelial (or "myoep") cells. Both types develop from progenitor cells—a small fraction of the cells in the gland that retain the ability to divide.

Progenitor cells are thought to be much more likely to be transformed into tumor cells.

Dr. LaBarge believes that in older women the progenitor cells that normally maintain both types of cells in mammary glands are unable to keep the balance between the lineages. Progenitor cells in older women are less responsive to cues in the breast microenvironment that would promote differentiation into myoepithelial cells in younger women.

The breast microenvironment is a powerful shaper of cell fate, and changes brought on by aging alone, such as altered endocrine profiles, do play a part. But the implication in this new study, said Dr. LaBarge, is that aging leaves women more susceptible to malignant transformation by increasing the potential pool of target cells and decreasing the ability to contain malignancies.

More information: "Aging-related changes make mammary epithelia more vulnerable to cancer: A story of altered stem cells," Monday, Dec. 17, 2012, 12:30 pm, Session: Tumor Microenvironment, presentation: 1674, poster: B1445, Exhibit Halls A-C.

Provided by American Society for Cell Biology