Surface acoustic wave based separation techniques

Value Proposition

Complex biofluids such as blood, urine etc. contain a plethora of particles of interest that are of diagnostic and research interest. Examples of such particles may include exosomes, or Circulating Tumor Cells (CTC). Before these can be studied however, they need to be separated from the fluid medium and isolated from other particles. Current methods for doing so include technologies such as centrifugation, chromatography, sieving, filtration, immunological separation, precipitation and electrophoresis. These however suffer from a myriad of problems such as low yield rate, long processing times and low purity of isolated samples. They also often alter the structures and properties of these particles which limits their usability. There is thus a need in the market for a technology that allows the fast separation of bioparticles from complex fluids, with high throughput without altering their structure, properties or function.

Technology

Engineers at Duke University have invented a lab-on-a-chip device that can provide effective separation of bioparticles from complex fluids, with a high throughput, without effecting the structure of these particles. They were able to isolate exosomes with a purity of 98.4% and a yield of 82% from an extracellular vesicle mixture. They were also able to isolate cancer cells from leukocytes with a throughput of 7.5 mL/h and achieve a recovery rate over 86%. Furthermore, the recovered cancer cells maintained their ability to proliferate.

Advantage

- High yield, nearly 85% for particles of most sizes
- High throughput. Extract samples in minutes rather than hours
- Maintain structural and functional integrity of extracted particles

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Links

- Dr. Huang's research website

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Publications

- Mengxi Wu, Yingshi Ouyang, Zeyu Wang, Rui Zhang, Po-Hsun Huang, Chuyi Chen, Hui Li, Peng Li, David Quinn, Ming Dao, Subra Suresh, Yoel Sadovsky, and Tony Jun Huang, Isolation of exosomes from whole blood by integrating acoustics and microfluidics. Proceedings of the National Academy of Sciences of the United States of America (PNAS), Vol. 114, pp. 10584-10589, 2017.
- U.S. Patent Application 16/642,641