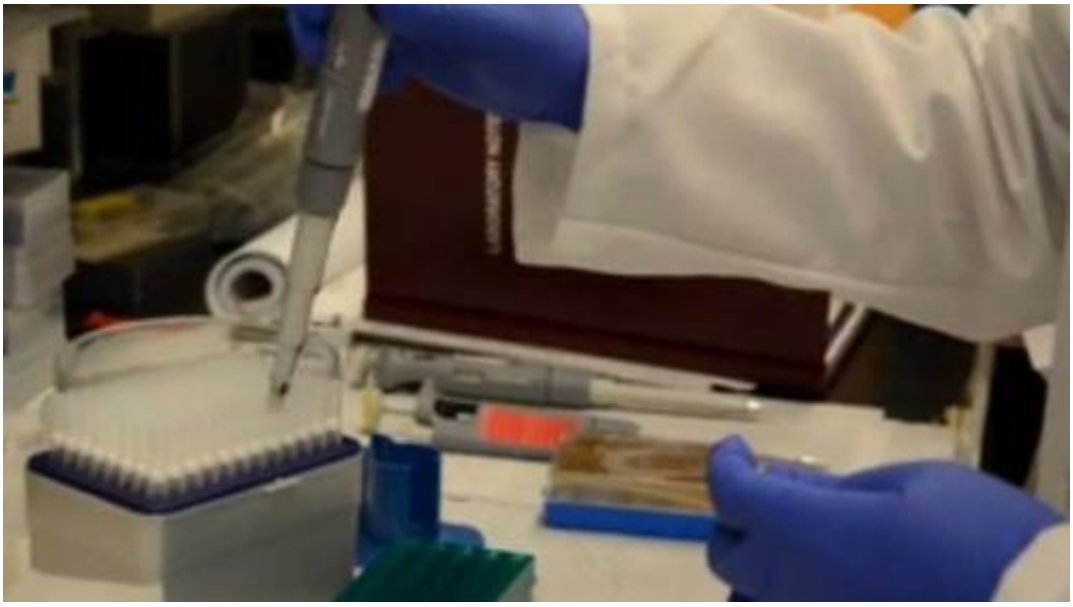
New tool to grow cancer cells streamlines laboratory research

May 15 2014



A new technique that allows the growth of both normal and cancer cells and keeps them alive indefinitely is transforming and expediting basic cancer research, say investigators from Georgetown Lombardi Comprehensive Cancer Center.

The scientists demonstrated that the use of conditionally reprogrammed cells (CRCs) significantly reduced the time it took to develop a certain type of breast cancer in mice. The tumor that grew also behaved as it

does in human breast cancer retaining gene expression patterns—allowing for a more accurate animal model for studying the disease.

"We've had a glimpse of how these cells can provide an amazing advance in human cancer clinical research in preliminary work, and now we demonstrate how incredibly useful they are in laboratory cancer research," says Anna T. Riegel, PhD, Cecilia Rudman Fisher Professor of Oncology and Pharmacology at Georgetown Lombardi. The work was published online May 15 in *PLOS ONE*.

For example, it normally takes Riegel and her team seven to nine months from birth to grow tumors in transgenic mice that express a particular oncogene (HER2) in their mammary gland cells. In this study, using CRCs, the team showed that cells taken from the tumor in one mouse could be grown indefinitely, and that transplanting about a million of these cells into a second mouse produced tumors in one month, with metastasis two weeks later.

"The tumors that grew in the second mouse had the same pathology and gene expression as tumor cells taken from the transgenic mouse," Riegel says. "This means we don't have to create and grow transgenic mice every time we want a good mouse model of breast cancer."

This finding could dramatically expedite Riegel's research, which focuses on how the environment that surrounds a tumor—the supporting cells, fat tissue, immune cells and blood system—affects development of breast cancer. "Using CRC cells will significantly speed up our research, and will provide much more dependable results."

She also showed that CRCs could create a bank of normal mouse breast cells that grow all the 3D structures of a normal breast.

CRCs were developed in late 2011 by Georgetown Lombardi researchers

Richard Schlegel, PhD, and Xuefeng Liu, MD. They discovered that adding two different substances to cancer cells or to normal cells push them to morph into stem-like cells that stay alive indefinitely. When the two substances are withdrawn, the cells revert back to the cell type they once were.

This method overcomes a longstanding obstacle in cell biology research: while immortalized tumor cell lines did and still do exist, their gene expression and pathology change so much over time that researchers say they cease to resemble natural cancer cells.

Another use of this technology is to create cell lines from patient tumors and testing the cells with various therapies to find the treatment that works. Georgetown Lombardi researchers demonstrated this strategy in the September 27, 2012, issue of the New England Journal of Medicine. They described how CRCs derived from normal and tumor cells of a 24-year-old man with a rare type of lung tumor allowed physicians to identify an effective therapy by testing it on his cells in the lab.

More information: Paper: dx.plos.org/10.1371/journal.pone.0097666

Provided by Georgetown University Medical Center