On a 'roll': Researchers devise new cell-sorting system

March 7 2008

Capitalizing on a cell's ability to roll along a surface, MIT researchers have developed a simple, inexpensive system to sort different kinds of cells — a process that could result in low-cost tools to test for diseases such as cancer, even in remote locations.

Rohit Karnik, an MIT assistant professor of mechanical engineering and lead author of a paper on the new finding appearing this week in the journal *Nano Letters*, said the cell-sorting method was minimally invasive and highly innovative.

"It's a new discovery," Karnik said. "Nobody has ever done anything like this before."

The method relies on the way cells sometimes interact with a surface (such as the wall of a blood vessel) by rolling along it. In the new device, a surface is coated with lines of a material that interacts with the cells, making it seem sticky to specific types of cells. The sticky lines are oriented diagonally to the flow of cell-containing fluid passing over the surface, so as certain kinds of cells respond to the coating they are nudged to one side, allowing them to be separated out.

Cancer cells, for example, can be separated from normal cells by this method, which could ultimately lead to a simple device for cancer screening. Stem cells also exhibit the same kind of selective response, so such devices could eventually be used in research labs to concentrate these cells for further study.

Normally, it takes an array of lab equipment and several separate steps to achieve this kind of separation of cells. This can make such methods impractical for widespread screening of blood samples in the field, especially in remote areas. “Our system is tailor-made for analysis of blood,” Karnik says. In addition, some kinds of cells, including stem cells, are very sensitive to external conditions, so this system could allow them to be concentrated with much less damage than with conventional multi-stage lab techniques.

“If you’re out in the field and you want to diagnose something, you don’t want to have to do several steps,” Karnik says. With the new system, “you can sort cells in a very simple way, without processing.”

Now that the basic principle has been harnessed in the lab, Karnik estimates it may take up to two years to develop into a standard device that could be used for laboratory research purposes. Because of the need for extensive testing, development of a device for clinical use could take about five years, he estimates.

Source: Massachusetts Institute of Technology