Going with the flow

September 12 2012

Scientists who study tissue engineering and test new drugs often need to sort, rotate, move, and otherwise manipulate individual cells. They can do this by prodding the cells into place with a mechanical probe or coaxing them in the desired direction with acoustic waves, electric fields, or flowing fluids.

Techniques that rely on direct physical contact can position individual cells with a high level of precision while non-contact techniques are often faster for sorting large numbers of cells.

An international team of researchers has now developed a way to manipulate cells that combines some of the benefits of both contact and non-contact methods.

The researchers suspended a tiny plate in a microfluidic channel and used magnetic controls to move the plate up and down and back and forth.

The movements generated fluid flow patterns that varied depending on characteristics of the oscillations such as frequency, magnitude, and phase, and the relative position of the plate and the channel wall.

Changing these parameters allowed the researchers to create different streamlines that either pulled or pushed a cell toward or away from the plate, as well as vortices that rotated the cell. When the cell reached the plate the researchers could also use the plate for precise, direct-contact manipulations.

The researchers demonstrated the technique, which they describe in a paper published in the American Institute of Physics' journal Applied Physics Letters, by manipulating a single bovine egg cell.

As a next step, the team plans to demonstrate control of multiple cells simultaneously.

More information: "Local streamline generation by mechanical oscillation in a microfluidic chip for noncontact cell manipulations" is published in *Applied Physics Letters*, apl.aip.org/resource/1/applab/v101/i7/p074102_s1

Provided by American Institute of Physics