



HEALTH • LONGEVITY

# Scientists Discover the Secret to Keeping Cells Young



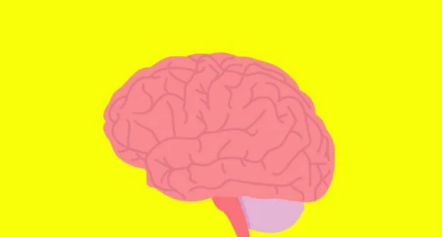
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BY ALICE PARK • APRIL 30, 2015

In a breakthrough discovery, scientists report that they have found the key to keeping cells young. In a study published Thursday in *Science*, an international team, led by Juan Carlos Izpisua Belmonte at the Salk Institute, studied the gene responsible for an accelerated aging disease known as Werner syndrome, or adult progeria, in which patients show signs of osteoporosis, grey hair and heart disease in very early adulthood.

These patients are deficient in a gene responsible for copying DNA, repairing any mistakes in that replication process, and for keeping track of telomeres, the fragments of DNA at the ends of chromosomes that are like a genetic clock dictating the cell's life span. Belmonte—together with scientists at the University Catolica San Antonio Murcia and the Institute of Biophysics at the Chinese Academy of Sciences—wanted to understand how the mutated gene triggered aging in cells. So they took embryonic stem cells, which can develop into all of the cells of the human body, and removed this gene. They then watched as the cells aged prematurely, and found that the reason they became older so quickly had to do with how their DNA was packaged.

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In order to function properly, DNA is tightly twisted and wound into chromosomes that resemble a rope in the nucleus of cells. Only when the cell is ready to divide does the DNA unwrap itself, and even then, only in small segments at a time. In patients with Werner syndrome, the chromosomes are slightly messier, more loosely stuffed into the nuclei, and that leads to instability that pushes the cell to age more quickly. Belmonte discovered that the Werner gene regulates this chromosome stability. When he allowed the embryonic stem cells that were missing this gene to grow into cells that go on to become bone, muscle and more, he saw that these cells aged more quickly.

"It's clear that when you have alterations in [chromosome stability], the process of aging goes so quickly and so fast that it's tempting to say, yes, this is the key process for driving aging," says Belmonte.

Even more exciting, when he analyzed a population of stem cells taken from the dental pulp of both younger and older people, he found that the older individuals, aged 58 to 72 years, had fewer genetic markers for the chromosome instability while the younger people aged seven to 26 years showed higher levels of these indicators.

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Barack Obama in January, 2009. Real age: 47 Saul Loeb—AFP/Getty Images

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"What this study means is that this protein does not only work in a particular genetic disease, it works in all humans," says Belmonte. "This mechanism is general for aging process."

Before it can be considered as the Fountain of Youth, however, Belmonte says new and better techniques need to be developed that can more specifically and safely alter the Werner gene in people, not just a culture dish of human cells. He also stresses that there may be other processes contributing to aging, and it's not clear yet how important chromosome stability is compared to those factors. But, he says, "having technologies like this will allow us to determine how important each of these parameters are for aging." And if the findings hold up, they could be first step toward finding a way to help cells, and eventually people, live longer.

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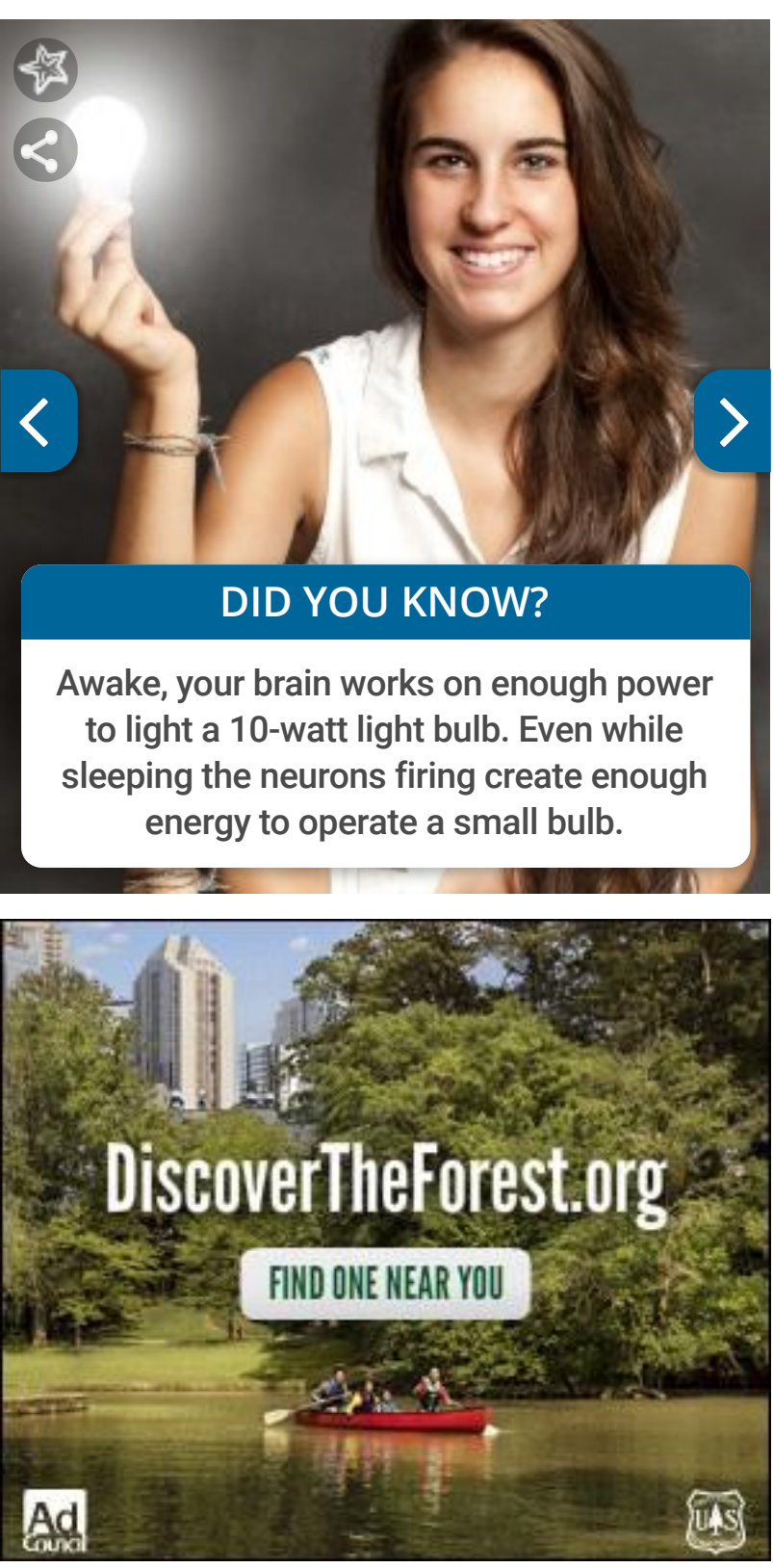
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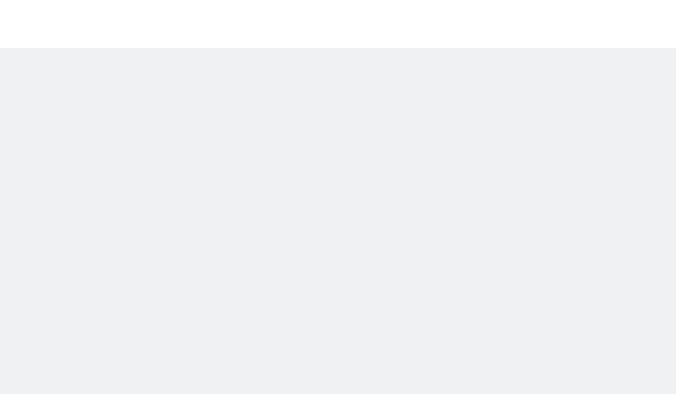


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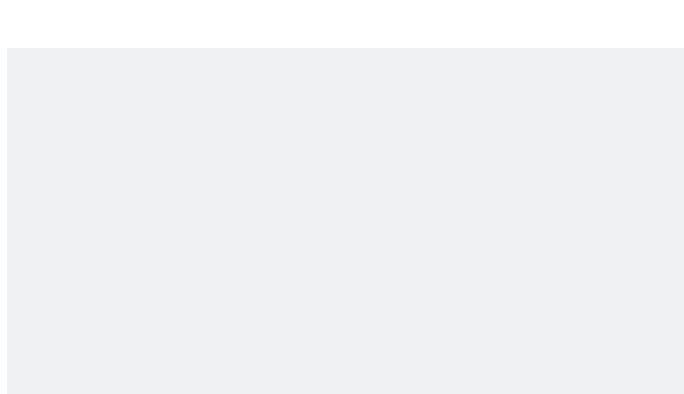
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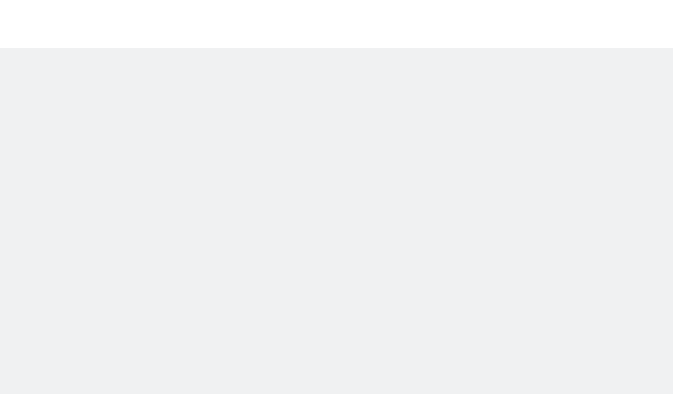
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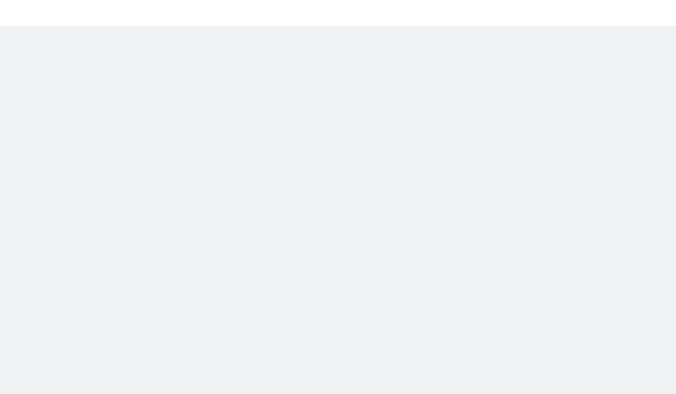
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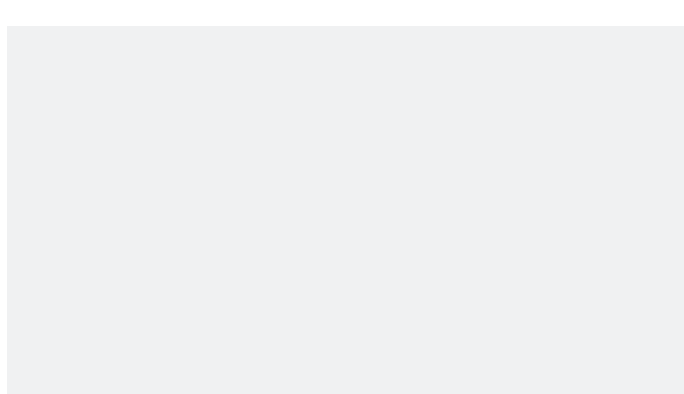
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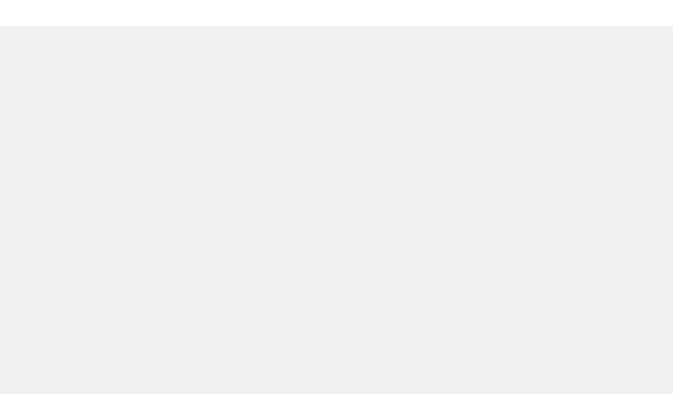
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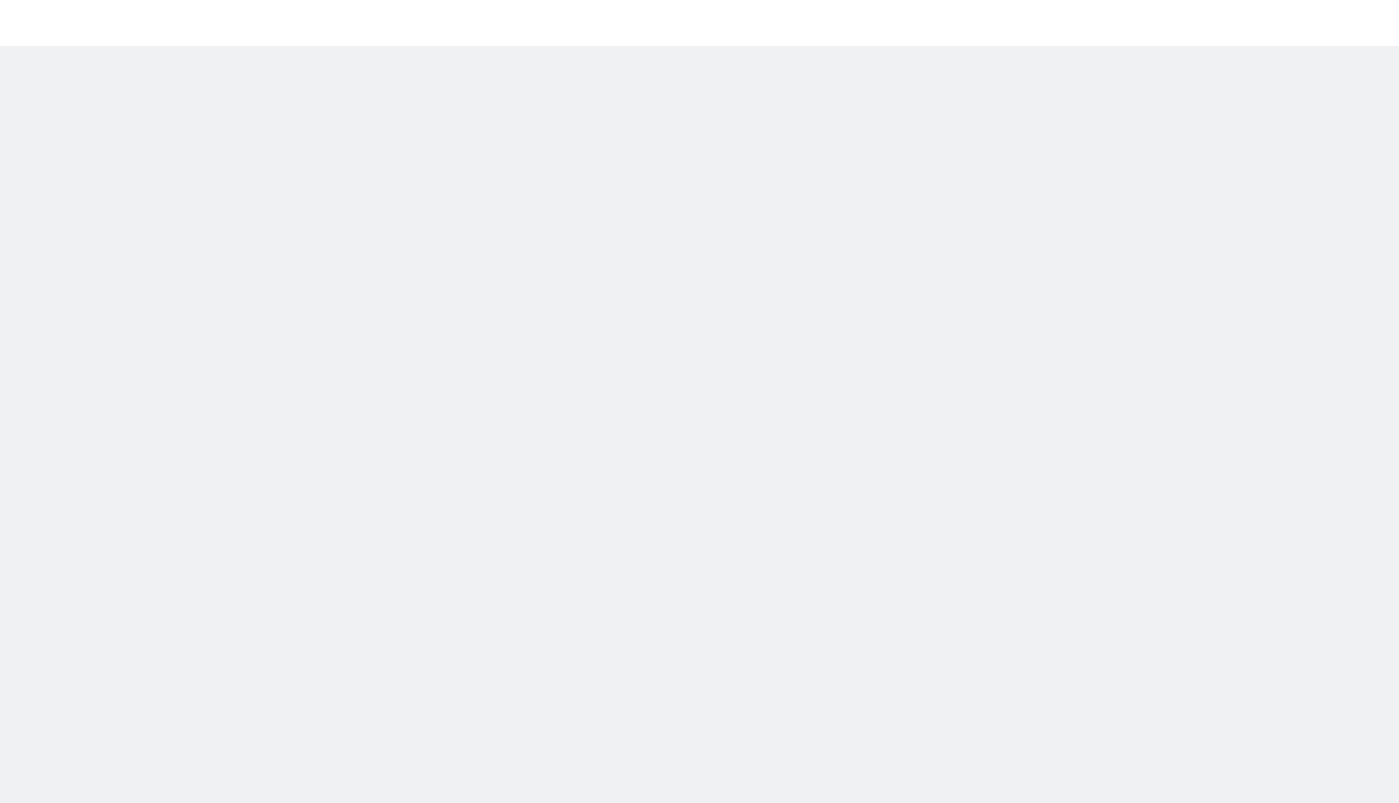
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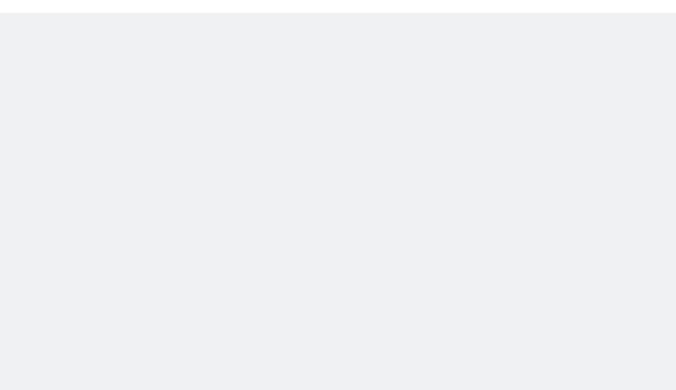
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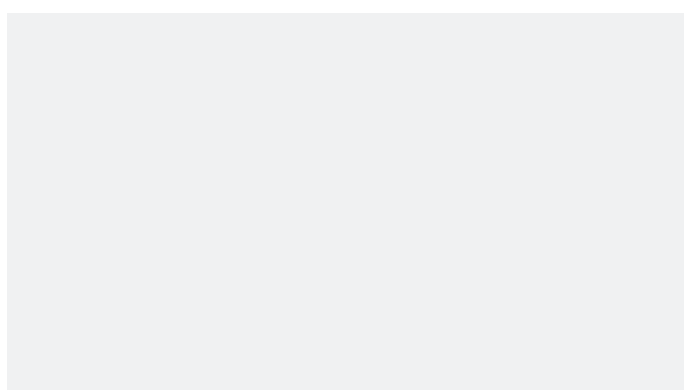
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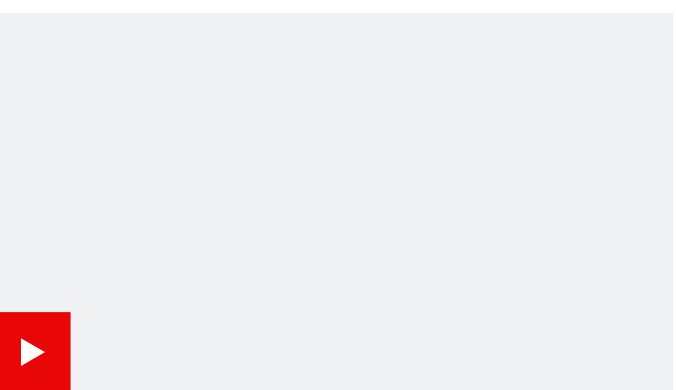
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