

The 100-year life: how to prolong a healthy mind

As concerns about dementia grow, more research is investigating how we can keep our brains fit and sharp

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Sci-fi aside, how long will I live?

Living to 100 will soon become a routine fact of (long) life. Life expectancies have been rising by up to three months a year since 1840 and although gains in the UK began to slow in 2011, it is still estimated that more than half the babies born in wealthier countries since 2000 may reach their 100th birthdays.

It is an impressive increase: in the early 1900s, the probability of a baby reaching 100 was 1%. A newborn in the UK today has a 50% chance of living to 105. There were 3,600 centenarians in 1986. Today there are some 15,000.

You do not have to be a newborn to benefit from this trend of increased longevity, though. A 60-year-old in the west today has an even chance of living to 90 and a 40-year-old can expect to live to 95.

But the longevity boost is not done yet: it is generally agreed that the natural ceiling to human life is somewhere around 115. Others say that even without cutting-edge AI or other technological wizardry, we could live far longer. Opinion broadly divides into three groups: the “levellers” who say we are at peak lifespan now. The “extrapolators” who argue that technology and education have made their biggest leaps but can squeak us up to a ceiling of 120 before levelling off for good. And the “accelerators” – those determined to defeat ageing, who believe we are on the verge of major breakthroughs in scientific and technological research that will increase longevity, pushing us into the realms of immortality.

Why are we living so much longer?

Life expectancy has been increasing since we cracked infant mortality in the 19th century. Economy, technology, healthcare and education have all combined with vaccines, safer childbirth and medical advances in the care of stroke and heart attack patients to keep the relentless pace of increasing longevity going strong.

But the growth in life expectancy began to slow in 2011 in the UK and people live longer in more than two dozen other countries.

There has not been a big medical or health gamechanger in the past couple of decades. While some argue that we should celebrate the longest lifespans that humans have ever attained, others warn that illness and infirmity risk turning long lives into slow, miserable declines.

How to avoid this? How can I stay healthy for longer

In his essay on ageing, *De Senectute*, Cicero says there are four reasons why people write off old age: it stops you working, it makes your body weak, it denies you pleasure and every day is one step closer to death. Then he shows why each argument is wrong. “The old retain their wits quite well,” he notes, “so long as they exercise them”.

Dan Buettner coined the term “blue zones” for five regions he identified as having populations who live healthier and longer lives than others (they are **Okinawa** in Japan, **Sardinia** in Italy, the **Nicoya** peninsula in Costa Rica, **Loma Linda** in California and Ikaria in Greece). The diets of those living in these regions, he discovered, consist almost entirely of minimally processed plant-based foods – mostly wholegrains, greens, nuts, tubers and beans. Meat is eaten, on average, five times a month. They drink mostly water, herbal teas, coffee and some wine. They drink little or no cow’s milk.



Sardinia is one of the regions where people's diet tends to give them longer lives. Photograph: Alamy

Other scientists have added different ideas to the mix. Sufficient sleep and a sense of purpose are important but exercise is key – at least 150 minutes of moderate or 75 minutes of vigorous aerobic activity each week, plus twice-weekly muscle-strengthening sessions, to reap health and longevity benefits.

Having said that, **short bouts of light physical activity**, such as walking and cleaning, have been shown to increase the lifespans of older people. And **a study** published last January found that simply moving instead of sitting for 30 minutes each day could reduce the risk of early death by 17%. Some **research suggests** that club sports such as tennis and soccer are best for longevity because they also encourage social interaction, another vital ingredient to longevity.

What other ideas are there for prolonging healthy life?

At conferences on longevity, it is immediately obvious during the morning breaks that the buffets remain largely untouched – and that everyone drinks their tea and coffee inky black, disdaining even a drop of milk. Most serious seekers of longevity also practice both caloric fasting and intermittent fasting.

In a nutshell, the approach is to eat 30% fewer calories and fast for 16 hours a day, though this may not be appropriate for certain vulnerable groups. In essence, it means skipping breakfast and not making up for the missed meal during the day.

No one knows quite why intermittent fasting works. The best guess is that it has something to do with metabolic switching and cellular stress resistance causing the body to increase production of antioxidants.



Studies of mice seem to prove that intermittent fasting helps prolong life. Photograph: Redmond Durrell/Alamy

Repeated studies on mice going back a century seem to prove that it works – on rodents, at least. Last December, the New England Journal of Medicine [reviewed all the studies in this area](#) and concluded that a combination of fasting and caloric reduction does slow ageing, extend lifespan and counteract age-related disorders, including cardiovascular disease, cancers, diabetes and neurological disorders such as Alzheimer's, Parkinson's and stroke. "Animal models show that intermittent fasting improves health throughout the lifespan," the paper concluded.

The problem with gauging its efficacy on humans is that, as the paper said: "It remains to be determined whether people can maintain intermittent fasting for years and potentially accrue the benefits seen in animal models."

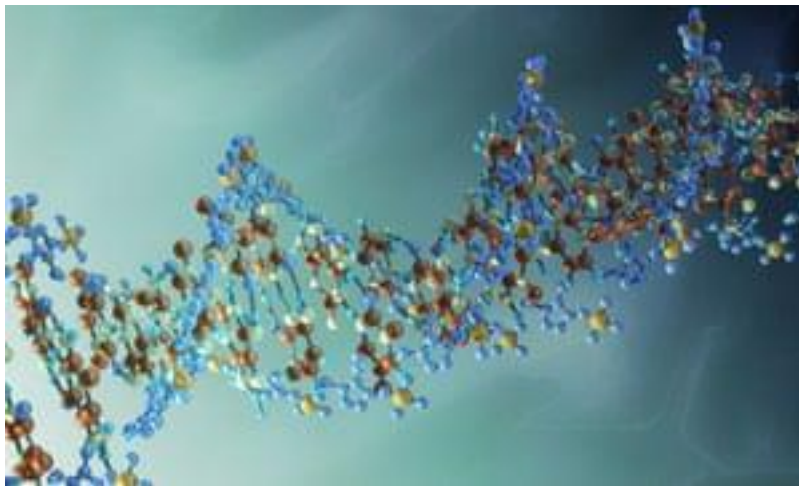
Are there any anti-ageing drugs in the pipeline?

US scientists are raising funds to launch a five-year clinical trial of a product called metformin, commonly prescribed for pre-diabetics and diabetics. Longevity advocates believe it may have a side effect slowing the development of age-related diseases.

“I’m not telling everyone to go out and take it until our clinical trial proves it does what I believe it does,” said Dr Nir Barzilai, the director of the Institute for **Ageing** at New York’s Albert Einstein College of Medicine. “But if our trials come back with the results I expect then, yes, I believe everyone should take this drug.”

Even more niche are the the promises of Dr Aubrey de Gray, a gerontologist who founded the Sens (Strategies for Engineered Negligible Senescence) Research Foundation with the goal of “undoing ageing”.

“Sens is defined by a focus on repairing molecular and cellular damage rather than on merely slowing down its accumulation,” he said. The logistics of indefinitely healthy ageing will, he believes, be simple and affordable: “Mostly it’ll be injections once a decade.”



Epigenetic clocks, which analyse the pattern of chemical chains that attach to the DNA in your cells, can apparently reveal how quickly you are ageing. Photograph: Mopic/Alamy

Can I tell how long I’m going to live?

The latest epigenetic clock, DNAm PhenoAge, will shortly hit the shelves. Epigenetic clocks – a form of molecular augury – were first developed in 2011 and claim to offer a glimpse into the future. By analysing the pattern of chemical chains that attach to the DNA in your cells, these clocks apparently reveal how swiftly you are ageing – and perhaps even how much longer you will live.

The big sell with these tests is that while DNA is fixed at birth, our epigenetic patterns change according to our lifestyles. The promise of those who produce these clocks for commercial use is that they enable us to calibrate our ageing.

The tests haven't been independently evaluated and do not need to be approved by the US [Food and Drug Administration](#) but that has not stopped some life insurance companies using the [tests](#) to predict lifespans. Researchers have jumped on board, too, using the clocks to [test anti-ageing](#) drugs and to look for [an anti-ageing diet](#).

Live forever

Humans were meant to live forever, according to the Bible. There were two trees in the **Garden of Eden**, and Adam and Eve could eat from one of them, the tree of life. It was the tree of knowledge that bought them trouble in the shape of death. Physical immortality (as opposed to the eternal existence of a disembodied dead soul) has been pursued by humans for as long as history relates. The obsessive search for immortality, however, killed the first emperor of China at just 49. In 221BC, **Qin Shi Huang** conquered China's seven kingdoms and - aged just 38 - ruled them all. Determined to continue his rule for 10,000 generations, he sent every scholar, magician and wise man in the nation to find the elixir of immortality. Despite making every effort - including providing a harem of 6,000 virgins to a magician who said he would exchange the women for the elixir, going to sea himself to shoot a **magic sea monster** and executing 460 scholars who failed to produce the elixir - the emperor died just 11 years after taking the throne, probably because of **mercury pills** prescribed by his alchemists to give perpetual life. So determined had the emperor been that he would live forever, however, that he had not chosen an heir. Despite keeping his rotting body in a covered carriage surrounded by rotting fish to disguise the smell of decay, the secret of his death came out. The nation erupted into a civil war so destructive that in three years, united China fell apart and everything Qin Shi Huang had achieved was destroyed.

Can I live for ever?

Talk of immortality was "outlaw science" until a couple of decades ago but now it is attracting serious interest and big bucks: in 2013, Google invested \$1.5bn (£1.1bn) in an entire division, [Calico, which is devoted to "solving death"](#). The PayPal co-founder Peter Thiel has given millions of dollars to De Grey's foundation.

Instead of focusing on why, say, we get cancer or have a stroke and how to treat each distinct condition, this branch of medical research argues for all these conditions to be regarded as symptoms of one far larger and deadly disease: ageing itself. Instead of trying to treat all these different diseases that develop as people age, the argument goes, we should be trying to treat

that one big disease. If we can do that, all the so-called age-related conditions that currently harm so many and cost so much will be – by definition – eradicated.

No one is saying it is going to be easy. This branch of research attempts to tackle ageing inside every cell of the body. In other words, change the whole genetic makeup of the human species. There are plenty of claims that we can already slow down the ageing of cells – or senescence – but the most radical adherents claim that the first person to live to 1,000 has already been born.

Reading list

[The Miracle of Fasting](#), Paul and Patricia Bragg

How Not to Die: Discover the Foods Scientifically Proven to Prevent and Reverse Disease, [Michael Grege](#)

[The Blue Zones: Lessons for Living Longer From the People Who've Lived the Longest](#), Dan Buettner

[Lifespan: Why We Age – and Why We Don't Have To](#), David Sinclair

The Telomere Effect: A Revolutionary Approach to Living Younger, Healthier, Longer, [Dr Elizabeth Blackburn](#) and [Dr Elissa Epel](#)

[100 Days to a Younger Brain](#), Dr Sabina Brennan