

Who Wants to Live Forever?

As a species, we humans appear to be the undisputed masters of our planet. Moreover, since Yuri Gagarin's inaugural space flight in 1961, we can even leave the confines of Earth to travel in space. Yet, we have one Achilles' heel—we're mortal

BY CHRIS MENON

AT 122 YEARS, THE MAXIMUM HUMAN LIFESPAN lags well behind some species of giant tortoise (188 years), Greenland shark (400 years) and the record set by the lowly Icelandic clam (507 years). Even those relatively few humans who do manage to make it past 100—some 14,570 people in the UK in 2015—are invariably bedeviled by poor health.

Recently, efforts to extend the healthy human lifespan have achieved much publicity following the backing of visionary, super-rich Silicon Valley tech entrepreneurs. In 2013, Google's founders created a subsidiary company called Calico (short for the California Life Company), which promptly hired a team of top scientists and now has more than £1bn in the bank to fund its work. Its CEO, Arthur Levinson (who's also chairman of Apple), has stated, "Our goal is to make progress on a very basic challenge—how to help people stay healthier for longer."

Calico have ignored our requests for more information about this research. Yet in March it partnered with C4 Therapeutics to use the latter's technology platform to develop small-molecule drugs. These drugs are designed to direct a specific mechanism in our cells, enabling them to selectively degrade disease-causing proteins—thus lessening incidences of Alzheimer's, cancer and inflammatory conditions such as rheumatoid arthritis.

Jeff Bezos, the billionaire founder

of Amazon, has similarly invested in Unity Biotechnology, which aims "to design therapeutics that prevent, halt, or reverse diseases of ageing". Unity intends to develop a new class of therapies called "senolytic medicines", designed to selectively eliminate senescent cells. Senescent cells accumulate with age and, unlike normal cells, they secrete inflammatory molecules that harm neighbouring cells and tissues, causing osteoarthritis, glaucoma, and atherosclerosis.

Not to be outdone by his fellow Silicon Valley billionaires, Elon Musk, co-founder of Paypal and the mastermind behind Tesla, has launched the medical research company, Neuralink. It intends to eventually enhance human brains by connecting them with computers so that thoughts—maybe even human consciousness—can be uploaded and downloaded. This might eventually provide humans with a form of virtual immortality.

However, even among scientists, opinions differ greatly as to what is feasible and the likely time scales.



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Some believe that death, like any disease, can be cured, while others seek to develop drugs that will provide an incremental increase in healthy lifespans.

IN THE US, THE SENS RESEARCH FOUNDATION aims to discover ways to fix or undo the damage the body automatically does to itself over time. For example, it's currently addressing age-related hypertension by developing enzymes that can break the accumulating chemical bonds that make our major arteries stiffer, as well as identifying ways to kill particularly dangerous cancers.

Its chief science officer, Aubrey de Grey, is optimistic about the prospects for curing ageing. "I think the damage-repair rejuvenation

Billionaire researchers, Arthur Levinson, Jeff Bezos and Elon Musk

technologies that the SENS Research Foundation is pursuing have a good chance of becoming comprehensive enough to merit being described as a solution to ageing within about 20 years. However, I need to stress that that depends on financial support."

Considered by many as an "immortalist", when asked if life beyond 1,000 is a possibility, de Grey contends, "There's honestly no limit. If anything, 1,000 years is conservative. The point is that the body's a machine—periodic preventative maintenance, once we've developed the tools, will be just as effective in maintaining it indefinitely at full performance as we can already do for a vintage car or aeroplane."

Dr. João Pedro de Magalhães,

associate professor in ageing at Liverpool University, accepts the theoretical possibility that ageing can be cured. “Ageing is surprisingly plastic in the sense that it can be manipulated by genes, evolution and diet.” Although he believes those tools

are still a long time away. “At the current rate of progress radical life extension will take centuries,” he admits.

Yet, de Magalhães does believe incremental increases are more likely. “In species such as mice, drugs have been shown to have five to 20 per cent longevity benefits—although these will likely be lower in humans. Yet retarding human ageing, even by a small degree, would still have

a big impact on human health and life—I’m convinced that longevity drugs will become widespread in the next 20 years.” For example, a drug might be taken daily for life as a preventative measure to ward off the possibility of developing cancer.

Another scientist even more sceptical of Aubrey de Grey’s grandiose visions is Dr Nir Barzilai, director of the Institute for Ageing

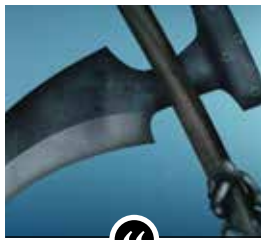
Research at The Albert Einstein College of Medicine in New York, who strives to improve healthspan, not lifespan. “My goal is to delay ageing, to make 80 the new 60—not to live to be 800. Aubrey wants to

be something more dramatic, he wants to never die. Aubrey de Grey is an immortalist.”

Next year, Barzilai, who discovered longevity genes in centenarians, is to launch the first trial of an anti-ageing drug with the approval of the US Food and Drug Administration. The medicine in question is an old drug for type-2 diabetes called metformin, which acts on the mitochondria, the cellular power plants. Metformin has been shown to affect the

receptors for particular biochemical pathways that are associated with longevity.

“I think that maximal lifespan is about 115 [based on global lifespan data trends] which means we have a lot of potential as the average age of death in the western world is currently around 80. Please note that I’m concerned with how we expand the healthspan of our population.



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Lifespan is simply a side effect,” enthuses Barzilai.

He adds, “That doesn’t mean that in the future we cannot extend life, or even start thinking about it sooner. But this is a little bit different technologically—and even if you can replace cells and the brain with new cells, well, your memory is going to go. So who are you in this new body? There are lots of ethical and biological issues.”

In such a scenario one has to wonder what would happen to our fundamental sense of self. Would it undergo a transformation as profound as the physical one? There are many unknowns.

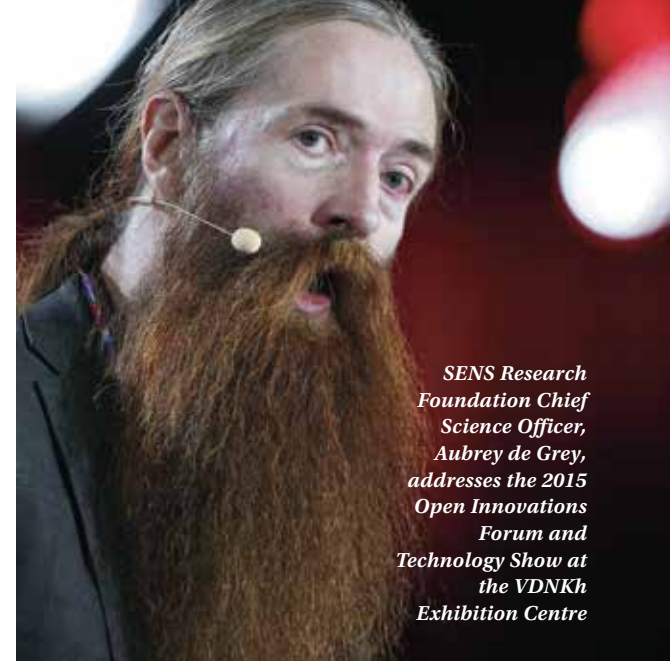
ENVIRONMENTAL FACTORS ARE ALSO IMPORTANT for longevity, as Howard Friedman, distinguished professor in the psychology department at the University of California, explains. “Genes account for about a quarter of the variation in longevity [in a given population]. The rest is environmental/behavioural factors and chance.”

Indeed, our lifestyle choices affect ageing and there’s ample medical

evidence to suggest that smoking, drinking and a sedentary lifestyle can shorten your life. For example, according to Cancer Research UK, smoking causes 28 per cent of cancer deaths in the UK.

Rather than focusing on radically improving lifespan, Friedman’s focus is on how to stop so many people from becoming ill in their 50s, 60s and early 70s—and to help most people thrive into their 80s and even 90s. A shift in attitude is required in order to create a world in which more effort is spent to encourage people to take preventative measures and assume more responsibility for their health, instead of being passive recipients of medical procedures.

According to Friedman, “Taking it

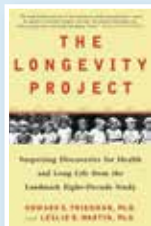


SENS Research Foundation Chief Science Officer, Aubrey de Grey, addresses the 2015 Open Innovations Forum and Technology Show at the VDNKh Exhibition Centre

HOW TO LIVE LONGER

Professor Howard

Friedman is author of *The Longevity Project*, which studied 1,500 Californian children from 1921 for 90 years. He shares seven tips for a long, healthy life:



1. Develop good social ties with a healthy community.
2. Stay physically active. Do anything that gets you out of your chair! Walk, cycle, cook, garden, swim, dance, play a musical instrument...anything that will keep you up and about for several hours a day.
3. Forget tobacco and drugs. Smoking and drug abuse remain the most important preventable behavioural causes of illness and ordinary death.
4. Be responsibly prudent. Consider the things your mother, teachers, doctors and nurses advised—from wearing seat belts to protecting against sexually transmitted diseases. The small things add up to big pay-offs over time.
5. Avoid obesity. Eat proper amounts of nutritious food, including vegetables, nuts, fruits, beans, and healthy fats found in avocado and olive oil.
6. Have a best friend. Or two.
7. Choose something worthwhile or meaningful to do in your life. Volunteer to help those less fortunate, assist a local club in cleaning up parks, or take up a hobby such as gardening or guitar—and become an expert in it.

easy is not usually a path to good health or a long life.

“Well over half of the variation in longevity is due to how you live. That is, genes do matter but not as much as most people assume.”

PROFESSOR JOHN

NAUGHTON, a senior research fellow at Cambridge University, acknowledges that a lot of serious research is going into eradicating diseases and increasing health into old age. Nevertheless, he argues that those Silicon Valley tech titans who believe our genetic code, like software, can be “cracked” to radically extend lifespan are deluded by their own hubris. “These people have parted company with reality,” he says.

While increasing healthspan could have positive societal ramifications, radically reducing the costs of looking after the elderly, there would likely be less favourable consequences from any increased lifespan enabled by costly drugs. Naughton warns, “Lifespan would become a matter of wealth to an even greater extent than it already is. WHO statistics

put male life expectancy in the Calton district of Glasgow at 54. Eight miles away in the affluent Lenzie, the corresponding figure is 82. And the reason for the discrepancy? Poverty.”

One dystopian future ushered in by medical science might be one in which power and wealth have been concentrated in the hands of a super-aged minority, a ruling caste that can pop pills to extend their lives while the rest of humanity age painfully.

In such circumstances, wouldn't the vitality of youth and innovation be hampered by an elite whose collective mindset was formed in the century before?

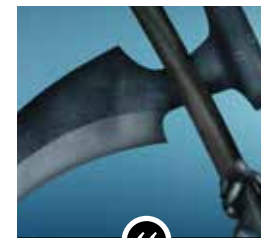
Yet, perhaps this is too pessimistic a picture to paint and we should welcome the fact that increasing life expectancy could improve the

collective wisdom of humanity. Dr George Leeson, director of the Oxford Institute of Population Ageing, explains, “Life expectancy today is 80 years. Let's say it goes up to 110 over the next 100 years—that's

a 30 year increase, which is not unlikely. That's exactly the sort of increase we've had over the past 100 years. That past 100 years has been a century of unprecedented growth and increase in our standards of living and welfare. What's making us think it's all going to fall apart just because we're going to be living an extra 30 years? Where has our faith in human ingenuity and invention gone?

“I've always said as a demographer, if you get worried looking into the future, take comfort

by looking into the past.”



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NO NEWS IS GOOD NEWS

On April 18, 1930 the BBC's newsreader had something a little different to announce. “There is no news”, read the simple script of the bulletin before piano music was played for the remainder of the 15-minute segment. How different April 18, 2017 proved to be, as Prime Minister Theresa May announced her plan to call an early general election.

SOURCE: BBC.CO.UK