Nanoprinter could have cells lining up to be tested

31 January 2010 by **Colin Barras**
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BORROWING a trick from the office photocopier may make it possible for a nanoscale printer to precisely manipulate biological cells for use in artificial tissue.

In 2007, John Rogers at the University of Illinois at Urbana-Champaign and colleagues produced a printer small enough to print electronic circuits from conductive ink on the nanoscale. By modifying the technique, they think it would be possible to manipulate biological cells or biomolecules such as DNA, says Rogers.

The team's electrohydrodynamic jet (e-jet) printer works by establishing a voltage difference between its metallic nozzle and a substrate below. The resulting electric fields cause charged ions in the ink to congregate in a meniscus at the nozzle. Because the charged ions repel one another, the meniscus deforms into the shape of a cone, creating an ultra-fine tip from which tiny ink droplets are shed.

This process produces an imbalance in the quantities of positive and negative ions in the printed ink, but the team realised that by switching the polarity of the voltage, they could solve that problem and also print intricate patterns of positive or negative charge onto the substrate (*Nano Letters*, DOI: 10.1021/nl903495f).

Once a pattern of charge is printed onto a substrate, the static could attract charged molecules and cells, marshalling them into shape in the same way toner inside a photocopier is forced into the required design. "[But] xerography itself does not offer comparable resolution," says Rogers.

The technique could complement cell-printing techniques for artificial tissue manufacture by helping to guide cells too fragile to be printed into position inside a 3D matrix. "It could be very useful indirect manipulation of cells," says Vladimir Mironov, a biofabrication researcher at the Medical University of South Carolina in Charleston.

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Nice to see that reversing the polarity really DOES come in handy work for something, and wasn't just made up by Jon Pertwee....

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