Heterogeneous ER+ breast cancer models allow more accurate drug testing

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(Medical Xpress) -- Cell cultures are homogeneous. Human tumors are not. A University of Colorado Cancer Center study recently published in the journal *Breast Cancer Research and Treatment* reports the development of human-derived estrogen-positive (ER+) breast cancer models that retain their heterogeneity, allowing researchers to more accurately test drugs for this disease.

"Breast cancer is never black or white. These models will allow us to tease apart the shades of grey," says Peter Kabos, MD, investigator at the CU Cancer Center, assistant professor at the CU School of Medicine, and the study's lead author.

What he means is that not all cells in an ER+ breast cancer are ER+. Instead, in a human tumor there may be pockets of cells that depend on estrogen for survival and so are susceptible to anti-estrogen therapies, alongside cancer cells that depend on other mechanisms for their growth. Testing a drug in a homogenous ER+ cell culture may predict little about how the drug performs in a heterogeneous ER+ breast cancer tumor.

This heterogeneity leads to breast cancer's most deadly characteristic: the ability to evolve past anti-estrogen drugs. In this theory, doctors may be able to kill ER+ cells with anti-estrogens, but this does nothing to slow the growth of other types of breast cancer cells, which soon become the tumor's dominant type. These ER- cells tend to be much more difficult to kill.

"These new heterogeneous breast cancer models allow two things," says Carol Sartorius, PhD, investigator at the CU Cancer Center, associate professor at the CU School of Medicine, and the paper's senior author. "First, we can more accurately test drugs on these models. And second, instead of looking for features that are common to all breast cancers, maintaining a tumor's heterogeneity allows us to ask what's unique to that tumor - not what makes all breast cancers the same, but what makes some breast cancers different than others. As we've seen in the modern push toward personalized cancer care, these unique features may allow us to more effectively target an individual's tumor."

In the recent study, human breast tumor samples derived after surgery were transplanted into animal models, after which the tumor samples maintained their heterogeneity, as in the original tumors.

"The next treatment will come from better understanding of the ratios of ER+ and ER- cells present in individual tumors and deciphering their hierarchy," Kabos says.

More information:
www.ncbi.nlm.nih.gov/pubmed/22821401

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