Clinical performance of the AccuCyte® – CyteFinder® System, a dual-technology platform for comprehensive collection and high resolution imaging of circulating tumor cells

Jackie Stiwell1, Nick Drovetto1, Arturo Ramirez1, Daniel Campton1, Joshua Nordberg1, Paulina Varshavskaya1, Alisa Clein2, Steve Quarrer1, Barry Friemel1, Daniel Sabath1, Eric Kaldjian1

1RareCyte, Inc., Seattle, WA; 2University of Washington, Seattle, WA

Abstract 1601

Background
High numbers of circulating tumor cells (CTC) predict poor prognosis. In addition, serial monitoring of CTC numbers may be used to assess response to therapy or progressing disease. The AccuCyte® – CyteFinder® system combines comprehensive density based collection of nucleated blood cells with automated staining, high-resolution digital microscopic imaging, image analysis and single-cell retrieval. Previous studies demonstrated a model CTC (mCTC) spike-in recovery of > 90% using various cell lines (BMC Cancer, in press).

In a blinded study of clinical and spike-in samples in a directly compared AccuCyte® - CyteFinder to the FDA-cleared CellSearch® System (Veridex), which relies on immunomagnetic capture of cells that express EpCAM.

Study Design
• Paired blood samples were obtained from patients with advanced cancer (17 prostate, 24 breast, 12 lung) under the Fred Hutchinson Cancer Research Center IRB. Samples were processed by the University of Washington using the CellSearch® assay and the AccuCyte® - CyteFinder assay was performed in parallel by RareCyte. RareCyte was blinded to CellSearch® counts until after AccuCyte® - CyteFinder analysis was performed and documented.
• Recovery of model CTCs (mCTCs) was compared using tumor cell lines with high EpCAM expression (MCF7, LNCaP) or low EpCAM expression (PC3, A549) in paired spike-in samples to investigate the influence of EpCAM expression in the performance of each assay.

Results
Samples fell into four categories:
1) CTC number was very low (<5) or zero by both methods
2) CTC number was similar by both methods
3) CTC number was notably higher (>50%) by AccuCyte® - CyteFinder than CellSearch®
4) CTC number was very low (<5) or zero by CellSearch® but detected by AccuCyte® - CyteFinder (>5)

Number of samples by cancer type

<table>
<thead>
<tr>
<th>Category</th>
<th>Breast</th>
<th>Lung</th>
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<tbody>
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<td>Breast</td>
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</tr>
<tr>
<td>Lung</td>
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</tbody>
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• AccuCyte® - CyteFinder and CellSearch® detected similar numbers of mCTCs from high-EpCAM expressing cells
• AccuCyte® - CyteFinder detected considerably more mCTCs than CellSearch® from low-EpCAM expressing cells

Conclusions
• AccuCyte® – CyteFinder identifies comparable numbers of CTCs as CellSearch® in a subset of cancer samples.
• AccuCyte® – CyteFinder identifies considerably more CTCs than CellSearch® in another subset.
• AccuCyte® - CyteFinder detects CTCs where CellSearch® does not in a third subset.
• The differences in CTC counts can be explained by variation in expression of EpCAM.

The AccuCyte® – CyteFinder system is capable of multiplexing using custom antibody panels.

Platform comparison:

Prostate cancer

Breast cancer

Lung Cancer

Images of AccuCyte® - CyteFinder CTCs

CTC recovery in model CTCs with variable EpCAM expression

Lung cancer CTC with low EpCAM expression

SKBR3 breast cancer cells spiked into blood and processed by AccuCyte were imaged on CyteFinder after staining with 6 fluorescent dyes. A second round of 2 dyes was performed after an automated de-staining process. Arrows indicate SKBR3 cell.