Supplementary information

1. Fig. S1 shows the disk and its assembly.

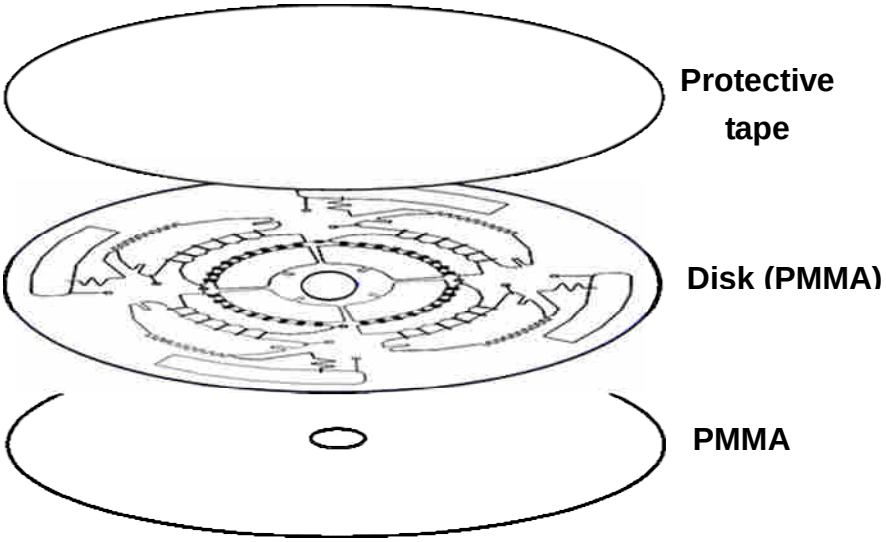
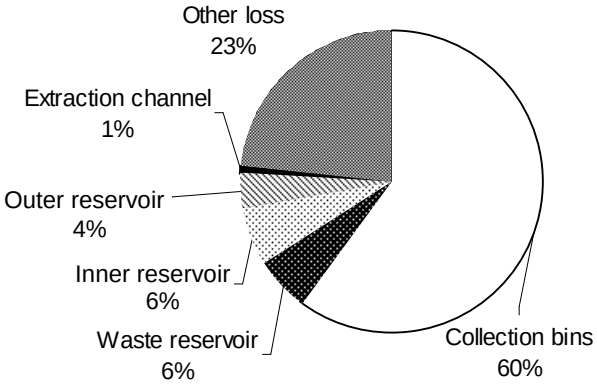


Fig. S1. Sketch of the three-layer disk assembly. A CO_2 laser engraver was used to cut the 1mm thick PMMA disk (middle layer) with microfluidic features. Then, the disk was bonded with a plain PMMA plate as substrate and a top layer of protective tape for enclosure.

2. Fig. S2 shows the average percentage and average number of MCF7s in various areas in one sector of a disk.



Area in a sector	Average	S.D.
Collection bins	61.3	2.5
Waste reservoir	6.0	7.0
Inner reservoir	6.3	6.0
Outer reservoir	4.0	4.4
Extraction channel	0.7	1.2
Other loss	24.0	2.9
Spiked number	102.3	

Fig. S2. Detected MCF7s in various microfluidic regions after disk operation. The average spiked number was 102.3 from three tests (in three sectors). Collected targets – those MCF7 in collection bins – claimed ~61% of spiked MCF7. Around 17% of targets distributed in other places in the disk, while 24% of targets are missing – calculated by the difference between the average spiked cell number (102.3) and the average detected cell count (78.3). The average and the standard deviation (S.D.) of cell count in various areas are listed on the right columns. The average of unaccounted cells is 24.0.

3. Fig. S3 presents a micrograph of MNC labeled with anti-CD45-PE prior to loading into the disk.

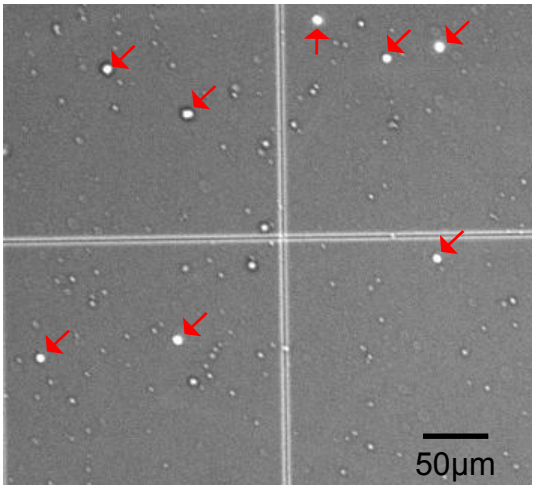


Fig. S3. Micrograph of fluorescence CD45-PE-labeled MNC on a hemocytometer. The photo was taken by monochromal CCD in green light channel with low bright-field illumination. $CD45^+$ cells are the bright dots indicated by red arrows. The other small particles without CD45-PE signal could be platelet or cell debris.