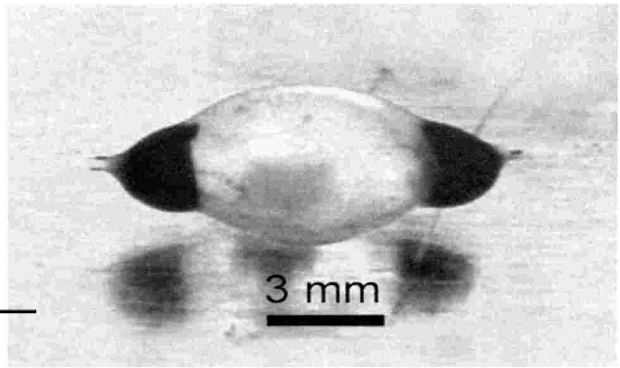
Wireless pulsating heart pump has potential for medical implants

Batteries not included

A miniature pump that beats spontaneously has been constructed by Japanese nanotechnologists. The device, only five millimetres in diameter, uses heart cells to provide the power, rather than an external energy source, making it of potential value in medical implants.

Implants usually rely on batteries, which are inconvenient for patients. Now, thanks to the efforts of Takehiro Kitamori and colleagues at the University of Tokyo, the prospect of battery-free implants is in sight. Using heart muscle cells, which contract and extend spontaneously, they were able to construct a miniature pump, without the need for an electrical power source.

To make their pump, Kitamori and colleagues wrapped a sheet of the beating muscle cells around a hollow silicone polymer sphere.



A hollow polymer sphere coated with heart muscle cells acts as a miniature pump that beats spontaneously

When the sphere was filled with liquid and fitted with inlet and outlet ports, the liquid moved back and forth. Remarkably, the pump worked continuously for over five days, so long as the cells were kept supplied with nutrients.

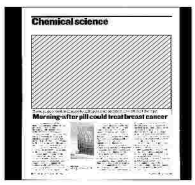
Piotr Garstecki, a microfluidics specialist from the Polish Academy of Sciences, Warsaw, Poland, said that the device 'pumps fluids at flow rates that are comparable to those used in lab-on-a-chip technologies', and added, 'the solution is simple and elegant and as such it sets a benchmark in the field.'

Kitamori says that the next step is to fit their device with chambers and valves, making the liquid flow in one direction only. Paul Kenis from the University of Illinois at Urbana-Champaign, US, an expert in microchemical systems, said that the device could be useful for many medical situations where pump and power source cannot be easily combined.

David Barden

Reference

Y Tanaka *et al*, *Lab Chip*, 2007, DOI: 10.1039/b612082b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