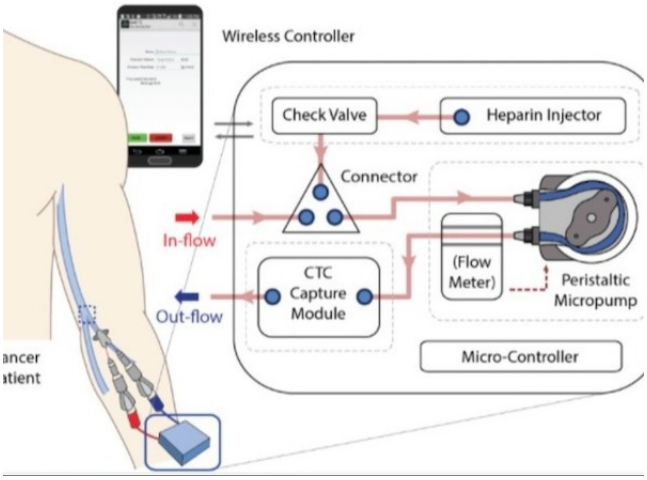
INNOVATION PARTNERSHIPS
UNIVERSITY OF MICHIGAN

Whole Blood Inertial Focusing Device

TECHNOLOGY NUMBER: 2020-179



Technology ID
2020-179

Category
Medical Devices
Life Sciences

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OVERVIEW

Inertial microfluidic device enhances circulating tumor cell capture from whole blood samples.

- Focusing cells in whole blood enhances capture efficiency and assay output.
- Applications include cancer diagnostics, treatment monitoring, and personalized medicine.

BACKGROUND

The detection and analysis of circulating tumor cells (CTCs) in blood have long been pivotal in cancer diagnostics and treatment monitoring. Traditional methods often involve labor-intensive processes such as centrifugation, which can be time-consuming and may lead to cell loss or damage. Existing technologies generally focus on the isolation of CTCs from smaller volumes of blood using fluid media like PBS or serum. However, these established methods struggle with focusing in whole blood due to its complex fluid properties and increased particle interactions. As the demand for more efficient and high-throughput systems rises, there is a clear need for advancements in isolating these cells directly from whole blood. Improved techniques could significantly enhance the processing of larger blood volumes, leading to better diagnostic information and more comprehensive downstream molecular analyses, crucial for personalized medicine.

INNOVATION

The presented device introduces a high-throughput inertial microfluidic approach, capable of focusing circulating tumor cells directly in whole blood—a previously unachieved feat. This innovation leverages a multi-section design with serpentine channels that progressively focus CTCs into tighter streamlines, dramatically increasing capture efficiency. By pre-focusing the CTCs before they pass through Herringbone Graphene Oxide Devices (HBGOs), the system can operate at significantly higher flow rates. This advancement allows for the processing of larger blood volumes, capturing more CTCs and enriching the data obtained from downstream assays. Real-world applications include enhanced cancer diagnostics and improved treatment monitoring, contributing to advancements in personalized medicine. The increased capture rate allows for greater insights from existing assays, offering the potential for accelerated research and clinical practices in oncology.