

# Scientists turn back time in cells to help ease the pain of getting older

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The research could help to treat diseases of ageing such as osteoarthritis

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The elixir of youth, sought by philosophers and alchemists for centuries, might not lie in a crystal or mythical text. Instead scientists think it may reside, somewhat less romantically, in a cocktail of mRNAs expressing OCT4, SOX2 and other transcription factors.

Or, at least, it does if you are a cell.

Scientists have shown they can reliably turn back time in cellular ageing. And while the discovery is not going to smooth out your wrinkles, it might eventually help us to treat diseases of ageing, such as osteoarthritis.

However, if you decided to apply it to your whole body the chances are that it would be more likely to give you runaway cancer than immortality.

“We are not so much interested in extending lifespan,” Vittorio Sebastiano, from Stanford University, said. “What we care about is extending healthspan — and helping old people who experience long years of suffering and frailty.”

His technology, described in *Nature Communications*, applies a technique discovered more than a decade ago. All cells in the body contain all the body’s genetic information. As an embryo these cells can become any other, specialising as muscle, brain or liver cells.

In 2006 scientists learnt that they could return cells to this pluripotent state using a cocktail of transcription factors. Along the way they also wiped out ageing, removing genetic markers that accumulate over time.

This was an astonishing achievement, but could not be applied to make, say, an aged heart cell young again. You would instead turn it back to how it was in the embryo, leading to cellular confusion and cancerous growths.

However, Professor Sebastiano has shown that if you stop the process at just the right point it wipes off the ageing but keeps the cell specialism.

When researchers tested it in cells taken from the cartilage of osteoarthritis patients, they found that they had stopped some of the processes that lead to inflammation, and the cells appeared to be behaving as if they were younger.

“We have discovered a way to rejuvenate cells,” he said. “It’s a technology that reboots, or reprograms, the cell.”

While Professor Sebastiano is clear this isn’t the fabled elixir of youth, he allows himself to dream. “We’re not just a bunch of crazy people trying to make rich people young,” he said. “This is about helping old people with incurable diseases. The idea is that one day we will be able to take a pill that is going to help rejuvenation [and] prevent ageing for some tissues.”

