

Why much of what we know about ageing is wrong

By Dr Duncan Carmichael

Until recently our knowledge about avoiding ageing seemed straightforward: low-fat foods – with a large portion of carbohydrates and smaller helpings of proteins and fats – would help us to get healthy and stay healthy. We could further help ourselves by making sure we got enough antioxidants, which are found in fruits, vegetables and increasingly in supplements.

It seemed to work: the average age in rich nations has climbed gently for decades, with people now likely to reach their late 70s or early 80s, and with each generation living a little longer than the last. Clearly, we were doing something right, and that meant there wasn't much more to be said about the subject.

Until, that is, there was.

In 2015, for the first time in many years, life expectancy in the United States declined. It has continued to drop, with more people dying from diseases such as Alzheimer's and diabetes, according to the Centers for Disease Control and Prevention. And it's not just the U.S. – something similar is happening in other rich countries. Granted, flu and pneumonia remain important culprits, but so too are the ailments of ageing: cancer, Alzheimer's and cardiovascular issues. The obesity epidemic is at least partly responsible.

It wasn't meant to be like this. For decades, many people followed the so-called heart-healthy diet, cutting out saturated fats like butter, and instead eating carbohydrates like bread, cereals and whole grains. But last year the PURE study punched a hole in the belief that avoiding eggs and tucking instead into a bowl of low-fat cornflakes was the healthiest way to start the day. After monitoring 135,000 people in 18 countries for more than a decade, researchers found those who ate their butter and eggs had fewer strokes and lived longer, while those who ate their bread and cornflakes died younger.

Linked to diet is the subject of antioxidants, which many of us have spent years consuming. It now seems that doing this harms us more than it helps, which is at odds with popular opinion. Back in the 1960s, Dr Denham Harman explained that our cells are damaged by free radicals, and that antioxidants attack those free radicals and, in so doing, help us. He was right, but there was a problem, because it turns out that our cells have their own powerful antioxidant system called SOD (standing for superoxide dismutase). Taking lots of antioxidants seems to make our SOD system lazy, which means it doesn't do its job as well. It turns out that a better solution is to exercise every day, because that wakes up our powerful SOD system.

As with so much in medicine, as in many areas of life, we are seeing "out with the old and in with the new": these days sugar and starch are (rightly) seen as the enemy, with exercise the preferred way to stimulate our body's built-in antioxidant system. (Exercise also helps in a multitude of other ways.)

Unfortunately, though, none of this new knowledge will stave off death. Or might it? For millennia we have known our allotted time is threescore years and ten – or, in modern English, 70. But other animals that share this planet do things differently.

Take the *Turritopsis dohrnii* jellyfish, for instance, which stands a full five millimetres tall: unless eaten, it never dies (giving it its other name: the immortal jellyfish).

Somewhat more mortal, but doing much better than us, is the bowhead whale. It is one of the largest mammals on Earth and can live for 200 years. What's unusual about this whale (and some other large mammals like elephants) is that its size ought to make it more prone to cancer (the uncontrolled division of damaged cells), which means bowhead whales shouldn't get close to 200. It manages to dodge cancer thanks to genes that control its cell-division cycle. Scientists are hopeful such genes could benefit humans too.

Scientists have also started to look at the growing numbers of people who make it to 100. They have found that many have special longevity genes – called gerontogenes – that protect them. So how can you and I can go about acquiring some gerontogenes: in fact, many of us already have them, and daily exercise and cutting out sugary carbohydrates can switch them on. But what of those who don't carry these genes in the first place? To answer that, scientists turned to the world of bacteria: when bacteria fend off a viral attack, they use a cut-and-paste mechanism that snips out unwanted parts of their DNA and replace them with new DNA.

Scientists hope to use this approach, called CRISPR, to transfer healthy gerontogenes from the lucky few to the rest of us. That might not help us reach the age of bowhead whales, but it could get us a long way past threescore years and ten, keeping us healthy for far longer than is currently possible.

As this remarkable future unfolds, two important “facts” about what we thought caused ageing, or that we believed would delay it, were wrong.

Firstly, it is sugar (and refined carbohydrates), not saturated fat, that is public enemy number one. Not only is sugar strongly linked to rising obesity rates; avoiding it switches on our longevity genes and helps us to live longer.

Secondly, antioxidants are not the health-hit we once hoped. Instead, daily exercise helps our internal antioxidant system to run smoothly. It also switches on our longevity genes.

In Britain today, one baby in three will reach their 100th birthday. Encouraging though that is, living longer is not a given for everyone, and populations could continue to die younger if governments and people fail to embrace what research is teaching us about health and ageing. On an individual level the goal is to die “young” as late as possible: to reach 100 in good health. The good news is that living this younger for longer life is easier than many people think.

