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## Invention: Plastic red blood cells

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Justin Mullins

### Plastic red blood cells

Red blood cells travel through the bloodstream delivering vital oxygen to body tissues and taking away unwanted carbon dioxide – and they have to squeeze through blood vessels as thin as 3 micrometres across to do it. But in some diseases, such as malaria and sickle cell disease, red blood cells lose this ability to deform.

Because of the small size of red blood cells and the demanding work they do, nobody has succeeded in making artificial versions to help people with such conditions.

Now though [Joseph DeSimone](#), a chemical engineer at the University of North Carolina at Chapel Hill, US, thinks he knows how.

He has created tiny sacks of the polymer polyethylene glycol just 8 micrometres across – in the range of human red blood cells – that are capable of deforming in a way that allows them to pass through the tiniest capillaries.

Polyethylene glycol is biologically benign, but binds easily with other substances, which makes it ideal for carrying cargo through the blood, says DeSimone.

For example, a haemoglobin-type molecule carried inside the bag could deliver oxygen to the body and carry away carbon dioxide. The bags could also deliver drugs instead, or help as contrast agents for scans such as magnetic resonance imaging, PET or ultrasound.

DeSimone has injected the particles into mice with "no adverse side effects", but there is no news yet of more extensive tests.

Read the full [plastic red blood cells](#) patent application.

### Microwave rock drill

Tunnelling through soft ground is relatively easy. Set a drilling machine to work in hard rock such as granite or basalt, though, and the rate of progress drops dramatically because of slow cutting speed and the increased rate at which drill bits wear out.

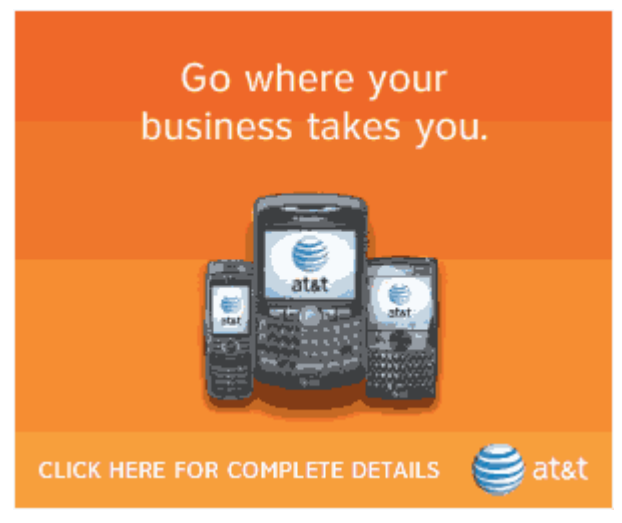
One way to speed up drilling would be to heat up the rock ahead, causing it to crack. Engineers have attempted to do this using gas jets, lasers and even electric heaters, but with little success, says [Jacques Ouellet](#), a mining engineer at McGill University in Montreal, Quebec, Canada.

Instead, he suggests fitting a drilling head with a low energy microwave generator to heat rock just ahead of the drill bit. This fractures the rock efficiently making it much easier to cut.

Read the full [microwave rock drill patent](#) application.

### Genital herpes vaccine

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Vaccination has changed little since the time of [Louis Pasteur](#). The method involves deliberately injecting a dead or inactivate organism into a person to stimulate their immune system to produce cells that fight off the fully fledged organism.

However, many infections have resisted all attempts at producing vaccines.

One of these is the [herpes simplex virus type 2](#) (HSV-2), which is usually the cause of genital herpes.

Now Michal Margalith at [Vical](#), a biopharmaceutical company based in San Diego, says he and colleagues have developed an HSV-2 vaccine using the emerging technology of [DNA vaccines](#).

This involves injecting the patient with a circular piece of DNA called a plasmid that programs their cells to produce HSV-2 proteins that trigger an immune response. That should train the vaccinated person's immune system to fight off the real virus.

The team says that the technique has successfully produced an immune response in mice. However, DNA vaccines are still highly experimental in humans.

Read the full [genital herpes vaccine](#) patent application.

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