

The
BigPicture
little book
of fast facts

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The *Big Picture* little book of fast facts

Big Picture is the Wellcome Trust's educational magazine, created for post-16 students, teachers and anyone interested in learning more about biology and medicine. Each issue is on a different topic in biology and comes with its own sprinkling of 'fast facts', fascinating snippets of information on the topic.

In this book, we've brought together the best of the fast facts from our last 14 issues, and a few more for good measure, and sorted them into eight themes. Use them in project work, as part of lessons or even just to astound your friends. We hope you enjoy them!

Share your thoughts or your own fast facts by emailing bigpicture@wellcome.ac.uk. Find out more at www.wellcome.ac.uk/bigpicture.

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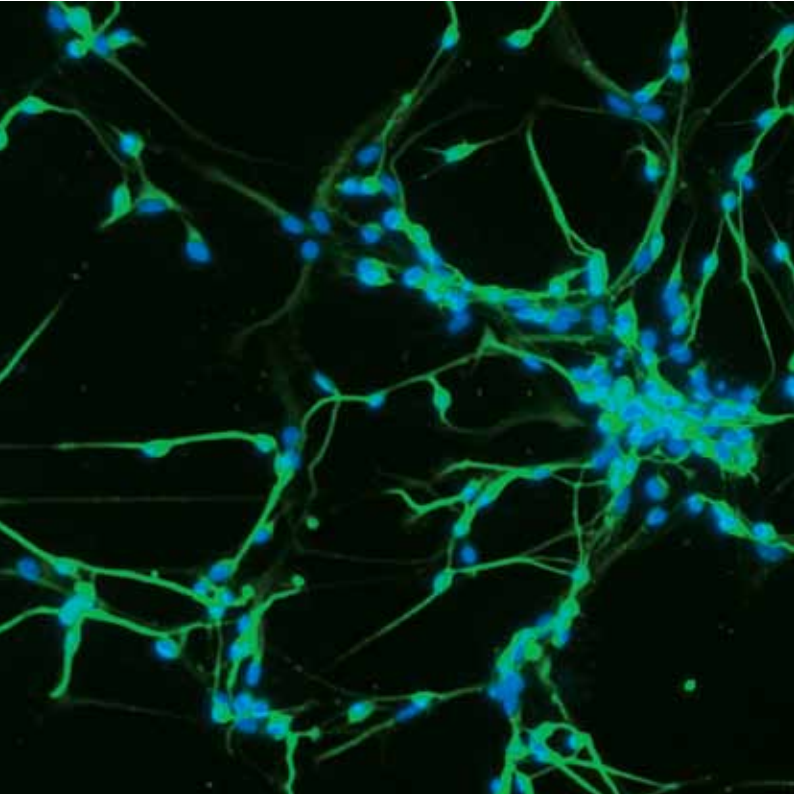
The brain

Our brains form a million new connections every second of our lives.



The hippocampus – a brain region involved in spatial navigation – is bigger than normal in London taxi drivers, who must pass ‘the Knowledge’, a test based on the city’s layout.

Maguire et al. Proc Natl Acad Sci USA
2000;97(8):4398–403.
Left: *Deejipilot/iStockphoto.*



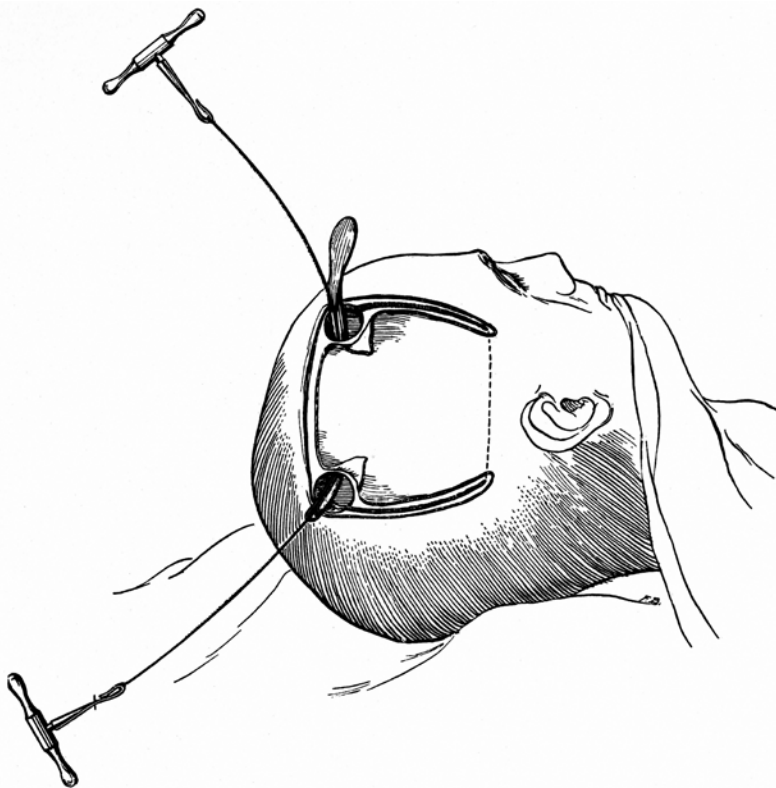
The adult brain contains around 100 billion neurons and even more support cells.

Magill's Medical Guide. 1998. p. 221.
Left: Neurons. Yirui Sun/Wellcome Images



Your brain uses less power than your refrigerator light – just 12 watts.

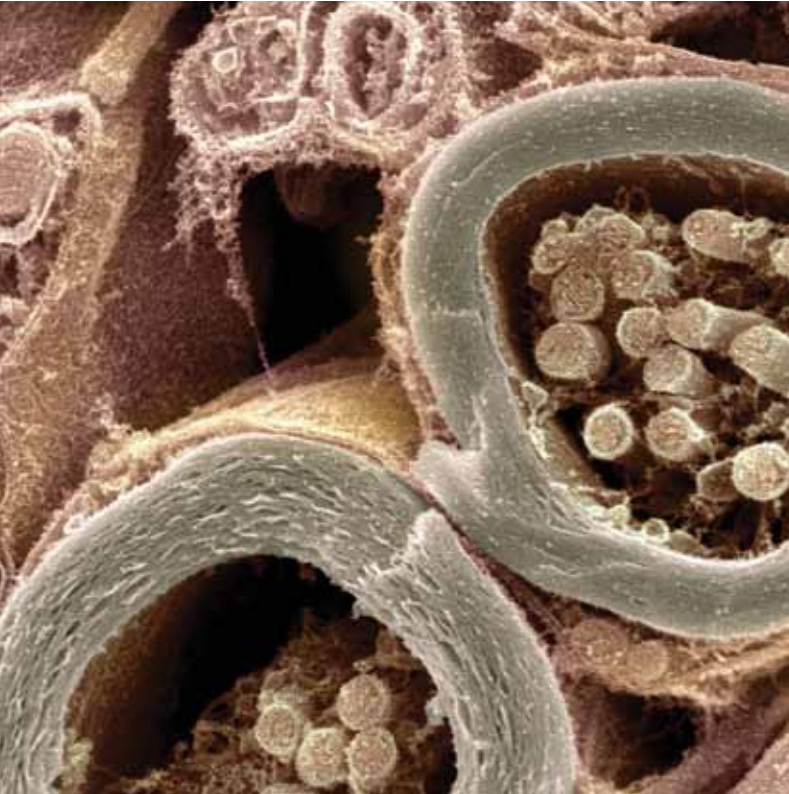
Times 2008 28 March.
Left: *Dominik Pabis/iStockphoto*



There are no pain receptors in the brain, so brain surgery or injury can occur without causing pain. The scalp and skull, however, are sensitive to pain.

Coon, Mitterer. *Introduction to Psychology: Gateways to mind and behavior*. 2008.

Left: Brain surgery. *Wellcome Library*



The total length of myelinated nerve fibres in the brain is between 150 000 and 180 000 km (enough to go around the Earth about four times).

Marner et al. *J Comp Neurol* 2003;462:144-52.
Left: Myelinated nerve fibres.
Dr David Furness/Wellcome Images



Your brain accounts for just 3 per cent of your body's weight but consumes 17 per cent of your body's total energy.

Times 2008 28 March.

Left: Artwork. *Chris Nurse/Wellcome Images*

Disease

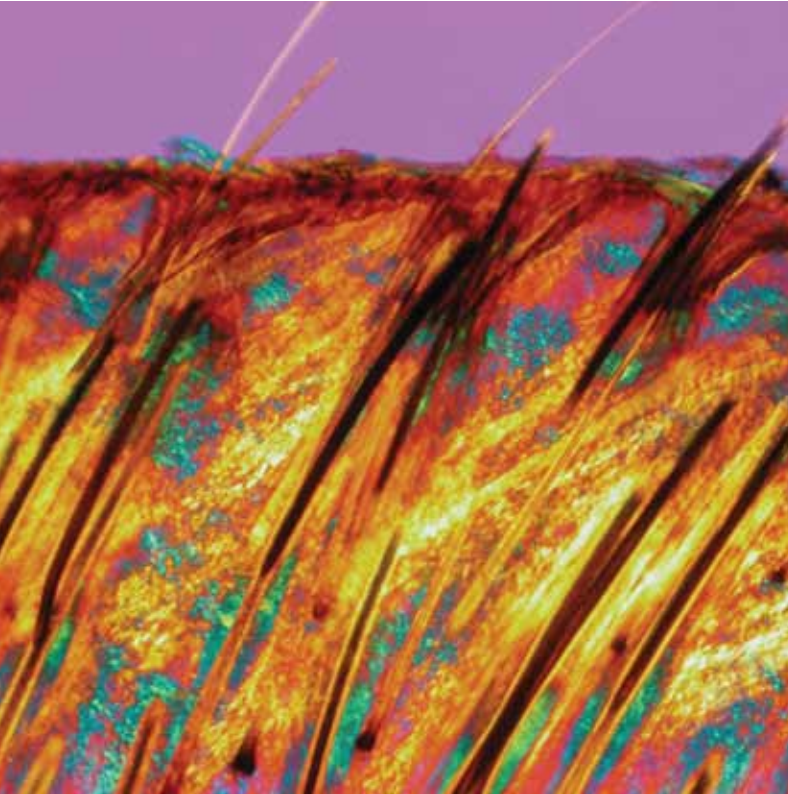
Around 13 per cent of all deaths worldwide were caused by cancer in 2008 – some 7.6 million people.



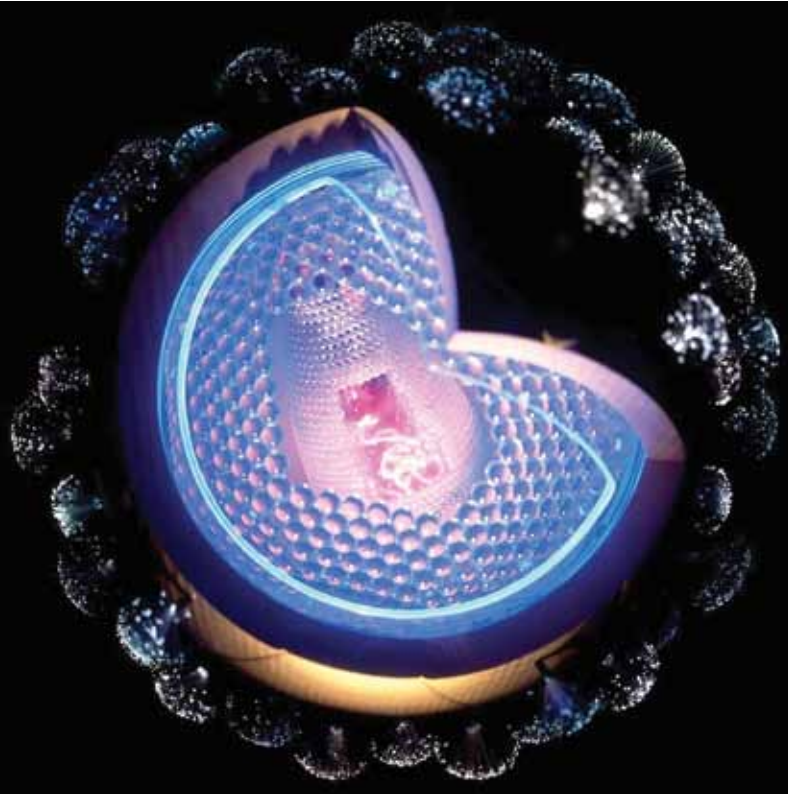
The number of children under five dying each year, worldwide, fell from more than 12 million in 1990 to 7.6 million in 2010 – but that’s still 14 deaths per minute.



The three leading global causes of premature death and disability in 2030 are projected to be HIV/AIDS, depression and ischaemic heart disease (where the blood supply to the heart is reduced).



Chemotherapy can lead to hair loss because the hair follicle epithelial cells – like cancer cells – divide rapidly and, hence, are targeted by many anticancer drugs.



Worldwide, 33.3 million people were estimated to be living with HIV/AIDS at the end of 2009. In this year, there were an estimated 1.8m deaths and 2.6m new infections.

World Health Organization.
Left: Cut-away model of HIV.
John Wildgoose/Wellcome Images



The World Health Organization estimates that climate change is the cause of around 150 000 deaths and 5 million illnesses per year. This is expected to double by 2030.

Intergovernmental Panel on Climate Change.
Left: *VikaValter/iStockphoto*

Evolution

Starfish are our distant cousins. Sea urchins and other echinoderms are the closest relatives of the vertebrates.



Analysis of DNA from museum specimens revealed that the dodo was a type of pigeon.



***Mus spretus* and *Mus domesticus* look similar, but crosses between these two species of mouse fail to produce offspring because of a single genetic incompatibility.**



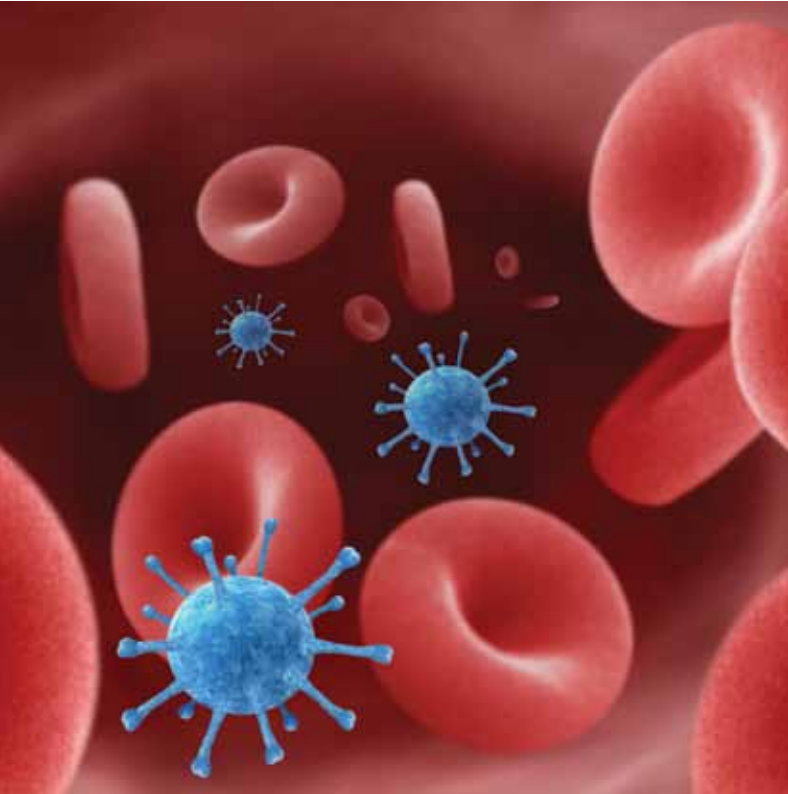
Most living things can make vitamin C, but some that can't – including humans, other primates, guinea pigs and bats – rely on their diet to get it.

www.last-word.com

Left: Scanning electron micrograph of a fruit bat tongue. *Kevin MacKenzie, University of Aberdeen/Wellcome Images*

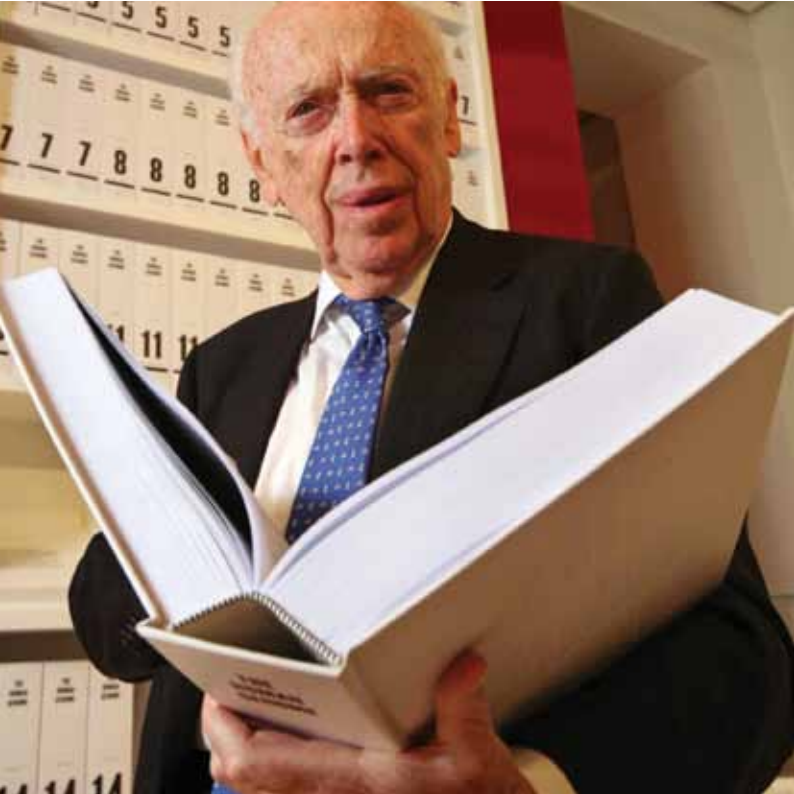
Genes

**In an average meal,
you eat around
150 000 km of DNA.**



Losing a gene can be a good thing. A mutated caspase-12 gene has been selected for during human history; it may make us less likely to suffer from sepsis.

Xue et al. *Am J Hum Genet* 2006;78:659–70.
Left: Viruses in the bloodstream.
Annie Cavanagh/Wellcome Images



**It would take 9.5 years,
non-stop, to read aloud
a person's genome base
by base.**

genomics.energy.gov

Left: James Watson reading the human genome
sequence. *Wellcome Images*

Sex & gender

In 2008, 51.9 per cent of girls and 41.2 per cent of boys in the UK achieved two or more A levels or equivalent.



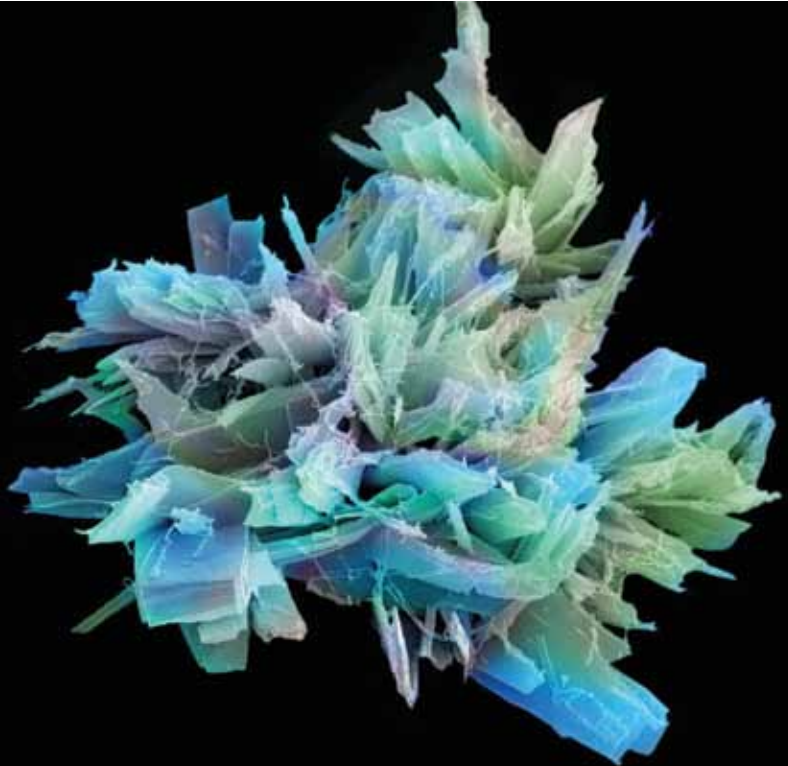
Of the 1.42 million offenders that were sentenced for criminal offences in England and Wales in 2006, 80 per cent were male.



Even allowing for size differences, women have disproportionately smaller feet than men.



Girls born today are expected to live 4.2 years longer than boys, although this gap is gradually narrowing.



Research suggests that aspirin protects men against heart attack but not stroke, yet it protects women against stroke but not heart attack.

Berger et al. JAMA 2006;295:306-14.
Left: Aspirin crystals.
Annie Cavanagh/Wellcome Images



There were more than three times as many suicides among males as among females in the UK in 2009.



Women wake up from anaesthesia nearly twice as fast as men.

Tong et al. *Anesthesiology* 1999;90:1283-7.
Left: *Reflektastudios/iStockphoto*

Food & diet

A 20-year-old obese man can expect to live for 13 years less than average.



The average spend per person on eating out was 26 per cent of their total food spend in 2005, compared to less than 10 per cent in 1955.



Fifteen minutes of moderate to vigorous exercise per day cuts obesity risk by 50 per cent.



Grapefruit juice contains compounds that block enzymes involved in metabolising a range of drugs, so drug levels stay higher for longer. These drugs include calcium-channel blockers used to treat high blood pressure.



Eating soup makes you feel full for longer than eating solid food with a glass of water. Why? Water mixed with solids (e.g. soup) stays in the stomach longer than water alone.



Research has found that people tend to associate sweet and sour tastes with high-pitched sounds and umami (savoury) and bitter tastes with low-pitched ones, and that people enjoy food more when ‘matching’ music is played during eating.



Jelly containing fresh pineapple, papaya and kiwi won't set as the proteases in them break down the protein gelatin in the jelly. The proteases also digest some of the proteins in your mouth and tongue when you eat these fruits, causing tingling and stinging.



Research has shown a strong relationship between the weight of children and the body mass of their biological parents but not between the weight of children and the body mass of their adoptive parents.

Stunkard et al. *New Eng J Med* 1986;312:193-8.
Left: *Rauluminate/iStockphoto*



UK households throw away 8.3 million tonnes of food (£680 per family) per year – the same as one in three bags of shopping going in the bin.

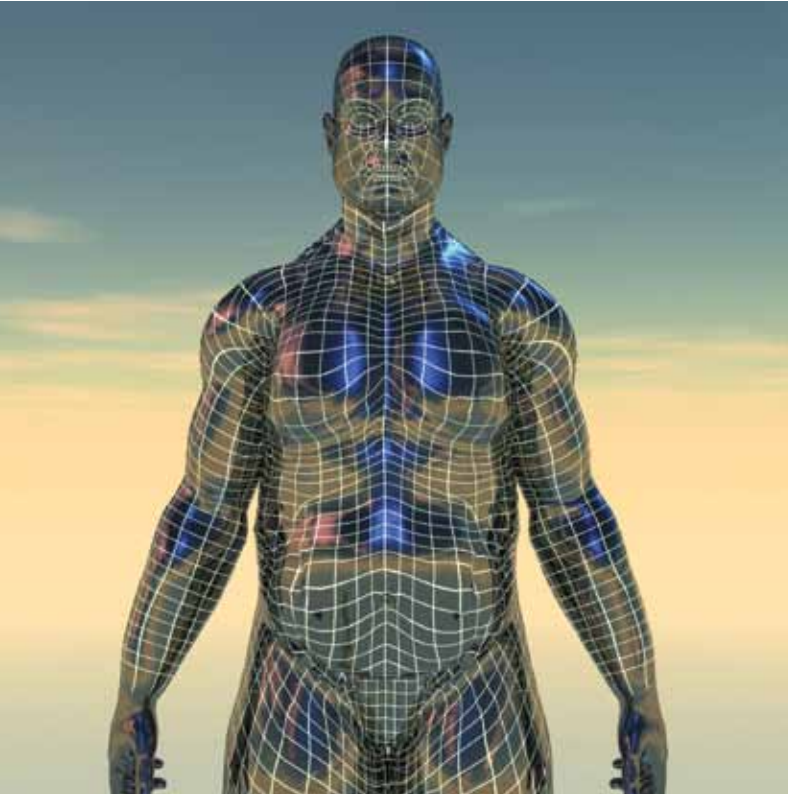


The 4.5 kg increase in weight of the average American between 1990 and 2000 caused aircraft to burn 350 million more gallons of fuel, at a cost of \$275 million, per year.



**Wimbledon's seats are
6 cm wider than the
original 1922 models.**

Times 2004 10 June.
Left: *Harry Fodor*



World Health Organization figures suggest 25–70 per cent of European adults are overweight (depending on the country) and 5–30 per cent are obese.

World Health Organization.
Left: Artwork showing the body contours of an overweight man. *Jürgen Ziewe/Wellcome Images*

The body

**A man makes
1500 sperm per
heartbeat.**



In a recent study of keyhole surgery, surgeons who played a musical instrument were significantly faster at suturing than those who did not.

Boyd et al. JSLs 2008;12:292-4.
Left: *Tim van de Velde*



Human eggs are made in the embryo, so the egg cell that fused with a sperm to become you was actually produced around six months before your mum was born.

Gilbert. *Developmental Biology*.
Left: Human egg with coronal cells.
Yorgos Nikas/Wellcome Images



The tallest man in history was 8'11" (2.72 m). The current world's shortest man is 1'11.6" (59.9 cm).



**38 274 cosmetic
procedures were carried
out in the UK in 2010.
90 per cent of these
were on women.**



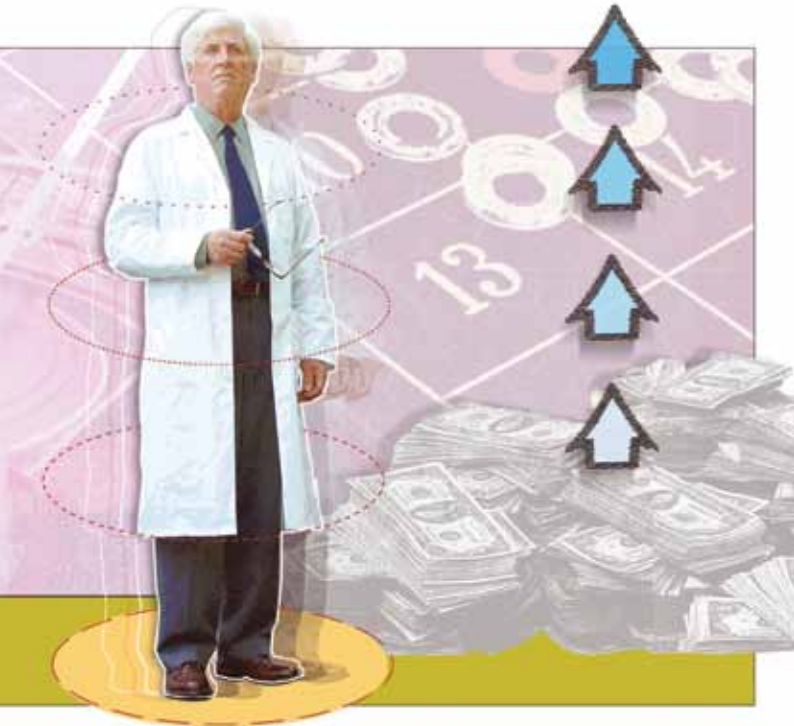
6'1" : The average adult male height in the Netherlands, making Dutch men the world's tallest.

Cole. *Econ Hum Biol* 2003;1:161-8.

Left: Making clogs. *Jan Kranendonk/iStockphoto*

Applied science

14 000:
**The estimated number
of pills prescribed over
an average lifetime.**



It is estimated that the global healthcare marketplace will be worth \$1.3 trillion by 2020.



It is estimated that around £300 million per year is wasted on prescription medicines that go unused in England.

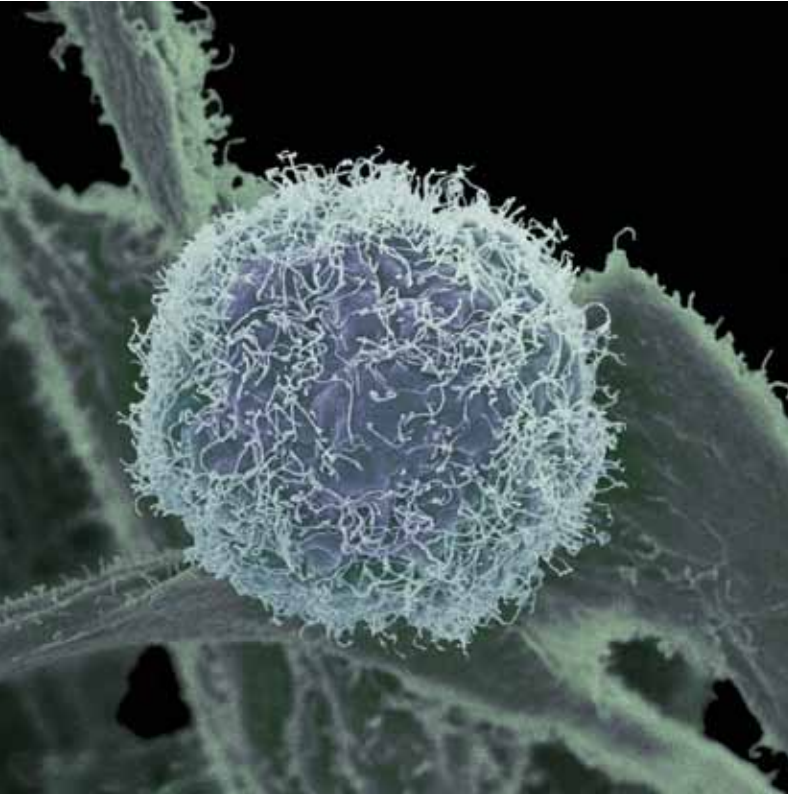
York Health Economics Consortium and the School of Pharmacy (University of London). 2010. Evaluation of the Scale, Causes and Costs of Waste Medicines.
Left: *Worden Sports College/Wellcome Images*



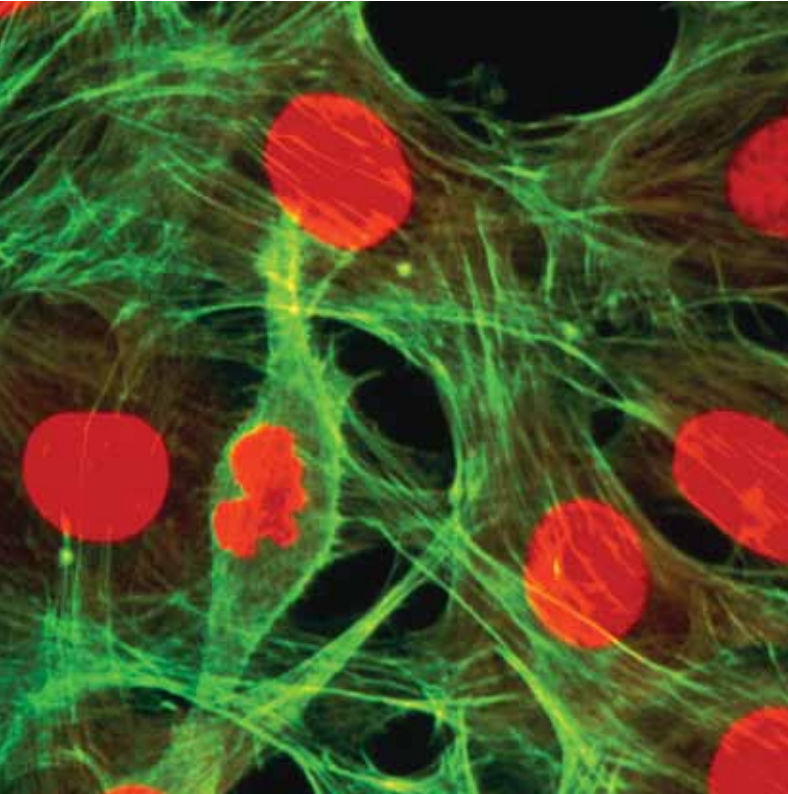
Getting a diagnosis wrong can be harmful to a patient's health. One study found that diagnostic error is responsible for about 10 per cent of adverse events occurring in UK hospitals.



Radiology and pathology, which rely on visual interpretation (e.g. of X-rays), have low diagnostic error rates of about 2–5 per cent. In the higher-stress environment of A&E, the rate can reach 12 per cent.

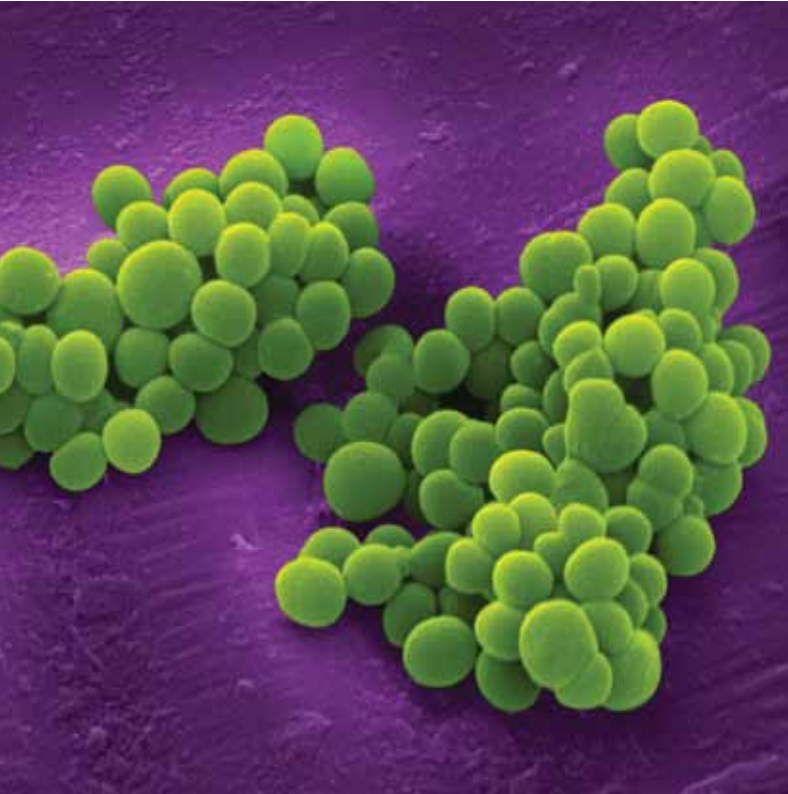


In personalised medicine, therapy is tailored to a patient's genetic make-up. One example is the drug vemurafenib, which blocks a protein that is mutated in over half of cases of melanoma.



Advances in nanotechnology have enabled the creation of miniature machine parts made from DNA. It might be possible to use these to fix faulty cells.

Dietz et al. *Science* 2009;325:725–30.
Left: Dividing fibroblast, DNA in red.
Kate Whitley/Wellcome Images



Scientists have used carbon nanotubes and enzymes to create an antimicrobial coating that can kill MRSA within two hours of application. This could be used to paint the walls of hospitals and sterilise equipment.



Scientists have created a nanotechnology-based therapy that can repair brain damage and partially restore the eyesight of blind animals within a few weeks.



Stem cell therapies are already in use in the form of bone marrow transplants – the first of which was performed in 1956.

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The team

Education editor: Stephanie Sinclair

Editor: Chrissie Giles

Assistant editors: Kirsty Strawbridge, Tom Freeman

Writers: Chrissie Giles, Emma James, Ian Jones

Graphic designer: Anja Fouad

Project manager: Jennifer Trent Staves

Publisher: Hugh Blackbourn

The Wellcome Trust's vision is to achieve extraordinary improvements in human and animal health. We believe that this can only be realised if there is both a sustainable supply of high-quality scientists and a wider population that can embrace, challenge and respond to the innovation and development brought about by science and technology.

The future of science depends on the quality of science education today.