MICROBIOLOGY

Inflamed guts boost bad bacteria

Inflammatory bowel disease increases the risk of colorectal cancer — possibly because gut inflammation promotes the growth of a bacterial strain that produces a DNA-damaging toxin.

Christian Jobin of the University of North Carolina at Chapel Hill and his team exposed mice suffering from gut inflammation, or colitis, to gut bacteria and to a carcinogen. Animals that had been colonized with the *Escherichia coli* strain NC101 were much more likely to develop colorectal cancer than those that had been colonized with another human gut bacterium. However, in the absence of inflammation, mice were able to protect themselves from the *E. coli* strain's harmful effects. The researchers pinpointed a small region of DNA in *E. coli* NC101 that encodes a DNA-damaging toxin. *E. coli* lacking this toxin induced intestinal inflammation but not cancer.

Science **http://dx.doi.org/10.1126/science.1224820 (2012)**

For a longer story on this research, see http://go.nature.com/tx21ez

NEUROBIOLOGY

Flushing proteins from the brain

To rid itself of extracellular proteins, the brain relies on water transport by cells called astrocytes and on the flow of cerebrospinal fluid. This fluid was thought mainly to provide mechanical and immunological protection to the brain.

Jeffrey Iliff and Maiken Nedergaard at the University of Rochester Medical Center in New York and their teams tracked fluorescently labelled molecules as they moved through the brain. The proteins — including amyloid beta, thought to be pathogenic in Alzheimer's disease — were transferred into cerebrospinal fluid. This, the authors report, flows into the brain through the spaces surrounding arteries, and out by means of the spaces around veins. The blood vessels were surrounded by projections from astrocytes. In mice lacking a protein that transports water across the astrocyte cell membrane, 70% fewer molecules were cleared from the brain than in normal animals.

Understanding this clearance system could help to explain how some neurodegenerative diseases develop, the researchers suggest.

Sci. Transl. Med. 4, **147ra111 (2012)**

INFORMATION TECHNOLOGY

Textbook encoded in DNA

A 5.27-megabit book containing more than 53,000 words, 11 digital images and a computer program has been encoded in DNA — the largest amount of non-biological data yet stored in this way.

Sriram Kosuri at Harvard's Wyss Institute in Boston, Massachusetts, and his colleagues created nearly 55,000 different short DNA strands, or oligonucleotides, each containing 159 nucleotides. Of these, 96 represent data in the form of 1's and 0's, 19 show how the oligonucleotides should be ordered, and 44 facilitate sequencing. The researchers designed their system such that the DNA's A and C bases represent 0, with G and T corresponding to 1. Sequencing the DNA molecules allows the data to be decoded.

The technology, although currently too costly for routine use, stores information more densely than is possible with conventional devices.

Science **http://dx.doi.org/10.1126/science.1226355 (2012)**

For a longer story on this research, see http://go.nature.com/i56h26

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MATERIALS

Graphene, heal thyself

HIGHLY READ on pubs.acs.org in July

Graphene, atom-thick sheets of carbon, has a multitude of unusual properties, and self-healing can now be added to the list.

Quentin Ramasse of the SuperSTEM Laboratory in Daresbury, UK, and his colleagues deposited metals on sheets of graphene and then scanned the sheets using an electron microscope. The metals catalysed the breaking of carbon bonds, making holes in the carbon's honeycomb structure. When the supply of catalysts had been exhausted, the graphene healed itself. In the presence of other hydrocarbons, the graphene sheet filled its gaps with variably sized rings of additional carbon atoms. However, if no hydrocarbons were present, the carbon atoms rearranged themselves into their original two-dimensional hexagonal structure.

Researchers hope that the 'reknitting' process can be used to help control nanometre-scale etching of graphene.

Nano. Lett. 12, **3936–3940 (2012)**

A. COOPER/R. HARDING

CLIMATE SCIENCE

Melting triggers more melting

The whole of Greenland's ice sheet is likely to experience some degree of melting over the next decade.

Jason Box at the Ohio State University in Columbus and his team combined satellite measurements of surface albedo — how much sunlight the ground reflects — with models of surface air temperature and solar radiation hitting the surface for the past 12 summers. The researchers found that positive albedo feedback — whereby melting ice reduces surface reflectivity, leading to faster melting — has doubled the ice sheet's surface melt rate since 2000.

The authors identified three ways in which recent warm summers could have contributed to the reduced albedo: surface heating due to unusually warm air currents creates larger snow grains that reflect less sunlight; less cloudy skies increase direct heating from sunlight; and reduced summer snowfall results in a darker surface.

Another warm decade could mean that Greenland will absorb instead of resist the heat from 24-hour sunlight, leading to expansion of the melt area to encompass the entire ice sheet. This process has already begun, with an estimated 97% of Greenland's ice sheet having shown surface melting by mid-July of this year.

Cryosphere 6, **821–839 (2012)**

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