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Abstract

# Design and production of a microfluidic device for the capture of circulating highly metastatic cancer cell clusters

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## Abstract:

The three main challenges of cancer treatment are metastases, recurrence, and acquired therapy resistance. These challenges have been closely linked to circulating cancer cell clusters. A detailed understanding of their genetic and morphological composition is essential. This will not only improve our knowledge of basic cancer biology but enable the successful development of much needed therapies preventing some if not all of these three main challenges. Extensive research effort is underway to isolate, capture, and analyze circulating tumor cells. However, few if any current efforts specifically target cancer cell clusters, and their much greater ability to initiate new tumors. Growing scientific consensus over the last five years has convincingly established the importance of targeting circulating cancer cell clusters verses individual CTCs to prevent the occurrence of metastatic disease. Based on the increased clinical importance of cancer cell clusters as the main driver of cancer metastasis, new and improved methods are much needed to access these larger multi-celled structures. Microfluidic devices offer a readily accessible platform for a customizable microenvironment for cell isolation and analysis. In this study, we show how a well-known passive micromixer design (staggered herringbone mixer - SHM) can be optimized to induce maximum chaotic advection within antibody-coated channels of dimensions appropriate for the capture of cancer cell clusters. The device's principle design configuration is called: Single-Walled Staggered Herringbone (SWaSH). The preliminary empirical results of our work show that utilization of extensive simulation and modeling can accelerate the development of a working prototype that allows for target-specific cancer cell cluster isolation.

## Biography:

Peter Teriete is utilizing my expertise in structural biochemistry and biophysics to advance novel therapies for a number of diseases. Gaining a detailed understanding of the molecular effects of small molecule modulators on their target, most of which are proteins, can help us to design more potent, efficient and selective drugs. By combining structural biochemistry and biophysics with chemical biology, we can effectively probe and answer important biological questions about the molecular drivers of many diseases.


## Recent Publications:

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