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Background: The current standard Circulating tumor cell (CTC) enrichment method employs antibodies, which misses cells not expressing the target antigen. Several alternative methods enrich CTC by filtration, between different filtration methods large variations in material, pore size, operating pressure and sample fixation exist.

Methods: Track etched polycarbonate filters with pore diameters of: 5, 8 and 10 μ m and microfabricated silicon nitride filters with pore diameters of 5, 6, 7, 8, 9 and 10 µm were used. 300 cells from the cell lines were spiked in 1 ml of blood from healthy volunteers. Cells were prestained with CellTracker orange and green and identified on the filters by fluorescence microscopy.

Results: MDA-231, a 15 µm sized epithelial cell line, can readily pass through a 5 µm pore at low pressure (< 50 mbar). Red and white blood cells contribute most to the pressure across a filter, the influence of buffers such as PBS or serum was found to be negligible. Fixation using formaldehyde increases the pressure needed to push white, red and culture cells through a pore by 25 fold and recovery with spiked samples decreases from 85% to 40%. Different filter types were compared and evaluated for cell line recovery using unfixed blood. Optimal recovery of cell lines was between 80-90% with low WBC contamination for track etch filters with 8 µm pores and for silicon nitride chips with 5 μ m pores. Only a weak correlation was found between recovery and size for the nine different cell lines.



A0.18 0.16 0.14 0.12 0.1 **e** 0.08 0.18 0.16 0.14 0.12 0.1 0.1 0.08 (%) **a** 50-

Key factors for filtration of tumor cells from whole blood Dalum van G, Coumans FAW, Beck M, Terstappen LWMM

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