

Evaluation of Novel Approach to Circulating Tumor Cell Isolation for Cancer Gene Panel Analysis in Patients with Breast Cancer



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Study Aim: To evaluate a novel approach for isolating circulating tumor cells (CTCs) from breast cancer patients and perform genomic analysis on the isolated CTCs.

Methods:

- Blood samples were collected from 11 breast cancer patients
- CTCs were isolated using a size-based filtration method with a high-density microporous (HDM) chip
- Isolated CTCs were analyzed by immunofluorescence staining and cancer gene panel sequencing
- The Ion AmpliSeq Cancer Hotspot Panel v2 was used to screen for mutations in 50 cancer-related genes

Key Findings:

- CTCs were detected in 10 out of 11 patients (90.9% detection rate)
- Average CTC count was 3.9 cells per 5 mL blood sample
- Average purity of isolated CTCs was 14.2%
- Mutations were detected in genes including IDH2, TP53, NRAS, PIK3CA, PTEN and others
- EpCAM-negative CTCs were identified in one patient through mutation detection

Conclusions:

- The novel CTC isolation approach was successfully applied to isolate and genomically analyze CTCs from breast cancer patients
- The method could isolate both EpCAM-positive and EpCAM-negative CTCs
- This approach may have applications in cancer diagnosis, monitoring, and personalized treatment

The study demonstrates the feasibility of this CTC isolation technique for obtaining CTCs suitable for downstream genomic analysis in breast cancer patients. The authors suggest this liquid biopsy approach could be useful for non-invasive molecular profiling of tumors.