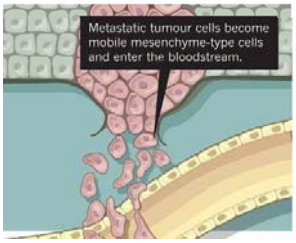
Cell Layouter : Label-Free Cell Isolation and Aspiration System of Circulating Tumor Cells

OT Masuda[1] Y Sun[1], M Niimi[1], A Yusa[2], H Nakanishi[3], F Arai[1]
[1]Nagoya University, JAPAN, [2]Aichi Science and Technology Foundation, JAPAN
[3]Aichi Cancer Research Institute, JAPAN

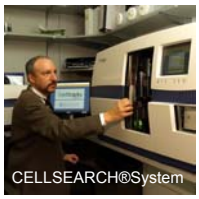
In situ isolation and aspiration of rare cells

1.Background



H Ledford, Nature (2011)

CTC:
Circulating Tumor Cell



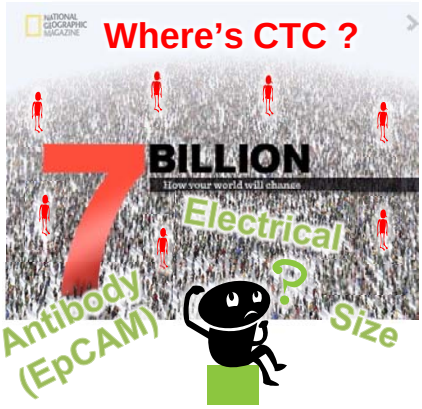
Detection of CTC for clinical application
- ➢Early diagnosis of Metastasized Cancer
- ➢Cancer prognosis
- ➢Monitoring of therapeutic efficacy
- ➢Liquid Biopsy

Blood Cells **CTC is very very rare cell**
Φ < 8 μm , over 10^9 / mL
CTCs(Cancer Cells)
Φ10 μm ~ , 1 ~ ?0 / mL

Agendas
- ➢Removal of a lot of blood cell
- ➢Requirement of time and effort (7.5 mL/ some hour)
- ➢Larger and costly device (0.4 million $)

2. Concept

Layout and Remove using Convective Self-assembly



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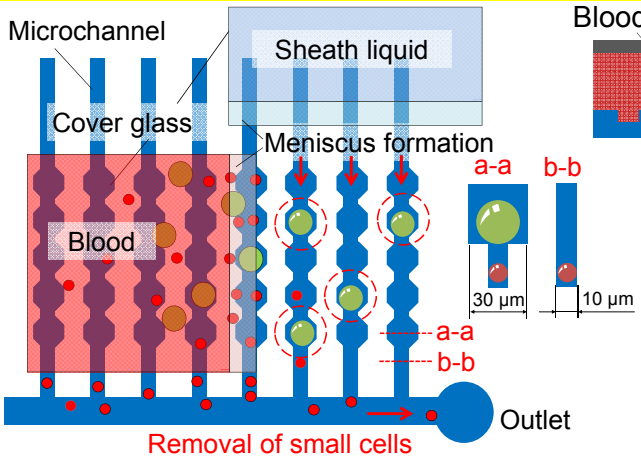
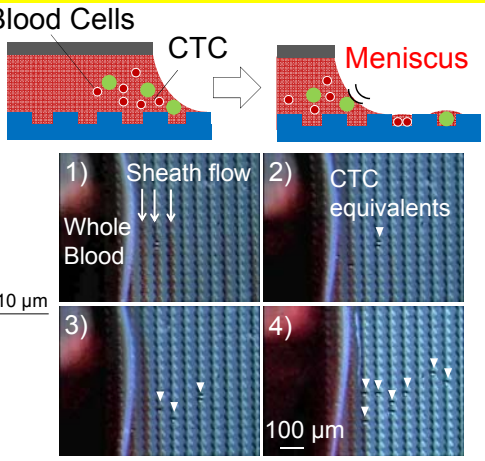
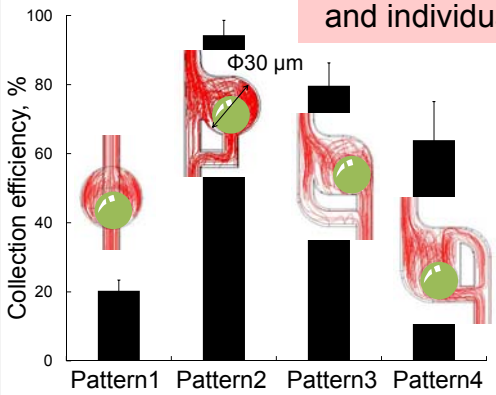
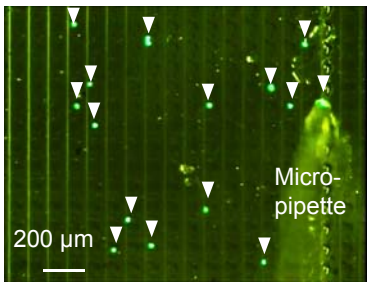




3. Result

Four kinds of channel patterns and individually collected Cell





Green: Cancer Cell (GCIY)

The pattern 2 had the highest collection efficiency of about 90%. Isolation rate: 0.8 mL/hr

CTC isolation/aspiration system:
"Cell Layouter"

Serve as a minimally invasive "Liquid Biopsy"

4. Conclusion

- **Label-free CTC isolation** by the technique of connective self-assembly.
- A specific design of microchannel provided a cancer cell collection efficiency of about 93%.
- Our system aims at achieving **liquid biopsy** to estimate the risk for metastatic relapse easily.

5. Reference

T. Masuda, Y. Sun, M. Niimi, A. Yusa, H. Nakanishi, F. Arai, Cell Layouter : Label-Free Cell Isolation and Aspiration System of Circulating Tumor Cells, 17th International Conference on Miniaturized Systems for Chemistry and Life Science, pp. 1662-1664, 2013.

Contact Person : Taisuke Masuda
E-mail: masuda@mech.nagoya-u.ac.jp
URL: http://www.biorobotics.mech.nagoya-u.ac.jp/
TEL: 052-789-5026, FAX : 052-789-5027

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