

Cancer

Further perils of passive smoking

Cancer Cell 4, 191–196 (2003)

Passive smoking is thought to cause lung cancer, but this might be only one of its effects. Research by Bo-qing Zhu *et al.* hints that second-hand smoke could also speed tumour growth by prompting new blood vessels to form.

The team exposed mice that had been injected with lung cancer cells to second-hand smoke or clean air for 17 days. Fume-breathing animals developed tumours that were about five times larger than those in control animals. Blood levels of vascular endothelial growth factor (VEGF) — a molecule that stimulates blood-vessel growth — were doubled, and the tumours developed elaborate blood supplies.

When the smoke-breathing mice were treated with mecamlamine, which stops nicotine from binding to cells, tumour growth was reduced by two-thirds. This suggests that the nicotine found in second-hand smoke stimulates blood-vessel and tumour growth. Drugs that block the receptors for nicotine or VEGF may help to slow tumour growth, the team speculate.

Helen R. Pilcher

Plate tectonics

America claims the Far East

Geophys. Res. Lett. 30, 1924–1927 (2003)

Part of Siberia belongs to America. That, at least, would be the case if national boundaries were defined tectonically rather than politically and geographically. G. M. Steblov *et al.* — an even-handed collaboration of Russian and American

geoscientists — have mapped out the boundaries of the tectonic plates in the eastern corner of Siberia, and find that everything east of the Cherskiy mountain range, lying roughly along latitude 160° E, is part of the North American plate (see picture). West of this, the land belongs to the Eurasian plate.

This division has been long suspected, even taken for granted. But the researchers have now been able to confirm it, thanks to data on plate motions obtained over a 4–6-year period using the Global Positioning System. The relative motions of several Siberian monitoring stations indicate which plate they are situated on. The results do not at this stage resolve the question of whether there are two small microplates — the Okhotsk and Amurian — at this boundary. But if the Okhotsk microplate does not exist, the North American plate snips off the northernmost tip of Hokkaido in Japan as well.

Philip Ball

Physiology

Fat body sizes fly

Cell 114, 739–749 (2003)

Apart from storing proteins, carbohydrates and fat, the so-called fat body in the fruitfly *Drosophila* also secretes hormones — not unlike our liver. Julien Colombani and colleagues claim that it also senses nutrient availability and orchestrates fly growth.

In a screen for genes that modify growth, Colombani *et al.* identified *slimfast*, a gene encoding a protein that transports amino acids into cells. Lowering the amount of *slimfast* in *Drosophila*'s fat-body cells mimicked nutrient deprivation in only these cells, yet it triggered a widespread response: the development of fly larvae was delayed and, even though food intake was normal, the flies were born small and lean, with little wings.

Cells can limit their growth by turning off enzymes such as PI3K. And when flies are fed amino-acid-free food, this is exactly what happens. But individual cells grown in the absence of amino acids don't switch off PI3K, suggesting that amino-acid availability is not sensed at the cellular level, but by some central sensor. Could that sensor be the fat body?

Indeed, Colombani *et al.* show that an amino-acid shortage in the fat body suffices to suppress PI3K activity in the fly's peripheral tissues. They propose that the fly's fat body is its nutrient sensor — which, presumably by the secretion of hormones, adjusts fly size according to food availability.

Marie-Thérèse Heemels

Astrophysics

Lost lithium

Preprint at <http://arXiv.org/astro-ph/0309480> (2003)

Light elements such as deuterium, helium and lithium were created in the furnace of the early Universe. Since then, they have been slowly consumed in stars. Only in old, slowly simmering stars and tenuous gas clouds has the relative quantity apparently remained more or less unchanged.

But old stars have lost more lithium than astronomers thought, according to Alain Coc and colleagues. Using the latest tally of atoms in the Universe, calculated from observations of the cosmic microwave background radiation, and updated estimates of nuclear reaction rates inside stars, Coc *et al.* predicted how much lithium they should see. Only a third of this amount is evident in old stars.

In contrast, deuterium — which is far more easily destroyed — has not changed much in abundance over the Universe's lifespan. The authors suggest that the estimated nuclear reaction rates for lithium may have to be revised.

Joanne Baker

Cell biology

It's the old story of yeast

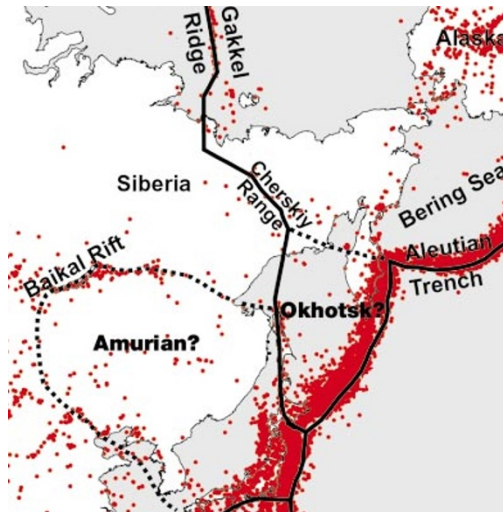
Science 301, 1908–1911 (2003)

The incidence of cancer increases with age. And genomic instability is thought to contribute to tumour development. Are the two connected? From studies on baker's yeast, Michael A. McMurray and Daniel E. Gottschling have evidence that they may be.

A common measure of yeast lifespan is the number of daughter cells a mother cell produces before dying. McMurray and Gottschling isolated successive daughter cells over the entire lifespan of a mother, and looked for the presence of an indicator of genomic instability in certain marker genes. That indicator — 'loss of heterozygosity' — was more common in daughter cells from older mother cells than in those from younger ones, apparently because of an increased rate of chromosome breaks. Once loss of heterozygosity was detected, it occurred at greater frequencies in subsequent progeny. So there seems to be a switch, thrown late in life, that makes the yeast genome more unstable, and it is on a clock that is distinct from the clock that determines yeast lifespan.

The authors speculate that ageing mother cells may accumulate damaged proteins that are less able to repair damaged DNA. But whether similar mechanisms contribute to the age-related increased occurrence of human cancers is, of course, another matter.

Barbara Marte



Tectonic takeover: the North American plate includes part of Siberia, and might also claim the tip of Japan. Red dots indicate the incidence of earthquakes.

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