Supplementary Information

Ultrathin silicon nitride membrane with slit-shaped pores for high-performance separation of circulating tumor cells

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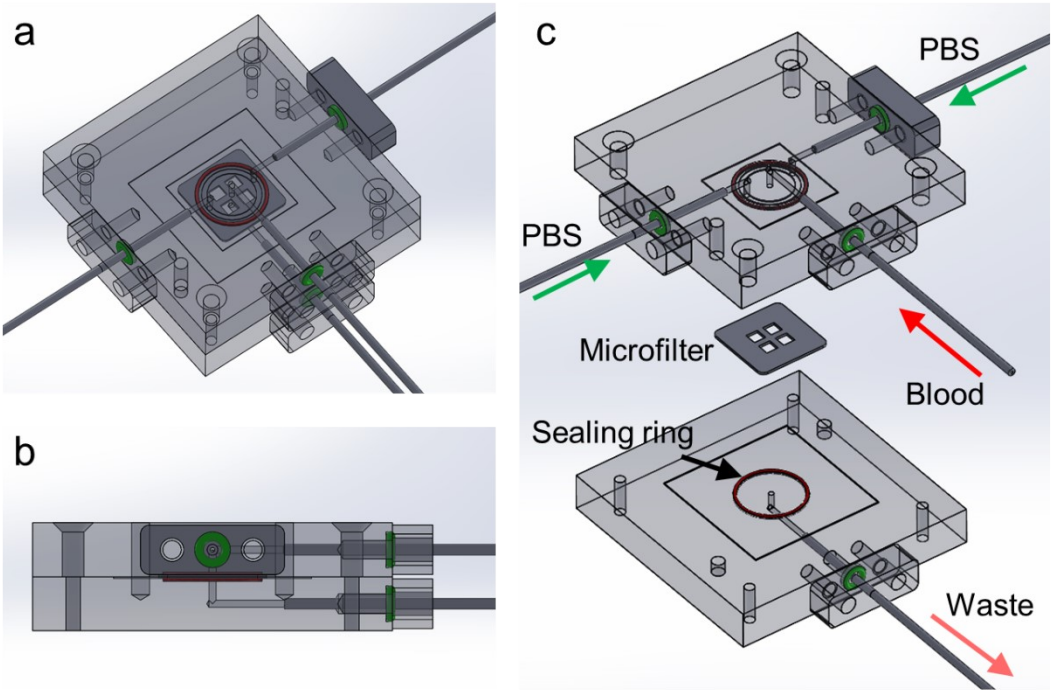

Fig. S1 Schematic diagram of a microfluidic chip, containing a microfilter with Si_3N_4 membrane and corresponding clamps. (a) The 45-degree view of the microfluidic chip. (b) Side view of the microfluidic chip. (c) The 3D exploded view of the microfluidic chip.

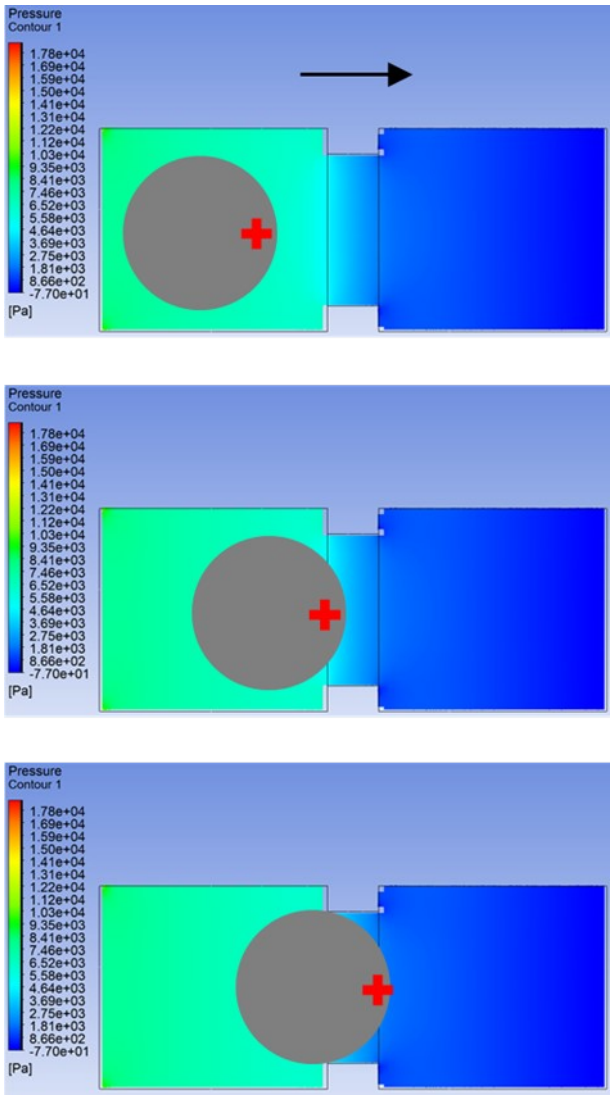

Fig. S2 Schematic diagram of cancer cells flowing to the filtering pores and the changes in pressure drop. The grey color represents cancer cells, green background represents high pressure area, and blue background represents low pressure area. The largest pressure drop is created when the front side of cancer cells (marked in red) passes from the front of the filtering membrane (green background) to the back (blue background).

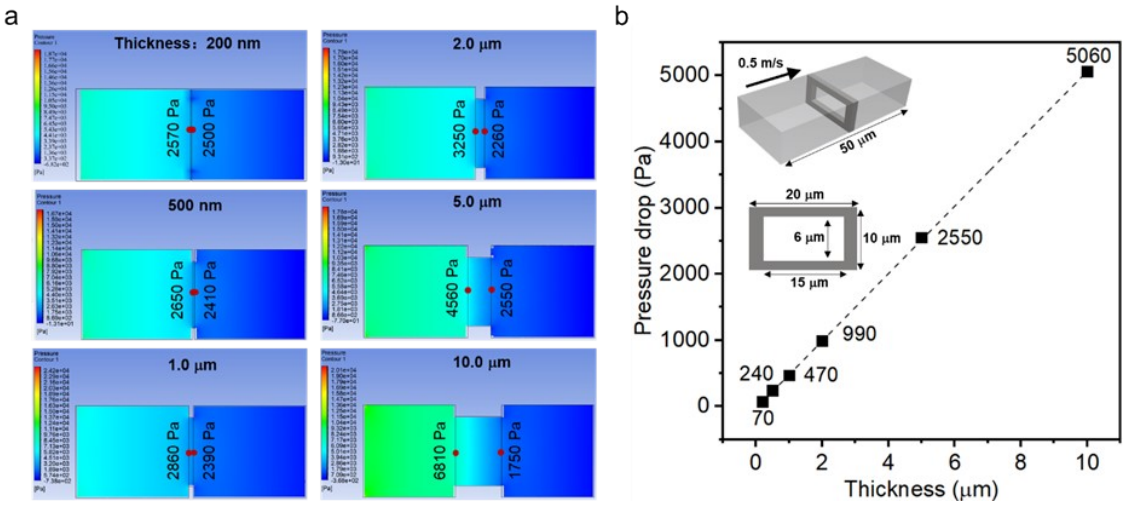

Fig. S3 Effect of different thicknesses of membranes on the pressure drops on the cancer cells.

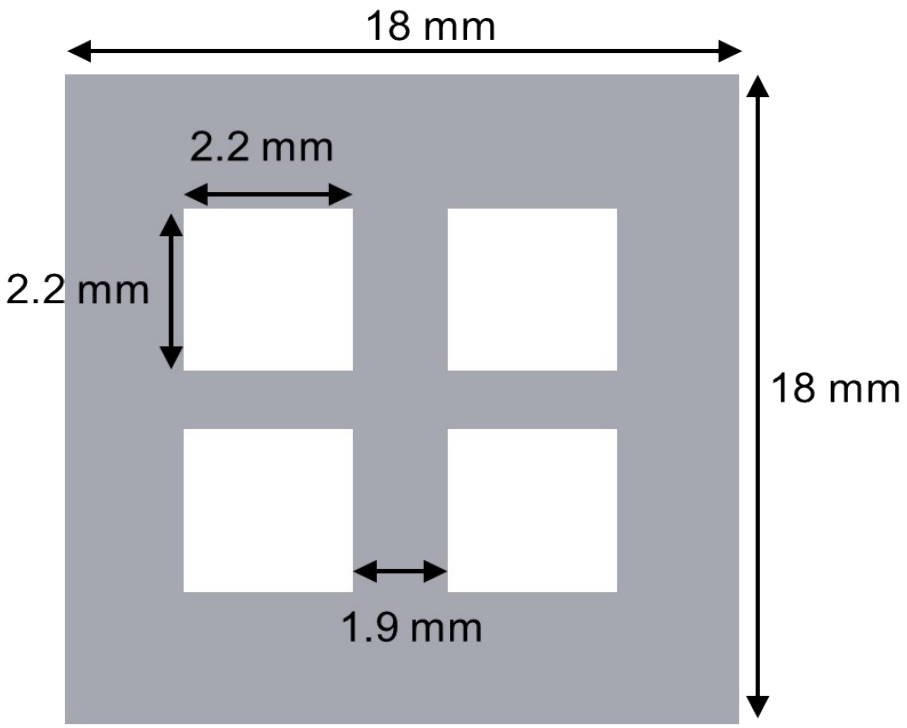

Fig. S4 The whole filtering membrane size was 18 mm × 18 mm and contained four filtering regions. The size of each filtering region was 2.2 mm × 2.2 mm, and the distance between each region was 1.9 mm. The thickness of each filtering region was 200 nm.

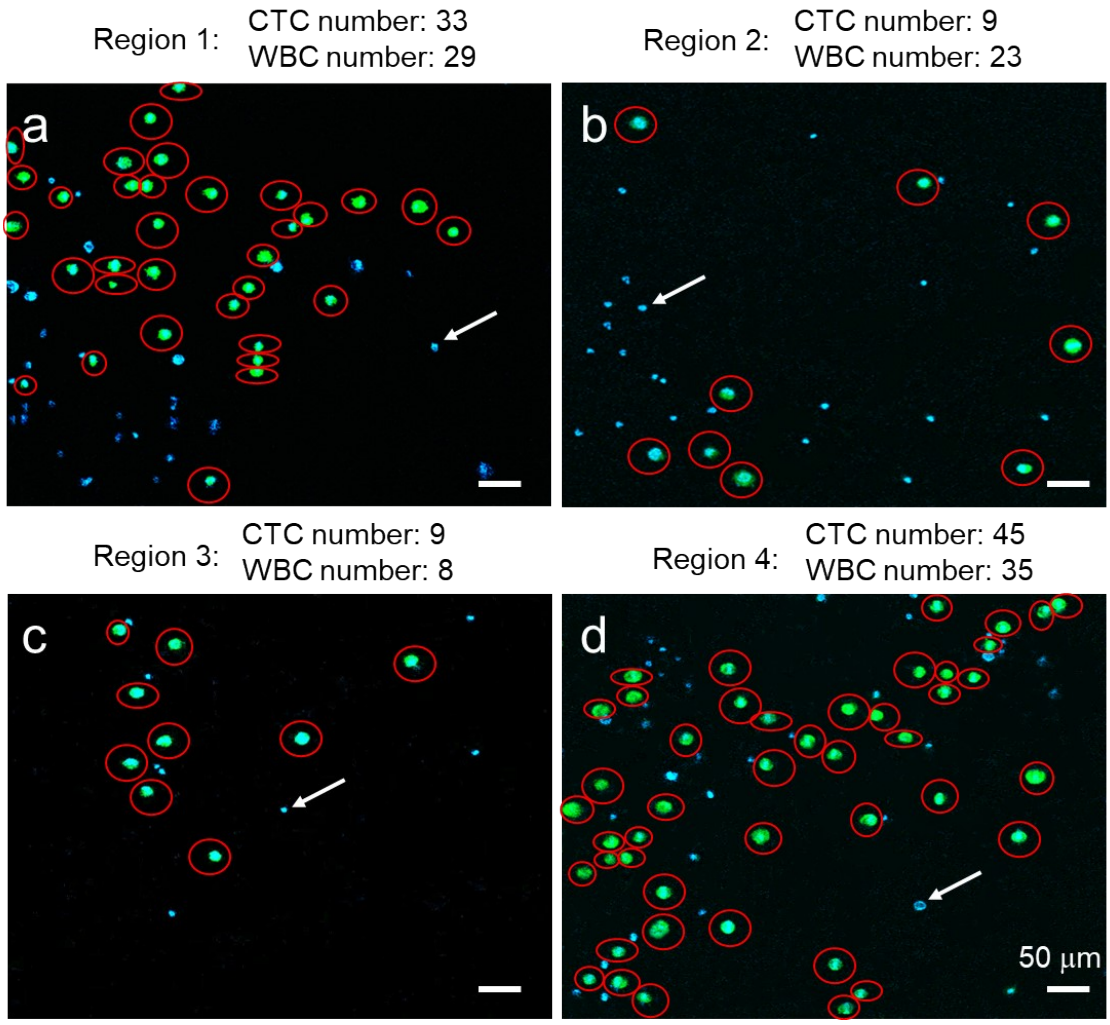

Fig. S5 Manual counting of CTCs (Red circles, green/blue fluorescence) and WBCs (White arrows, blue fluorescent) in spiked blood experiments. (a) Region 1: CTC number: 33, WBC number: 29. (b) Region 2: CTC number: 9, WBC number: 23. (c) Region 3: CTC number: 9, WBC number: 8. (d) Region 4: CTC number: 45, WBC number: 35.

Table S1 Assay information for EGFR mutation detection by Sanger sequencing

Gene information	Sequence (5'-3')	Size
EGFR-21-F	AGGCGGAGGTCTTCATAAC	735 bp
EGFR-21-R	CCACATGCAGATGGGACAG G	

Table S2 Quantification of CTCs in blood samples from cancer patients and healthy donors

Patient ID	Gender	Age	Clinical Investigation	Sample Volume	CTC Counts
P1	Male	74	Lung cancer	2 mL	11
P2	Male	84	Lung cancer	2 mL	10
P3	Female	49	Lung cancer with bone metastasis	2 mL	11
P4	Male	78	Lung cancer with liver metastasis	2 mL	18
P5	Male	77	Lung cancer	2 mL	12
P6	Female	75	Rectal cancer with lymph node metastasis	2 mL	15
P7	Male	51	Colon cancer with liver metastasis	2 mL	9
P8	Male	53	Colon cancer with lung metastasis	2 mL	17
P9	Female	57	Rectal cancer with liver metastasis	2 mL	20
P10	Female	74	Rectal cancer with liver metastasis	2 mL	6
H1	Male	29	Healthy	2 mL	0
H2	Male	25	Healthy	2 mL	0
H3	Female	31	Healthy	2 mL	0
H4	Female	37	Healthy	2 mL	0
H5	Male	54	Healthy	2 mL	0

Table S3 Patients' information of EGFR mutation

Patient ID	Gender	Age	Cancer Type	Therapy	Gene Exon	Nucleotide Mutation
1	Female	57	Lung	Chemotherapy and targeted therapy	EGFR-21	G>A