Circulating tumor cells can provide 'real-time' information on patient's current disease state

28 September 2010

Circulating tumor cells (CTCs) may be a promising alternative, noninvasive source of tumor materials for biomarker assessment, according to data presented at the Fourth AACR International Conference on Molecular Diagnostics in Cancer Therapeutic Development.

"The basic idea is that CTCs can provide real-time information about a patient's current disease state, acting as a 'liquid biopsy,'" said Siminder Kaur Atwal, Ph.D., senior research associate at Genentech. "They are much less invasive than tumor biopsies because they can be detected from a blood draw and don't require surgical intervention."

For this study, Atwal and colleagues compared the CTC capture efficiency of the Food and Drug Administration-approved CellSearch platform with two biochip platforms, using tumor cell lines spiked into whole blood. They tried to detect epidermal growth factor receptor (EGFR) protein expression in CTCs from patients with lung cancer and HER2 expression or amplification in CTCs in patients with metastatic breast cancer.

Under the tested conditions, CellSearch and the newer biochip platforms offered similar efficiency. Further, capture efficiency was dependent on EpCAM (epithelial cell adhesion molecule) expression.

"This may be a limitation in capturing CTCs from certain tumor types, notably triple-negative breast cancers," Atwal said.

Captured CTCs were amenable to biomarker analyses such as HER2 status, qRT-PCR for breast cancer subtype markers, KRAS mutation detection and EGFR staining by immunofluorescence, the researchers found. In patients with HER2-positive breast cancer, HER2 status in CTCs and tumor tissue generally correlated; however, in one patient subset, HER2 status changed from the primary tumor at diagnosis. This finding indicates that in some cases, CTCs may offer a real-time view of a patient's biomarker status that is different from diagnostic tissue, Atwal said.

Some improvements are necessary in CTC detection and capture before the technology can be generally useful in clinical biomarker analysis, Atwal said. Future studies will focus on evaluating different detection and capture methods with a particular emphasis on tumor types with a low EpCAM expression. In addition, future research will look for other biomarkers in CTCs to determine if they represent a patient's tumor, she said.

Provided by American Association for Cancer Research