Supplementary Material (ESI) for Lab on a Chip

A microfluidic device for rapid capture and culture of rare circulating tumor cells

Joo H. Kang, Silva Krause, Heather Tobin, Akiko Mammoto, Mathumai Kanapathipillai and Donald E. Ingber

SUPPLEMENTARY FIGURE LEGENDS

Fig. S1. Graph showing measured drag velocity (*v*) and estimated magnetic forces (*F*) of magnetic beads pulled along the *y*-axis shown while flowing through the microchannel along the *x*-axis in **Fig. 2d**, as measured using a fast camera. The average drag velocity was 1.92 ± 0.06 mm/sec.

Fig. S2. Schematic diagram of the microfluidic channel that links the inlet to the main microfluidic channel at an angle of 60 degrees. The drag velocity of a cell bound to a magnetic bead was estimated, and computational fluid dynamic simulation revealed that the initial position of the cell will be confined within the lower 240 µm of the main channel (300 µm wide) closest to the magnet and dead-end side chambers. A magnetic bead-bound cell experiences the combined force vector (red) that is composed of the magnetic force (F_{mag}) and the force driven by flow (F_{flow}), and an estimated transverse movement of ~60 µm while traveling through the angled inlet conduit.

Fig. S3. (**a)** Fluorescence micrograph showing magnetically collected cells stained in the dead-end side chamber with calceinAM (green) and ethidium homodimer-1 (red) to live and

dead cells, respectively. Note that all collected cells were found to be viable. (**b**) Graph showing that M6C tumor cells consistently exhibited greater than 90% viability whether measured immediately after trypsinization (1), after magnetic isolation and collection in the side chambers of the device (2), or treatment of the RBC lysis solution containing ammonium chloride and 0.1 % BSA (3).