Biomarker for Diagnosis of Aggressive Breast Cancer

Technology #20160149

Measures aerobic glycolysis in cancer cells

A novel metabolomics method can detect pre-invasive and metastatic breast cancer cells by measuring aerobic glycolysis (conversion of glucose to lactate). The ability of cancer cells to produce lactate through aerobic glycolysis is a hallmark of cancer, and increased glucose uptake and elevated aerobic glycolysis are closely correlated with increased tumor aggressiveness and poor prognosis. Pre-invasive or metastatic cancer cells have dramatically increased production of 3-13C-lactate produced from 1-13C-glucose, over non-invasive cancer cells. By measuring the rate of aerobic glycolysis, which closely correlates with glucose uptake and lactate production in cancer cells, this technology may enable development of a biomarker for diagnosing pre-invasive or metastatic cancer.

Diagnostic test for pre-invasive and metastatic cancer

Although increased mammography screenings have detected more ductal carcinoma in situ (DCIS), it has not reduced breast cancer death from metastatic breast cancer. The majority of the DCIS never becomes metastatic and it is unclear why certain DCIS lesions develop into invasive breast cancer. No reliable biomarkers or screenings (i.e., mammography, MRI) for pre-invasive breast cancer currently exist, because none can distinguish pre-invasive breast cancer from indolent breast tumor or benign breast lump or lesion. This new technology, however, can distinguish pre-invasive cancer from benign breast diseases or indolent breast tumors. This diagnostic test may prevent unnecessary breast biopsies. It may also be used to monitor therapeutic response and progression of metastatic cancer, either alone or in conjunction with PET/CT.
Phase of Development

- In vivo/metastatic mammary tumor mouse model study completed. Pilot human clinical trial is currently underway.

Benefits

- Minimize unnecessary biopsies
- Monitor therapeutic response and progression of metastatic cancer

Features

- Detecting elevated production of 3-13C-lactate in serum samples as a biomarker for pre-invasive and metastatic breast cancer
- Positional isotopic labeling and liquid chromatography-mass spectrometry (LC-MS)-based targeted metabolomics method
- Method has limited interferences from other metabolic pathways

Applications

- Diagnostic/prognostic testing kit for early stage primary breast cancer patients
- Detecting pre-invasive breast cancer in women with positive mammogram screening so they do not need to undergo breast biopsy
- Monitoring progression of metastatic cancer; monitoring therapeutic response and/or tumor relapse
- High-throughput screening of drugs that inhibit glucose uptake and glycolysis in cancer
- Assist with development of personalized therapy for cancer patients

Interested in Licensing?
The University relies on industry partners to further develop and ultimately commercialize this technology. The license is for the sale, manufacture or use of products claimed by the patents. Please contact Kevin Anderson to share your business needs and licensing and technical interest in this technology.

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