Internal compass points to injury

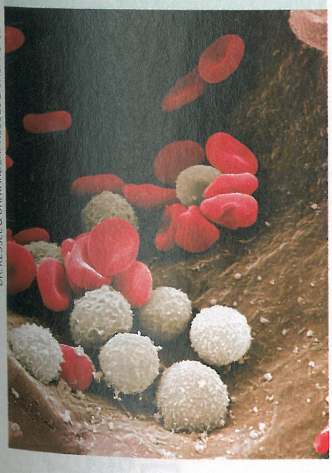
CELLS can't see or hear, but some of them have a sense we lack: they can detect the electric fields generated by a wound. Identifying how they do this could help efforts to boost wound healing.

The flow of ions across a cell membrane creates tiny electric fields. Tissue damage changes that field, and cells involved in tissue repair seem to sense this change.

To work out what might cause these cells to respond to electric fields, Min Zhao and Alex Mogilner at Stanford University in California and their team looked at fish skin cells, which are often used to study cell motion. When placed in an electric field to mimic the field formed around a wound, whole cells moved towards the positive electrode, as if moving towards an injury. Curiously, though, smaller fragments of cellular material in the fish skin cell sample headed in the opposite direction.

The cells and fragments have one thing in common – both possess bundles of proteins that help them move. The team realised that these proteins act as tiny electromagnetic compasses: they propel cells towards a wound, but send cell fragments away (*Current Biology*, DOI: 10.1016/j.cub.2013.02.026).

Inducing electric currents at sites of injury could improve wound healing therapies, says Zhao.



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All the benefits of a gastric bypass... without the knife

A BACTERIAL cocktail could soon offer a simple alternative to gastric bypass surgery.

An effective treatment for obesity, a gastric bypass limits a person's eating by reducing the size of the stomach. However, it carries a high mortality risk, especially in severely obese people.

Lee Kaplan at Massachusetts General Hospital in Boston and colleagues may have discovered a better option. The team took microbes from the guts of mice that had had a gastric bypass and fed them to healthy mice. These mice lost five per cent of their body weight in two weeks, compared with mice on the same diet who were not fed the bacteria (*Science Translational Medicine*, doi.org/kzb).

The work is a big step towards a "knifeless bypass", says Carel le Roux at University College Dublin in Ireland, who was not involved in the study. He says that although a gastric bypass cuts calorie intake, it also leads to subtle changes in gut bacteria, hormones, bile acids and nerve connections. "It changes how the gut talks to the brain," he says.

How the bacterial cocktail leads to weight loss in mice is still not clear. One idea is that the gut flora that develop after a bypass may reduce the ability of the intestines to absorb nutrients, or alter signals regulating metabolism.

Swapping gut bacteria isn't unprecedented as a treatment: it has been used to cure infection and reduce symptoms of multiple sclerosis, rheumatoid arthritis, chronic fatigue syndrome and even Parkinson's disease.

Magnets to reveal dark-matter fluid

EVERY underdog has its day. Using the same underlying physics as MRI scanners, a new experiment could boost the search for one of the humbler dark matter candidates: the axion.

Most hunts for dark matter focus on detecting individual, highly elusive particles known as WIMPs. The runner-up is the axion, which should behave more like a background fluid – and is even harder to find.

Peter Graham of Stanford University in California and colleagues presented a possible solution at the SnowDARK workshop in Utah on 24 March. Theory says axion fluid should separate the charge inside protons and neutrons, giving them what is called an electric dipole moment, so that they have positive and negative poles, like magnets.

If axions exist, applying a magnetic field to a lump of lead would align the dipoles in a specific direction, and applying a perpendicular electric field would then set the dipoles spinning like wobbly tops. That spin generates a secondary magnetic field that the experiment could detect – akin to what happens in an MRI machine.

BYUNG-SUN CHUN

You can't keep a great bustard down

THEY may be the heaviest flying animal, but that doesn't stop great bustards getting around. Satellite tagging shows some migrate 4000 kilometres each year. Their secret? Long layovers.

Male great bustards weigh a whopping 10 to 16 kilograms; females clock in at 5 kilograms. Mimi Kessler of Arizona State University suspected that despite their heft, Mongolian populations travelled great distances to escape harsh winters – January temperatures can drop to -50 °C.

She fitted GPS backpacks to three birds in northern Mongolia, and tracked them for two years. They headed 2000 kilometres south to China's Shaanxi province in autumn, returning in the spring – twice as far as other bustards migrate (*Journal of Avian Biology*, doi.org/kxw).

They did it the hard way. Most long-distance migrators soar to conserve energy, but the fat bustards flap their way south. Frequent, lengthy stops may be how they cope, says Kessler. The tagged treks took four months, just 2 to 6 per cent of which was spent in the air. Other migratory birds fly non-stop for days.