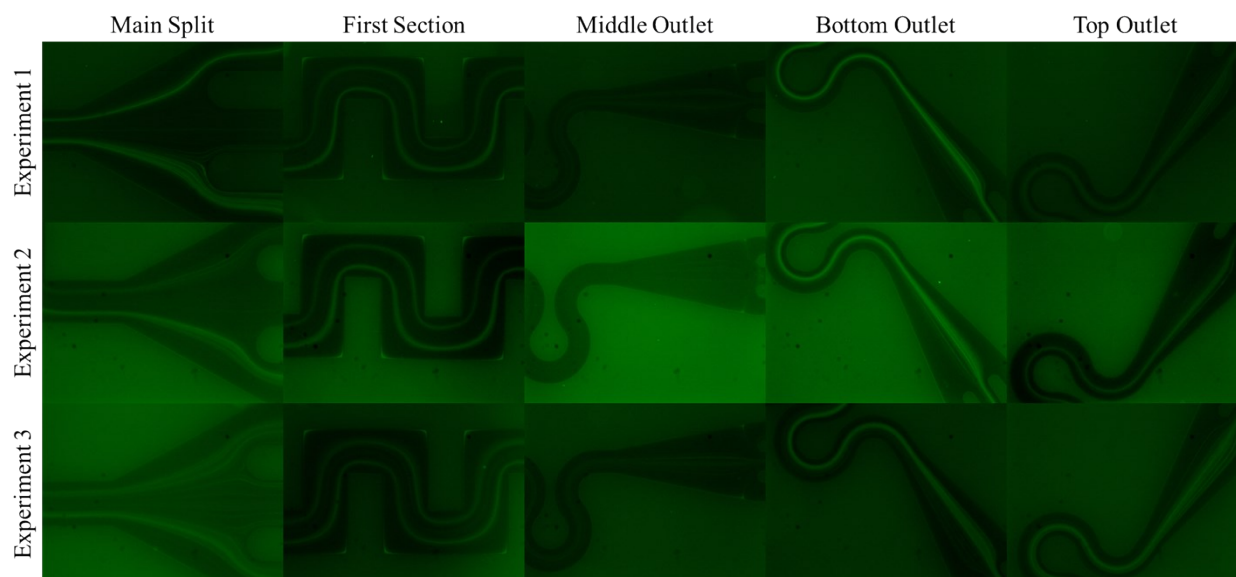
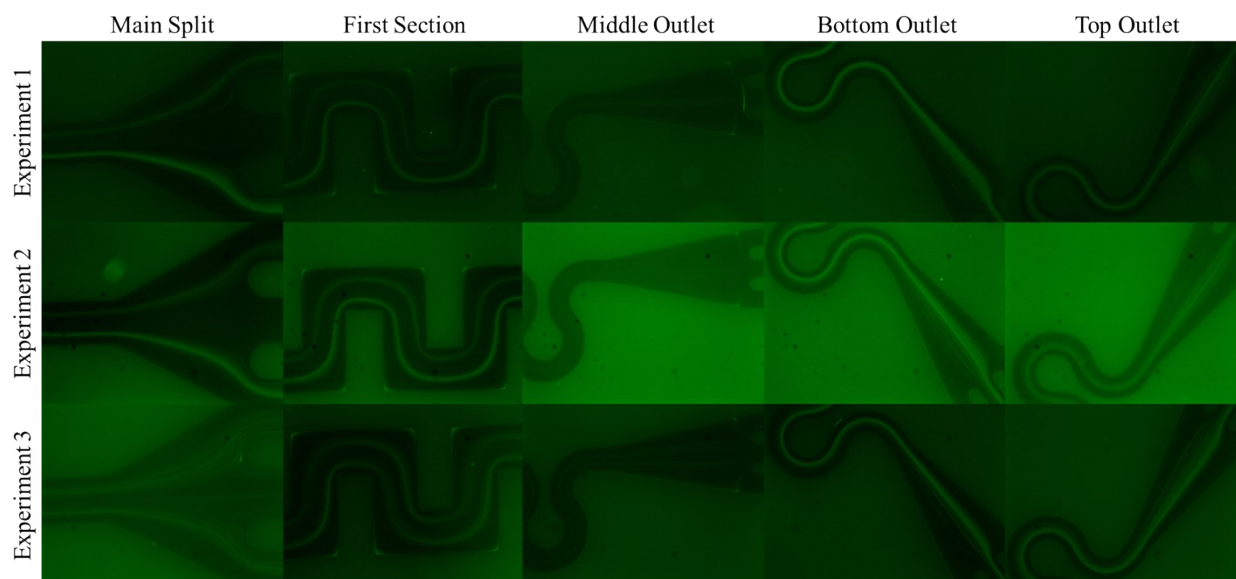


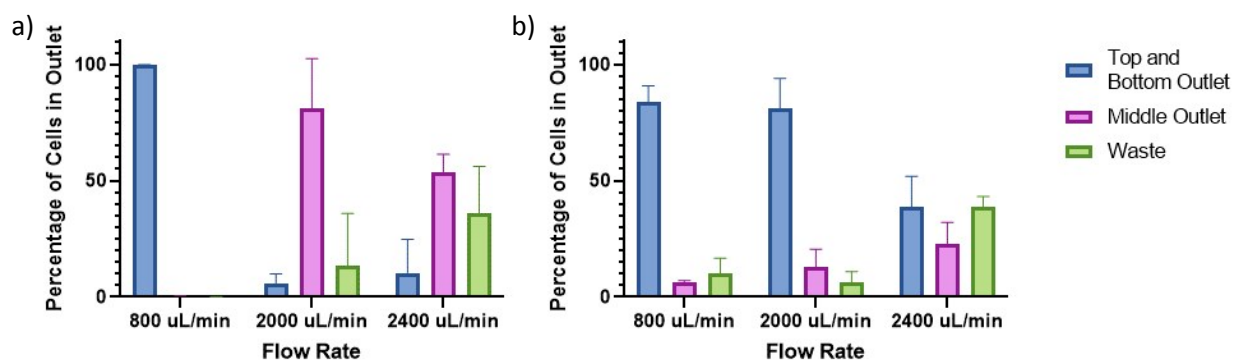
**Supplementary Figure 1: Focusing Images of MCF7 cells in Whole Blood at 800  $\mu\text{L}/\text{min}$ .** Each row represents the images collected from an individual repeat experiment.



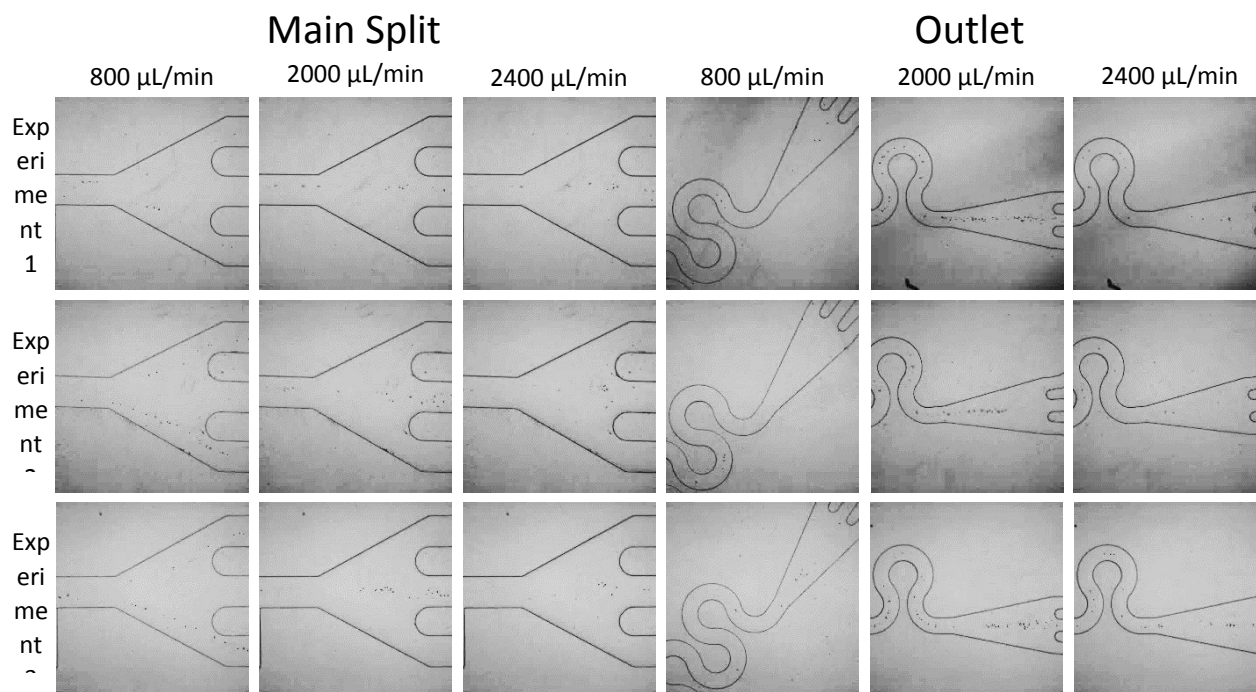
**Supplementary Figure 2: Focusing Images of MCF7 cells in Whole Blood at 2000  $\mu\text{L}/\text{min}$ .** Each row represents the images collected from an individual repeat experiment.



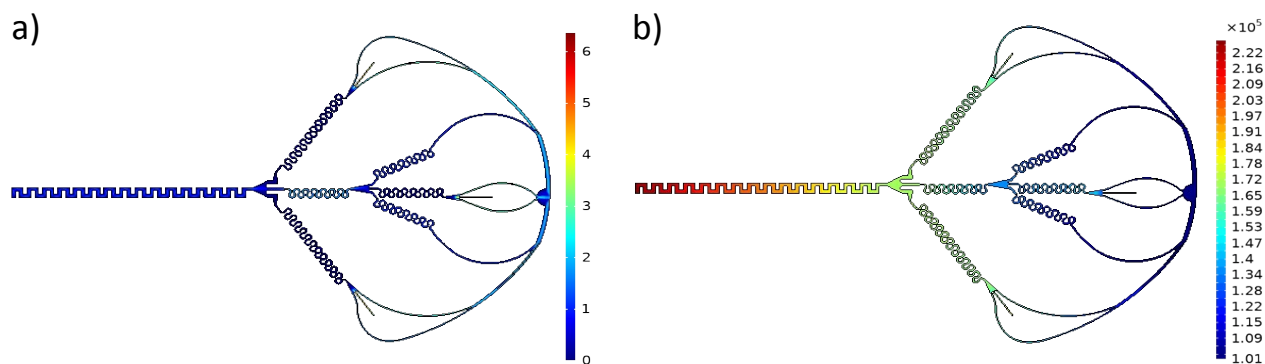
**Supplementary Figure 3: Focusing Images of MCF7 cells in Whole Blood at 2400  $\mu\text{L}/\text{min}$ .** Each row represents the images collected from an individual repeat experiment.



**Supplementary Figure 4: Small Cell Numbers Spiked into 7 g/dL BSA.** Quantification of cell recoveries from the CTCKey™ device at various flow rates. Percentage of cells recovered by the CTCKey™ device from samples with a)  $\sim 1000$  A549 cells and b)  $\sim 300$  WBCs per mL spiked into 7 g/dL BSA and processed through the CTCKey™ device at various flow rates. Percentage of cells collected in top and bottom outlet are shown together (blue) while the middle outlet (pink) and waste are shown individually (green).



**Supplementary Figure 5: Images taken with a high-speed camera of MCF7 cells focusing in 7 g/dL BSA.** Each row represents images from an individual repeat experiment. Videos from experiment two at 2000  $\mu\text{L}/\text{min}$  are attached as supplementary files.



**Supplementary Figure 6: COMSOL® Model of the CTCKey™ with an inlet flow rate of 2400  $\mu\text{L}/\text{min}$ .** a) Velocity profile of blood through the CTCKey™. b) Pressure in the CTCKey™ with blood.