Genetics

Mutation and speech impairment

Am. J. Hum. Genet. **76,** 1074–1080 (2005)

Studies of a particular family with developmental speech difficulties have implicated a mutation in a gene known as *FOXP2* in such disorders. In a wider study, Kay D. MacDermot and colleagues have now identified another mutation elsewhere in the same gene that also seems to impair speech.

The previously identified defect in *FOXP2* is a 'missense' mutation that alters the amino-acid sequence of the resulting protein, a gene-transcription factor. Members of the family who carry this mutation have problems controlling the precise muscle movements required for speech, a condition known as developmental verbal dyspraxia.

MacDermot *et al.* screened the entire *FOXP2* gene in 49 volunteers with verbal dyspraxia. In one person, a four-year-old boy, they found a 'nonsense' mutation that causes the protein product to be truncated and to lack several crucial domains, including a DNA-binding site. The boy had language skills far below those expected for his age. Moreover, his mother and sister carried the same mutation, and also reported language problems, whereas his father had an apparently normal gene and normal speech.

Evidently, there may be a range of defects in *FOXP2* that result in incorrect speech development. **Michael Hopkin**

Aeronautics

That leaking feeling

Appl. Phys. Lett. **86,** 174105 (2005)

The dangers posed to manned space flight by small air-leaks in the skin of a spacecraft — caused by space debris or a meteorite impact — are obvious. Stephen D. Holland *et al.* present a method that is suitable for detecting and localizing millimetre-size holes in metal structures under space conditions.

Conventional leak-detection strategies used on Earth — such as recording of characteristic ultrasound whistles with directional microphones — do not work so well in space, where the air carrying the noise escapes into the vacuum. Holland and colleagues developed a technique that relies instead on mounting a few vibration sensors directly on the inner surface of a pressure vessel. A computer algorithm allows the authors to 'feel' the leak by correlating the individual sensor signals. These experimental correlations are compared with dynamically computed correlations, so that the leakage can be spotted reliably and reproducibly.

Several sensor configurations were tested in the laboratory. Although the algorithm occasionally reported spurious leaks, it did not miss a single real one. The authors believe that their technique is now ready for terrestrial testing on space hardware. **Andreas Trabesinger**

Cell biology

Calcium connection

J. Cell Biol. **169,** 435–445 (2005)

Calcium ions regulate much of what happens in a cell, and a search has long been on to identify the mechanism underlying the phenomenon known as store-operated calcium entry. Jack Roos and colleagues have come up with what appears to be a crucial protein in the pathway.

In several cell types, when intracellular calcium stores are depleted, an ion channel opens up on the cell surface that allows calcium to enter. Working with insect cells, Roos *et al.* used the technique of RNA interference to pinpoint an essential player in this process — a protein called Stim. 'Knockdown' of the mammalian version of the protein, STIM1, reduced store-operated calcium entry in three different lines of human cells. Interestingly, overexpression of STIM1 produced only a modest increase in calcium influx, so it looks as if the protein is not itself the channel.

STIM1 is a single-pass transmembrane protein with a calcium-binding component, and it is present both at the cell surface and in the membranes of intracellular organelles. These characteristics make it a good bet in connecting store depletion to calcium entry. **Lesley Anson**

Medical imaging

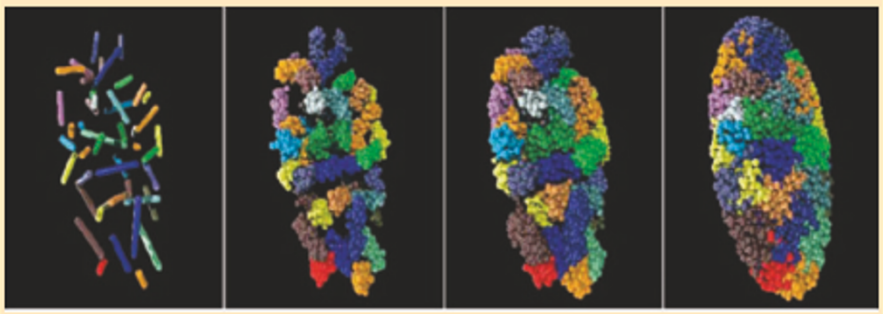
Vessel in sight

Chem. Commun. doi:10.1039/b502347e (2005)

How can clinicians check for the growth of new blood vessels around a tumour? The process of 'angiogenesis' cannot easily be visualized using the conventional technique of magnetic resonance imaging (MRI) — hence Anouk Dirksen and colleagues' interest in developing a better 'contrast agent'.

To enhance the quality of an MRI scan, scientists use contrast agents containing the paramagnetic metal gadolinium wrapped in an organic molecule that targets a specific tissue type — cancer cells, for example. Dirksen *et al.* have produced a contrast agent that ties an atom of gadolinium to a cyclic peptide, cNGR, which is known to bind specifically to CD13 — an enzyme that is overexpressed in growing blood vessels.

By adding the protein avidin to the contrast-agent mix, the authors also find that up to four molecules of cNGR can bind to a single molecule of CD13. Accumulating gadolinium atoms around a blood vessel in this way should further enhance the clarity of an MRI image, and the authors now plan to test their supramolecular contrast agent in mice. **Mark Peplow**



Molecular biology

A new dimension to DNA

PLoS Biol. **3,** e157 (2005)

An innovative technique for three-dimensional imaging offers geneticists a fuller picture of what happens inside the cell nucleus. Andreas Bolzer *et al.* have developed a fluorescent staining method that allows them to visualize all chromosomes at key points in the cell cycle, while preserving the shape and position of each 'chromosome territory'.

Working with human fibroblast cells cultured from a skin biopsy, the team investigated the positions of all chromosomes in the nuclei of cells that had stopped dividing. They found that small chromosomes in non-dividing fibroblasts stuck close to the centre of the nucleus, whereas larger ones cosied up to the outer edge.

Different cell types show different chromosome arrangements, and although nuclei vary in shape — flat ellipsoidal in fibroblasts versus spherical in lymphocytes, for instance — geometry doesn't seem to explain the variations, as computer models using geometrical rules to fill the nuclear space (pictured) put small chromosomes at the outside. Gene density might be the answer, though, as gene-poor regions tended to be close to the nuclear envelope, whereas gene-rich segments were farther inside. The authors predict that examining three-dimensional images will enable researchers to link the position of genes within the nucleus to their subsequent expression. **Roxanne Khamsi**