



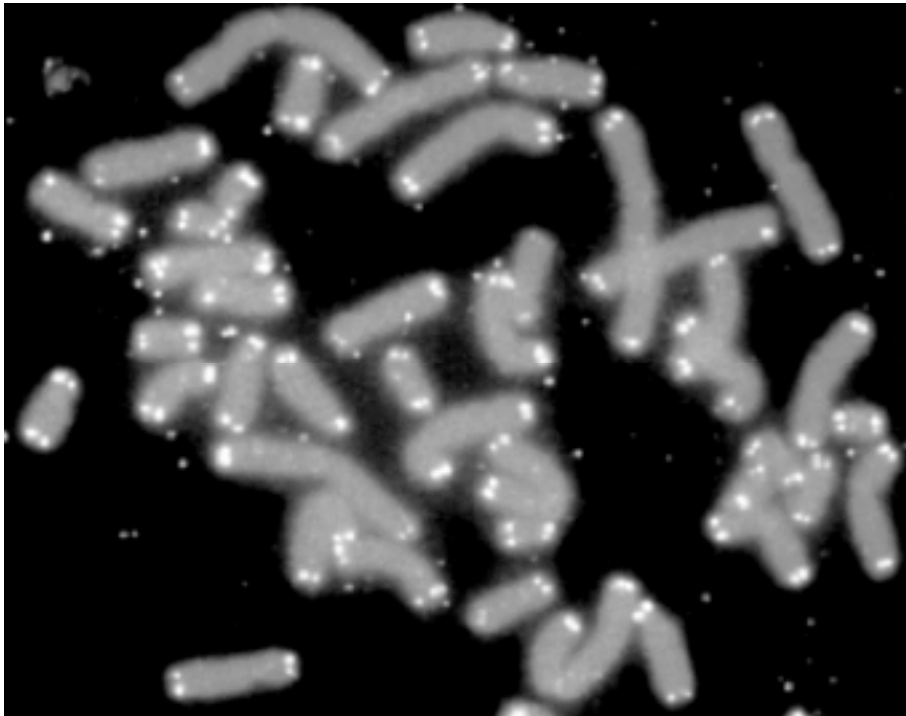
I.A.A.M

International Academy of Anti-Aging Medicine

Anti-Aging

Telomeres, telomerase, and health/longevity

Telomeres, elongated strands of repeating sub-units at the end of DNS/chromosomes, are indicators of longevity and remaining life span; they are the longest at birth and shorten as we get older. Telomerase is the enzyme that can increase telomere length.



Human chromosomes (grey) capped by telomeres (white)

Comparing telomere length in leukocytes (blood cells) in elderly Danish twins, researchers found that the one with shorter telomeres had a greatly increased probability to die first. Follow-up research showed quite clearly that the twins who died earlier had worse health practices than the ones who lived longer.

To shed light on the telomerase issue Dr. Dean Ornish and his researchers at USC San Francisco Medical School studied a group of 30 men that were willing to undergo strong lifestyle changes and measured *before* and *after* levels of telomerase in a special type of blood cell (PBMC, peripheral blood mononuclear cells) for which a method analyzing

telomerase had been worked out. After the 3-months period of lifestyle changes overall health and well being of the participants had greatly improved and telomerase activity had increased substantially.

Stay Cool - - Live Longer

How much does it cost to look younger?

From simple facial surgery to complete face-lifts (different types), joint replacement to get you moving again, liposuction for body-shaping, anti-aging skin treatments, hair replacement and more: See MONEY magazine, March 2007.

Why does Restylane give long-lasting effects in eliminating wrinkles?

Collagen loss is believed to be the major cause of wrinkle formation; filling the wrinkles with Restylane injections smoothes out wrinkles and thus makes the skin look more youthful.

Michigan Medical School researchers studied collagen formation in fibroblast cells deep in the skin. The immediate effects after injection are due to the physical presence of Restylane (filling wrinkles). However, within 3 weeks new collagen formation begins. Restylane injections were also found to inhibit an enzyme that acts on aging skin. Reference: J. Voorhees, Archives of Dermatology, February 2007.

Often wake up tired? Why do we need sleep?

During the day, when we are physically active, metabolism is high and lots of oxidation products are formed. When muscles start hurting and performance decreases, lactic acid and other side-products accumulate in the body, thus interfering with normal cellular functions; at night, when we sleep, metabolism decreases and our body excretes this metabolic debris via kidney filtration and everything comes back to a normal equilibrium. When people sleep in a cool environment, reaching this “back to normal” equilibrium (homeostasis) is achieved in less time; sleeping in a warm room may require 8 hrs to reach homeostasis, while sleeping in a cool room may get you back to normal in only 7 hours.

Researchers at Scripps Research Institute engineered mice with a slightly lower body temperature; only 0.5 degree below their normal body temperature. Female mice lived 112 days longer, and male mice lived 89 days longer than their regular counterparts; these mice have an average life span of about 2 years.

Much of this agrees with earlier findings that caloric restrictions (lower metabolism) increase life span.

If you often wake up tired that means that your metabolism was too high during your sleep period or you didn't have enough time to come back to homeostasis; turn down the

thermostat in your bedroom, don't stuff yourself late at night, don't eat junk foods that mess up your metabolism (sugar), and take some antioxidants (vit. E, selenium, others) and anti-inflammatories (fish oil, Turmeric, Boswellia, others.)

Reference: Newspapers, news media, 11.04.06.

Scientist Discover a True Link between Telomere-length and Aging: STRESSED OUT AND PREMATURELY AGED.

Previous research had established a clear connection between telomere-length and life span; telomeres, consisting of repeating sub-units found at the end of every DNA molecule, are the longest at birth (60 sub-units for humans). As we age, and cells in our body replicate by dividing, telomeres shorten. In humans the complete set of 60 sub-units corresponds to a maximum life span of about 120 years. There are established procedures for measuring telomere-length in immune cells, for example; in young people who had AIDS for some time telomere-length are equivalent to 80-year old people.

Excessive stress and telomere-length:

Dr. Elizabeth Blackburn of the University of California, San Francisco, recruited 58 healthy women between the ages of 20 and 50. All the women were mothers of at least one child. 39 of the women were caregivers to a child that was chronically ill, and those women reported much higher stress levels than women who had healthy children. Examining telomere lengths in immune cells (mononucleocytes) researchers found that women with higher stress levels had shorter telomeres, resembling premature aging by 10 years.

Stress, Free Radicals, and Aging: Free radicals, molecules or fractions of molecules with a single electron, capable of causing serious damage to living cells, have been established as causes of aging (Free Radical Theory of Aging by Prof. Denham Harman). Antioxidants (vitamins E, C, A, trace mineral selenium, glutathione, others) have been shown to deactivate free radicals. The researchers in the above study found that the highly stressed women had more free radical damage in their cells.

Reference: Major news item, newspapers, TV, early part of December, 2004. Science News, Vol. 166, Dec. 4, 2004, p. 355. Also: Proceedings of the National Academy of Sciences, January 2005.

Werner's Syndrome - - a disease that causes accelerated aging, with premature wrinkles, cancer, heart disease, dying around age 40 - - traced to faulty gene.

Researchers at Salk Institute, Biological Studies, La Jolla, California, found that people with Werner Syndrome were unable to correctly replicate the ends of chromosomes because of the defective WRN gene, causing malfunctions in cells. Ref. SCIENCE, Dec. 2004.

More than 20 years ago, when teaching at Roosevelt university in Chicago, I published "The Multi-Factorial Theory on Aging" (Kugler, American Laboratory, 1975).

In longevity studies we compared two groups of test animals - - one subjected to many of the mistakes people make (high-fat, high sugar diet, no exercise, cigarette smoke, no vitamin supplements, tap water as drinking fluid), the other given optimum health factors (quality diet, no sugar, exercise, vitamin and mineral supplements, no cigarette smoke, some other anti-aging compounds, carbon-filtered water) - - **and the results were a close to 100% difference in average life span.**

Most recently a British longevity enthusiast, **Aubrey De Grey of Cambridge**, proposed a similar approach. Looking at aging from a “What we know today” standpoint, he proposes to come up with solutions to the following (he calls them “7 deadly sins of aging”) aging-related problems: Overall cell loss, cell senescence, lysosomal junk, extracellular junk, sugar-protein molecular bonds, mitochondrial DNA mutations, and nuclear DNA mutations.

At this point De Grey has no supporting evidence in terms of successful longevity studies - - and it would certainly be interesting to argue the value of his proposed anti-aging measures - - but from a merely theoretical point of view anti-aging enthusiasts might want to read a fascinating article by Joseph Hooper in **POPULAR SCIENCE, January 2005, pp. 69-78.**

Introductory comment: Many anti-aging related areas overlap. Better medicine, for example eliminating a major disease like cancer or heart disease, would increase the average life span; so would improvements in general health and/or immune functions, etc. etc. Today’s anti-aging medicine/treatments, if effective, will bring more people closer to the maximum life span. Finding ways to make a species live past the maximum life span is true anti-aging science.

Want to learn more about living longer and the science of anti-aging? Of all the articles written about this subject, two deserve your attention:

“HOW TO LIVE TO BE 100 (and not regret it). TIME Magazine, August 30, 2004. A good introduction with a special focus on the characteristics of people who lived to be 100 and beyond.

“CAN WE SLOW AGING? The Scientific Facts. Life Extension Magazine, January 2004. This article examines and explains the mechanisms behind growing old and explains new ways in which aging humans can slow this devastating process. Good science explanations that even lay-persons can understand. Ref.: www.lef.org.

A Clue to Aging Revealed

As reported in the April 26 issue of Science News, two separate research teams, one from Tufts University School of Medicine in Boston and the other from the New York State Institute for Basic Research in Developmental Disabilities on Staten Island, have found a new clue to the long-standing mystery of why and how we age. Both teams discovered a genetic mutation that causes the profoundly accelerated aging characteristic in children with Hutchinson-Gilford progeria syndrome. This research may provide insights into both this disease and normal aging.

A Giant Leap for Aging Research

Shortly after Dolly was cloned, the enthusiasm in the anti-aging field was quickly dampened. As it turned out, telomere length—an indicator of true age—was found to be the same length as the donor. So, cloning old cells produces a “new” animal with old cells. Trying to clone a young body from very old cells wouldn’t work because it would result in a body with very little remaining life potential. No miraculous rejuvenation, just duplication! “Not any longer!” says Dr. Michael West in a most fascinating paper published in *SCIENCE* (288; 2000: p. 665–9), in which he describes a very special technique they used to clone six cows from very old cells, truly setting their clocks back to the stage of newborns, rejuvenated even further than what is considered “normal.”

A Quick Update on Telomeres and Telomerase

The maximum life span of a species is determined mainly by the length of its telomeres, strands of repeating subunits found at the end of each coiled DNA that determine the number of remaining cell divisions. The maximum number of subunits that human telomeres have is 60, corresponding to a potential maximum of 60 cell divisions, and translating into a maximum life span of about 120 years. Each time a cell divides, the telomere is shortened by one subunit; when they are all used up, the cell has come to the end of its living potential and dies. When a child is conceived, the telomerase enzyme sets the telomeres back to their maximum potential.

About two years ago, scientists broke the sound barrier of aging research when they successfully inserted—via gene therapy—the telomerase gene into cells, making them go far beyond 60 cell divisions to achieve near immortality (*SCIENCE*, 279; 1998: pp. 349–51). Now, when a cell divides and a telomere unit is chopped off, the telomerase just adds one. This anti-aging milestone means no more telomere shortening and unlimited cell life span; the cells keep dividing with no cancer and no abnormalities. Today, these cell cultures are the equivalent of 400-year-old people and still going strong. One of the brains behind this was Dr. Michael West, co-founder of Geron Corporation and now president of his own company called ACT (Advanced Cell Technology) in Boston.