

Anti-Aging Pill Targets Telomeres at the Ends of Chromosomes

Could the secrets to anti-aging be at the tips of our chromosomes?

By Mandy Kendrick | August 17, 2009 (Scientific American)



WATCHING THE CLOCK: You can't stop the relentless march of time by casting a spell on a clock. Image:

Peter Pan stayed forever young in Neverland. In real life, some scientists are looking at **telomeres, or regions of repetitive DNA at the ends of our chromosomes**, to try to arrive at something like a real version of this story.

Telomeres consist of up to **3,300 repeats of the DNA sequence TTAGGG**. They protect chromosome ends from being mistaken for broken pieces of DNA that would otherwise be fixed by cellular repair machinery. But **every time our cells divide, the telomeres shrink**. When they **get short enough, our cells no longer divide** and our body stops making those cells. Over time, this leads to aging and death.

New York-based T.A. Sciences **claims** to be the only company in the world **manufacturing a supplement in a pill** form that has been lab tested and shown to stop **telomeres from shortening**, in hopes of halting the aging process. The product, **TA-65**, comes from **extracts of the Chinese herb astragalus**, which has been used for medicinal purposes for more than 1,000 years, says Noel Patton, chief executive officer of the company.

TA-65 is produced at very low levels in the astragalus plant, but the company purifies and concentrates the substance, which is thought to **"turn on" the enzyme telomerase (hTERT) that acts to maintain or lengthen telomeres**. hTERT is **usually "off" in adult cells, except in immune, egg and sperm cells, and in malignant cancer-forming cells**.

The TA-65 pill requires no approval from the U.S. Food and Drug Administration because it is marketed as a supplement and not a drug. Therefore, T.A. Sciences cannot make claims about the drug's efficacy at curing disease. But Patton and Calvin Harley, the chief scientific officer at Geron—the company that discovered TA-65—go on to note that researchers have found a correlation between telomere length and susceptibility to certain aging-related diseases.

T.A. Sciences did five years of testing on TA-65, beginning in 2002. Results from an anti-aging trial can be found at the company's Web site. Patton says he has been taking the supplement for two years and that everyone at T.A. Sciences over the age of 40 takes the product.

William Andrews has worked on telomere biology for the past 15 years. He is the chief executive officer of Sierra Sciences, LLC, a rival company that is screening for chemicals to activate telomerase, but also a T.A. Sciences client for the past two-and-a-half years. He thinks that "taking a telomerase inducer is safer than driving my car to work" but acknowledges that there are **some unknown risks** with taking the product.

For example, **telomerase is the same enzyme that allows cancer cells to stop aging** or to become immortal, so there is a chance that TA-65 **could keep alive cancer cells that would otherwise die**, notes Andrews.

However, telomerase activation should keep all telomeres longer in the first place, and that actually reduces the chances of cells becoming cancerous, Andrews notes. He also says that the enzyme should keep immune cells, which can fight off most cancerous cells, alive longer.

Another problem facing telomere science is that no suitable model organism is available for testing. Animals do not age through telomere shortening in the same way that humans do, Harley notes, adding that "not even mice or monkeys have the same telomere aging system. The best system to ultimately test is going to be the human."

The potential benefits of the supplement seem to outweigh the risk for patients like Andrews. "People such as myself who elect to take TA-65 and look forward to taking even stronger telomerase inducers in the future must act totally on gut feelings," Andrews notes.

For those who are less adventurous, other researchers have identified lifestyle changes that can help optimize telomerase activity, without the \$14,000-per-year price tag of the TA-65 treatment.