

Immunology

A nod in the right direction

Science **307**, 731–734; 734–738 (2005)

A gene called *Nod2* is often mutated in people with Crohn’s disease, in which chronic inflammation in the small intestine causes pain and diarrhoea. Two groups have begun to unravel how the altered gene might increase susceptibility to the condition.

Koichi S. Kobayashi *et al.* show that mice genetically engineered to lack *Nod2* protein are more susceptible to bacterial infection, and that immune cells lacking *Nod2* no longer recognize a bacterial coat protein or trigger the normal protective immune response. The authors also find that *Nod2* switches on the production of a group of antimicrobial peptides in the intestine that are important in suppressing infection by pathogenic bacteria.

Meanwhile, Shin Maeda *et al.* find that mice engineered to carry human-type mutations in *Nod2* are also more susceptible to bacterially induced intestinal inflammation. They suggest that the protein controls the activity of two molecules involved in inflammation, NF-κB and interleukin-1β.

The results suggest that *Nod2* mutations might promote Crohn’s disease by hobbling normal immune responses, rather than by triggering the disease itself — a finding that may point to new ways of treating the condition.

Helen Pearson

Metabolism

From fats to fat

Cell **120**, 261–273 (2005)

We all know that a high-fat diet leads to increased body fat and clogged arteries, but the metabolic details of this cause-and-effect chain are still not completely clear. A new link has now been added, with the discovery that high-fat foods stimulate the liver’s production of PGC-1β, a transcriptional coactivator protein that promotes the creation of fatty molecules such as cholesterol and triglycerides.

Mice fed a diet rich in saturated fats but low in cholesterol showed increased PGC-1β expression in the liver, report Jiandie Lin and colleagues. This in turn binds to and coactivates the sterol responsive element binding protein (SREBP) family of transcription factors, which can boost the activity of fat-creating genes.

The finding adds to the picture of how a fatty diet leads to increased blood levels of cholesterol and triglycerides, which can cause heart disease and atherosclerosis. Controlling the expression of PGC-1β in the liver might help to minimize the health impacts of a high-fat diet, the



Environment

Congestion success

Atmos. Environ. **39**, 1–5 (2005)

The London congestion charging scheme has been causing controversy since it began in February 2003. Some businesses claim that the charge of £5 (US\$9) to drive in central London deters shoppers, but the scheme has succeeded in reducing traffic jams.

Unusual weather conditions have made it difficult to assess the full impact of the scheme on air pollution, but using a combination of traffic-monitoring data and emissions modelling, Sean D. Beever and David C. Carslaw obtained some interesting findings. Between 2002 and

2003, the emission of nitrogen oxide compounds was reduced by about 12% inside the charging zone, while levels increased by roughly 1.5% on main roads just outside the zone.

Emission of small particles decreased by about 12% inside the zone, and by 1.5% just outside. Carbon dioxide emissions in the zone are down by almost 20%.

A significant factor in these reductions is that cars produce lower emissions when they travel faster: average speeds in the charging zone rose from 19 to 23 km h⁻¹ in 2003.

Although the authors admit a large uncertainty in the calculations, they say that their results are likely to underestimate the benefits of the scheme.

Mark Peplow

authors suggest — although a means to the same end is to eat less saturated fat in the first place.

Michael Hopkin

Animal behaviour

The sound of sustenance

Anim. Behav. doi:10.1016/j.anbehav.2004.06.020 (2005)

Bottlenose dolphins apparently use their sophisticated echolocation powers only sparingly in the wild, and the prevalence in their diet of fish that produce sound in various ways led to the idea that they listen passively for food.

Damon P. Gannon *et al.* provide evidence to support this idea. The researchers conducted playback experiments off the coast of Florida to determine the foraging behaviour of bottlenose dolphins. Gannon *et al.* played sound recordings of several species of prey fish in the water, as well as the sounds of the snapping shrimp — which the dolphins are not known to eat — as a control.

When the dolphins heard the fish sounds, they immediately changed their direction of travel, turning to pursue the fish and upping the previously low rate of echolocation. Control noises, on the other hand, elicited no change in behaviour. This dominance of passive listening in the initial stages of hunting suggests that echolocation incurs a heavy energetic or ecological cost, the authors say.

Roxanne Khamisi

Oceanography

Global warming all at sea

Geophys. Res. Lett. **32**, L02604 (2005)

Discussions of global warming tend to focus on the mean temperature of the atmosphere at the Earth’s surface, which has warmed by about 0.8 °C over the past century. But that tells only part of the story, according to S. Levitus and colleagues. They have brought together more than four decades of measurements to calculate that the world ocean has, on average, warmed by 0.037 °C since 1955.

Sounds paltry? It certainly isn’t. Water has a very large heat capacity, which means that it takes a lot of heat to raise its temperature. This apparently small increase in ocean temperature has been brought about by an enormous input of heat, accounting for 84% of the total increase in heat content of the Earth system. To put this in perspective, an ocean warming of 0.1 °C would, if all the heat were discharged to the atmosphere, warm the planet’s surface by 100 °C.

A large part of the warming has occurred in the upper 700 metres of the oceans, although the distribution of heat varies geographically: the Atlantic Ocean has taken up more heat than the Pacific and Indian Oceans combined.

Philip Ball