



Microfluidic Device for Capturing and Analyzing Rare Cells, Including Circulating Tumor Cells

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a microfluidic device that enables cells to be collected from a relatively dilute suspension and then stained and imaged in the collection area.

Overview

Circulating tumor cells (CTC) are an important area of cancer research. They could provide clinically relevant information about a patient's prognosis. However, these cells are extremely rare (roughly one to 100 cells per mL of whole blood), and their concentration is only about 500 cells per 100 uL after purification and subsequent concentration via centrifugation. This makes it difficult to culture and analyze these cells.

Methods for concentrating and counting CTC have been developed, but these methods can be harsh or prone to cell loss, or are feasible only on the macro-scale. Additionally, they are not suitable for detailed analysis of CTC or amenable to cell culture.

The Invention

UW-Madison researchers have developed a microfluidic device for concentrating rare cells. The velocity of flow through the device is manipulated such that particles in suspension, such as cells, are carried to and deposited in a particular location within the device. The flow in the region where the cells are deposited is slow, so the cells remain in the collection area without any modifications to the surfaces of the device or cells while the fluid that carried them is routed out of the device. Because particles in suspension enter the collection region but do not leave, many particles may be captured from a relatively dilute suspension. The cells then can be cultured, stained and imaged for analysis without being removed from the collection area, creating a gentle and efficient way to implement extensive washing and treatment protocols.

Applications

- Concentrating rare cells
- Counting, treating and identifying cells
- Culturing rare or delicate cell types
- Analyzing non-adherent or lightly adhering cells

Key Benefits

- Allows many particles or cells to be collected from a relatively dilute suspension without requiring device or cell surface modifications

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- Increases cell concentration by creating a microfluidic environment
- Enables initial treatment, culture and subsequent staining and imaging to occur in the same device



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- Device components can be added easily to most existing microfluidic designs.

Stage of Development

A device has been built and currently is being used in collaboration with a clinical trial of a prostate cancer treatment.

Additional Information

For More Information About the Inventors

- [David Beebe](#)
- [Jay Warrick](#)

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Microfluidics](#)
- [Research Tools : Detection](#)

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846

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