New device refines scientists' ability to sort and process human cells

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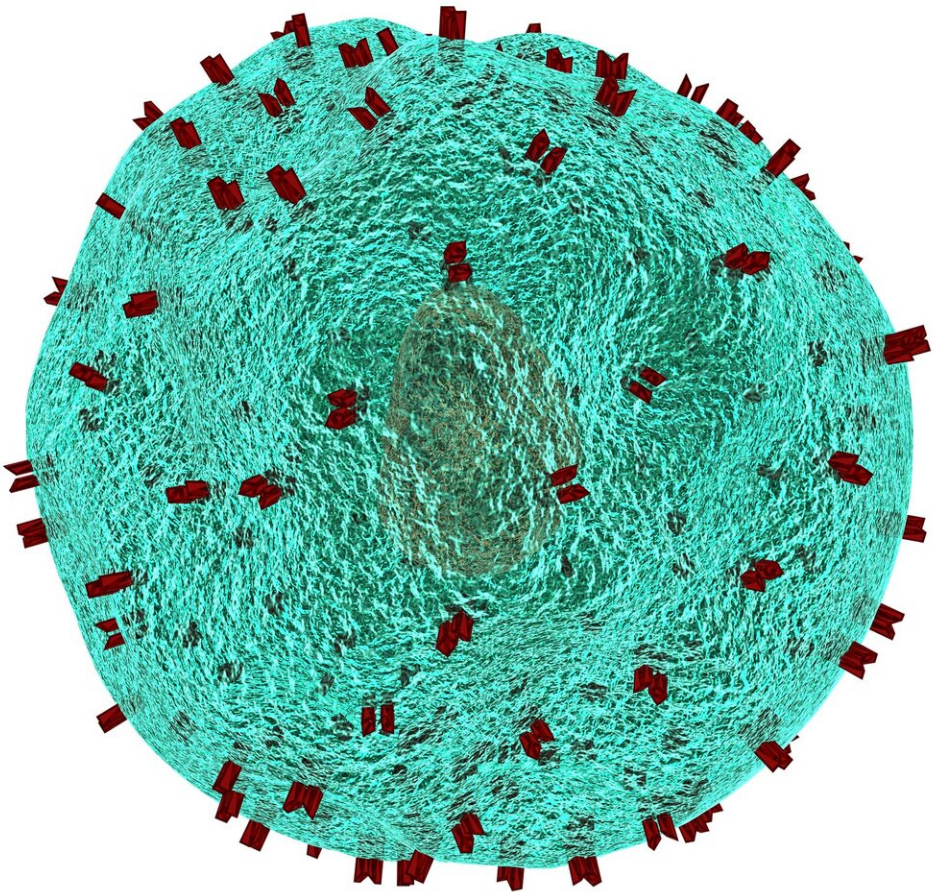

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An innovative new device which can examine and separate single cells on the basis of their response to stimuli could boost personalized medicine and advance our understanding of our own molecular mechanisms.

Developed at the University of Exeter's Living Systems Institute, the Functional Phenotype Flow Cytometer (FPFC) moves individual cells between "virtually" separate microfluidic channels, thereby exposing them to a substance that can induce a cellular response. For the first time, it allows scientists to sort cells by their function, and by the strength of the response, in greater granularity than ever before.

The research, published in *Advanced Biology* and funded by the BBSRC, with support from the Academy of Medical Sciences and the Swiss National Science Foundation, has potential to improve personalized medicine, by detecting whether a specific drug is likely to work for a patient before it is administered.

Dr. Catalin Chimerel, of the University of Exeter, who led the research, said: "Our new technology advances our ability to effectively separate and isolate biological cells into specific and well-defined subpopulations, which is crucial to advancing our understanding of cell make-up and function, and its relevance to disease."

Before they enter the device, the cells are exposed to a biological reagent solution, which means the brighter their florescent glow, the stronger the response. The technique performs three consequent cell processing steps on a novel microfluidic chip: monitors individual cell response across the population, incubates cells with a stimulus and sorts the responsive cells

in real time. The device can profile and sort hundreds of cells depending on their functional response, and crucially, can detect the strength of the response.

Dr. Chimerel said: "Our device allows cells to be sorted into sub-groups in a far more refined way than ever before. We can see not only their function, but how effective it is. We're excited to see how this research will develop, with a longer term aim of translation into commercial use. On a basic level, this has the potential to help us make huge advance into understanding our own cellular make-up. An obvious application is in testing drug response—by exposing the patient's cells to a drug in our device, we will get a very good indication of whether it will prove effective, meaning we have a much better chance of choosing the right drug first time, improving care and reducing unnecessary side-effects."

The University of Exeter has filed a patent application on the technology and is seeking a commercial partner to further co develop or in licence the technology and translate the positive proof of concept findings towards commercialisation.

The paper is entitled 'Functional Phenotype Flow Cytometry: On Chip Sorting of Individual Cells According to Responses to Stimuli', and is published in *Advanced Biology*.

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Provided by University of Exeter

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