

HEALTH AND STRESS

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CAN BIOLOGIC AGING BE SLOWED OR REVERSED?

KEYWORDS: Anti-aging Academy of Medicine, mummification, Jesus, and Lazarus, *Ba, Ka, and Akh* hieroglyphics, the *Ankh* "Key of Life", *crux ansata*, Alexander's "river of gold", Garden of Eden, philosopher's stone, Paracelsus, Thomas Perls, calorie restriction, *The Okinawan Program*, resveratrol, cryogenics, telomerase

As noted in previous Newsletters, your age may not reflect how old you are either physically or mentally. Chronologic age is very easy to measure and proceeds at a predictable and steady rate. In contrast, your biologic age is difficult to define or determine, since it differs for each of us depending on which benchmarks are selected, and how they are rated with respect to severity, effect on quality of life, and other criteria.

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While there are numerous claims for anti-aging products and interventions, none of these have been demonstrated to retard, much less reverse biological aging, with the possible exception of marked caloric restriction. Nor is there any way to accurately assess alleged anti-aging benefits, since this would require a very long-term study and detailed analysis of the results of an autopsy that had been specifically designed for this purpose.

Nevertheless, the anti-aging industry has steadily skyrocketed over the past two decades, with an annual growth rate of almost nine percent that is **projected to reach \$115.5 billion in U.S. sales** by 2010. As a result, everyone seems to be striving to get a piece of this very lucrative pie. The most successful by far is the American Academy of Anti-Aging Medicine, with its spin-off subsidiaries that offer conferences here and abroad, as well as "certification" in various areas of what they claim is a legitimate specialty.

The Phenomenal Allure Of Anti-Aging And Regenerative Medicine

The American Academy of Anti-Aging Medicine was founded in 1992 by two osteopathic physicians based on the premise that aging is a disease. Although they had no particular expertise in geriatrics or gerontology, they have since become the gurus of longevity, with books like **121 Ways To Live 121 Years And More, Grow Young With HGH** and *The Official Anti-Aging Revolution*. They have also become extremely wealthy through spin-off enterprises here and abroad that organize numerous conferences, offer various certification programs, anti-aging supplements and other products. Their recent annual meeting in Las Vegas, co-sponsored by The World Anti-Aging Academy of Medicine, (that they also founded in 1996) attracted 5,000 delegates and corporate leaders from 70 nations as well as over 500 exhibitors and corporate booths. That's more than five times larger than their meeting a decade ago in Las Vegas, when I was invited to give a talk on Stress and Aging. They will also profit this year from conferences being held in Seoul, (Korea) Vilamoura, (Portugal) Melbourne, (Australia) Mainz-Frankfurt, (Germany) Jakarta, (Indonesia) Dubai, (United Arab Emirates) as well as, San Jose, Orlando and Las Vegas. All of these rake in hundreds of thousands of dollars from registration and exhibit fees, in addition to their "certification" programs that are also promoted. Two years ago, an 80 per cent stake in their convention business alone was sold for roughly \$50 million to the Tarsus Group, a London media concern.

It was standing room only for many of the 120 presentations at the recent Las Vegas conference, which addressed such subjects as: "The Longevity Factor: How Red Wine and Resveratrol Can Unlock the Genetic Secrets to a Longer and Healthier Life", "Testosterone Therapy in Men: The Next Big Thing in Medicine", "Magnificent Mind at Any Age: Natural Ways to Balance Your Brain and Improve Everything In Your Life", "Stem Cell Therapeutics for Tissue Regeneration," "Fish Oil: Omega-3 Anti-Inflammatory Breakthrough," "The UltraMind Solution," and "Alzheimer's Disease: A Hormonal Approach to Treatment." There were also workshops on "Energy Medicine" and cancer.

The paper on "Dermatology Laser Techniques" to "yield optimal aesthetic results" delivered by the President of the Organizing Committee for the Romanian Anti-Aging International Congress, illustrates the growing involvement of plastic surgeons, dermatologists, dentists, other health professionals and cosmeticians around the world. This has led to the establishment of the Academy's Aesthetic Anti-Aging Fellowship, which consists of a four-module lecture series and a three module intensive hands-on clinical training series in: "Botulinum Toxin A Injections, Facial Filler Injections, Aesthetic Laser and Light Treatments, Aesthetic Venous Treatments, Body Contouring, (Peel Techniques and Sclerotherapy) Chemical and Mechanical Resurfacing and Cosmeceuticals."

It is not clear how any of the above procedures relate to preventing biological aging, although they presumably might help you to look younger, and perhaps the Academy recognizes that this is what most people really want. The modules cost applicants about \$15,000, which does not include expenses for the two weeks of accommodations needed to complete the program, or travel to and from the various sites around the country where different modules are offered. However, many apparently feel that the framed certificate they eventually receive is a good investment to attract clients and to charge more than unaccredited competitors. There is also a Fellowship and Certification in an American Board of Anti-Aging & Regenerative Medicine (ABAARM), American Board of Anti-Aging Health Practitioners Certification (ABAHP), an ACASP Certificate in Anti-Aging Sports Medicine & Rehabilitation as well as Health Clinic/Medical Spa Accreditation. All require registration for a minimum number of Academy sponsored conferences, hefty costs for training, educational material etc., and for periodic renewal of certification, which requires providing proof of continuing medical education at Academy events.

Egyptian Immortality, Shangri-La, "Elixir Of Life" And Dr. Faustus

The search for immortality started long before Ponce De Leon's quest for the Fountain of Youth. Over four thousand years ago the ancient Chinese referred to secret ways to find the *Yuan Qi* or "primordial Qi" that was said to restore youth. Early Egyptians placed an emphasis on immortality since they reasoned that if the Nile and all vegetation could rise again, so could humans. The amazing preservation of dead bodies in Egypt's dry soil supported this view, and over 5,000 years ago, led to the practice of mummification, since it was thought that as long as the skin and flesh did not decay, the body's soul would be preserved, and both could be resurrected at some future time. This belief dominated Egyptian faith for thousands of years, and resurfaced in Christianity with the resurrections of Lazarus, Jesus and several hundred others attributed to various apostles and saints. The art of mummification was progressively perfected as various salts and resins were developed to speed up dehydration and improve the protective power of various wrappings before the corpse was placed in a sarcophagus or tomb. This extensive process, which took over two months, required the participation of priests as well as expert embalmers in a ritual of purification in which charms and amulets were placed in layers of the linen wrappings to protect the soul on its journey to the hereafter. It was also very expensive and usually limited to royalty or the very wealthy who could afford elaborate tombs to preserve the mummy.

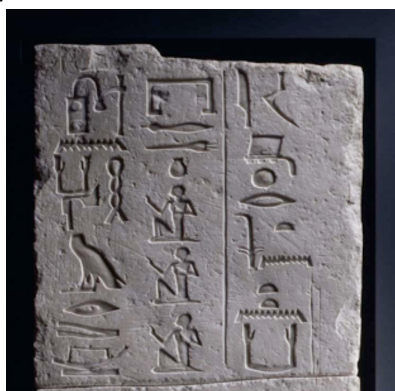
The soul was believed to consist of three components; the *Ba*, *Ka*, and *Akh* that had to be preserved, since if one died, all died. The *Ba* represented the personality, character, or individuality of the deceased.



It was depicted as a human headed bird, as shown to the far left. The *Ba* lived inside the tomb, but was allowed to leave and visit the land of the living, where it could take on any form before returning.

The *Ka* was an exact physical and emotional replica of the individual that had to stay close to the body. It could never leave the tomb or live unless the body was perfectly preserved, and it also required nourishment from regular offerings left at the tomb, such as dried fish or fowl as well as water.

If the preservation process broke down, *Ka* could still survive inside a picture of the body that had been painted or carved on the wall of the tomb, and was sometimes depicted as a human figure with raised arms, or just a pair of raised arms as shown to the right.



The *Akh* represented the immortality of the deceased. There are different versions of its significance and one popular belief was that at the moment of death, it left the body and flew to the stars to spend eternity in the heavens. The *Akh* was usually pictured as a crested ibis, a bird that was revered in ancient Egypt and bred specifically for sacrificial purposes. Also shown below is the *Ankh*, another hieroglyphic symbol of immortality.



Crested Ibis



An Ankh



An Ankh With A Mandala

The *Ankh* has had numerous variations over the past 20 to 30 centuries. The T or cross was said to represent temporal or masculine aspects, such as the phallus, whereas the loop or *shen* ring at the top reflected eternity, the womb, and femininity. It was also referred to as the "Key of Life", "Key of the Nile" or *crux ansata*, Latin for "cross with a handle". Egyptian gods or pharaohs are often portrayed carrying it by its loop or bearing one in each hand with their arms crossed over their chest, since it was thought that they had control over the journey of life. As noted above, in some illustrations, the loop is replaced by a mandala, an ancient circular symbol of mystic awareness used in ancient India as an aid in meditative practices.

The burial process consisted of rituals like the "Opening of the Mouth Ceremony", in which the mummy was purified with water and incense and the mouth was opened with an instrument called an adze. The priest also touched the mummy's face with a forked knife to restore sight, hearing, speech, taste and touch. Members of the funeral party members then held a feast at the tomb, as illustrated in the painting to the right.



When Tutankhamun's tomb was opened in 1922, it preserved the remains of a feast held for the boy king's burial more than 3,200 years previously.

Alexander the Great, who conquered most of the known world by around 320 B.C., had allegedly been searching for an Asian "river of gold" that prevented aging. This rumor resurfaced in the 12th century when a mysterious letter was widely circulated throughout Europe describing a Christian kingdom comprising the "three Indias". It came from Prester John, who portrayed a peaceful realm, where "honey flows and milk everywhere abounds" and there was a "fountain of youth" that offered the promise of immortality. Prester (a corrupted form of the word presbyter or priest) pleaded for help from Christian European armies to preserve this paradise, which was now in danger of being overrun by barbarians and infidels. In 1177, Pope Alexander III sent emissaries to find and assist Prester John without success, and subsequent attempts by others also failed. In 1340, an expanded ten-page letter indicated that Prester John's kingdom had now finally been located near Abyssinia (Ethiopia). That seemed more plausible geographically because of the early Egyptians' strong belief in immortality. Portugal sent several expeditions to Africa during the 1400s, and although they found nothing, the legend lived on as cartographers continued to include this mythical kingdom on maps throughout the 17th century.

The Bible had its "Garden of Eden", which means "delight" in Hebrew, and is sometimes referred to as "Paradise." Adam, Noah and Methusaleh all lived to be well over nine hundred and prior to Noah's flood, many other patriarchs lived for centuries and were fertile when they were hundreds of years old. Eden was thought to be located in Mesopotamia near the junction of the Tigris and Euphrates rivers and although Adam and his offspring had been expelled from this Utopia, Noah lived in the southern Tigris-Euphrates valley before his ark landed on Mount Ararat in Turkey. The story of Shangri-La is based on the concept of Shambhala, a mystical city believed by Tibetan Buddhists to be isolated from the world by the Himalayan Mountains. Its inhabitants were happy and healthy and could live for centuries. Shangri-La was resurrected in the 1930's by James Hilton's novel *Lost Horizon* that was later made into a popular movie. It is believed that the inspiration for Shangri-La was the Hunza Valley in northern Pakistan near the Tibetan border, which Hilton had visited several years before his book was published. This is an isolated green valley surrounded by the western end of the Himalayas that closely matches the description in the novel and where **people lived long and healthy lives due to the absence of stress.** Sir Robert McCarrison, a physician who had studied 11,000 Hunza natives in Kashmir from 1904-1911, wrote that they not only enjoyed unusual longevity, but preserved their youthful physique and appearance well into their eighties. McCarrison attributed this to the fact that they were **"endowed with a nervous system of notable stability" (i.e. resistant to stress),** and were "far removed from the refinements of civilization."

Attempts to concoct an "elixir of life" that conferred similar benefits date back to the ancient Chinese and are also described in the *Vedas*, the oldest Indian writings. Ingredients often included gold, since it was a non-tarnishing precious metal, and the notion of drinkable gold, popular in China by the end of the third century B.C., may have prompted Alexander's search for the "river of gold". The term "elixir", which first appeared in the 7th century, derives from *Al-Ikseer*, which is Arabic for "miracle substance". It has its counterpart in various cultures, such as Persian "dancing water" and Indian *Pepsi*, *Amruta*, and Pool of Nectar, all of which have slightly different meanings. The search for the "elixir of life" preoccupied medieval alchemists in their pursuit of the "philosopher's stone" that could convert base metals into gold, which, along with mercury, was an essential component of this magic potion. The most famous alchemist was Paracelsus, a physician whose 1570 *De Tintura Physicorum* described a tincture that would enable people to live for centuries. **Some view such elixirs of life as a metaphor for the spirit of God, citing Jesus' reference to "The Water of Life" and "The Fountain of Life."** Not surprisingly the Scots and the Irish adopted these for their own "liquid gold" and the Gaelic name for whiskey is *uisge beatha*, or "water of life."

About the same time that Paracelsus' book appeared, others dealing with the German legend of Dr. Faustus or Faust began to be published, explaining how his frustration in obtaining this knowledge led to his making a pact with the devil (Mephistopheles) to fulfill his goal. It soon spread to England where this theme resurfaced in Marlowe's 1604 *The Tragic History of Dr. Faustus*. Two centuries later, the legend became an obsession with Goethe, whose *Faust*, a hybrid between a play and an extended poem, emphasized the virtues of Christian morals. It is considered one of the greatest works in German literature and created a sensation that was the source of at least two very successful operas, Gounod's *Faust* and Boito's *Mefistofele*, musical compositions like *The Damnation of Faust* by Berlioz, Schumann's *Scenes From Goethe's Faust*, Liszt's *Faust Symphony*, others by Wagner and Mahler, as well as more recent literary works such as Thomas Mann's *Doctor Faustus*. A Polish folklore legend describes a nobleman named Twardowski who made a similar pact with the devil that condemned him to Hell, but from which he escaped by praying to the Virgin Mary.

HGH, DHEA And Other Supplements, Bioidentical Sex Hormones, Chelation

Most of us would like to live as long as possible, but not if those extra years consisted of being bedridden, or suffering from some physical or mental disability that significantly diminished the quality of life. Consider the following. **The average life expectancy in 1900 was 47, in 2000 it was 77, and it is projected to be over 90 by 2010!** The fastest growing segments of our population are those over 90 and centenarians, so we are obviously living longer. **However 10% of people aged 65 have Alzheimer's disease, the rate doubles every five to seven years after that, and is up to 47% in 85-year-olds in some studies.** The cost of caring for an Alzheimer's patient is twice that for mentally alert controls, and is projected to account for 60% of all long-term-care insurance claims by 2012. In addition to finances, Alzheimers' exacts a devastating emotional and physical toll on families, friends and caregivers, especially when insurance is lacking, since Medicare does not cover custodial care.

And that's just one disease. The same applies to Parkinson's, heart failure, emphysema, stroke, diabetes, cancer and other age related disabling diseases. Jet Blue reported that the percentage of passengers requesting wheelchair assistance has consistently increased over the past five years. This increases expenses for providing and storing equipment as well as extra attendants and significantly lengthens the time required to load and empty the plane, causing schedule delays. It is estimated that one out of four Americans will be disabled by the end of the next decade, most of whom will require wheelchairs or assistance with air travel that will further slow things down. The elderly are also much more likely to be victims of physical abuse

and fraud, such as scams to promote products or procedures that promise to restore youthful vigor, improve memory and prevent dementia.

What is referred to as "Rejuvenative" as well as "Regenerative Medicine", has the lofty goal of reversing the aging process by "enhancing and optimizing the body's innate mechanisms of self repair" or utilizing new techniques to achieve this or delay specific components of biological aging. These include the use of fetal stem cells, cryogenic preservation of healthy bone marrow hematopoietic stem cells and endothelial progenitor stem cells with the presumed potential to repair all tissues for future use, human growth hormone (HGH), estrogen, progesterone, testosterone, drugs to treat erectile dysfunction, hair loss, etc. There is also a dazzling array of vitamins, blueberry, green tea and numerous herbal and other supplements, nutraceuticals like resveratrol, DHEA, horny goat weed, coral calcium, kelp, krill and other sea products, devices that deliver electromagnetic fields to restore energy and wands containing dirt that supposedly align molecules to allow more water to get into cells. Hundreds of such products are hawked at Anti-Aging conference exhibits eager to cash in on this \$80 billion/year bonanza confirm Alexander Pope's view that "Hope springs eternal in the human breast", and P. T. Barnum's "There's a sucker born every minute." Anti-Aging Clinics abound, each offering their own proprietary or even patented blend of age reversing products and services that can cost hundreds of dollars/month. If HGH is included, add an additional \$2,000 or more for the daily injections. Of course this is all after \$2,500 or more for a day or two of evaluation that might include a nutritionist and/or exercise physiologists and various blood, skin and hair testing. Because aging is not a disease, there is no insurance reimbursement and patients must personally prepay for this as well as laboratory tests.

HGH is a particularly contentious issue since many clinics and Internet sites claim that it not only prevents or reverses aging but also improves nail and hair growth, sleep, skin tone, digestion, strength, and muscle mass, as well as poor hearing, vision, and sexual function. Claims that these infirmities, which are normal consequences of growing older, are caused by an age-related decline in growth hormone levels, and that HGH can prevent or reduce them, are not substantiated by either animal or human research studies. The FDA has approved HGH only for children with documented low levels who fail to grow, patients with a proven deficiency due to a rare pituitary tumor, or severe muscle wasting from AIDS. However, physicians can use an approved drug for any indication they choose and in 2004, sales totaled over \$620 million from some 213,000 prescriptions. The vast majority of these were for such off label use in older individuals and an October 2005 paper in *The Journal of the American Medical Association* described the distribution of human growth hormone for anti-aging as both

rampant and illegal. It reported that a Google search for "HGH" and "anti-aging" had generated over 3.4 million hits as of September 26, 2005. It's harder to track Internet sales, but one company generated sales of \$70 million/year for useless pills and sprays purported to contain growth hormone or to stimulate its production. Worldwide annual sales were estimated to be \$1.5 to \$2 billion.

Dr. Thomas Perls, Professor of Medicine and Geriatrics at Boston University, who has done landmark research on centenarians to uncover the secrets of their longevity, has been especially critical, noting that, "Growth hormone pills are destroyed in the stomach, and because the molecule is too large to enter the blood stream via sublingual and nasal sprays, such products have absolutely no biological effect. You might as well be paying hundreds of dollars for sand and water." And injectable HGH can have numerous adverse side effects, including blood clots, irreversible acromegalic changes of the hands and feet and increased risk for certain cancers. On the contrary, "Responsibly conducted and peer-reviewed science indicates that HGH could in fact accelerate aging and shorten lifespan," according to Dr Perls. Current laws specifically forbid prescribing, dispensing or administering growth hormone for anti-aging or other unapproved uses, with stiff fines to up to \$250,000 for an individual or \$500,000 for an organization and up to five years in prison, or 10 years if the offense involves a minor. The FDA and FTC simply do not have the resources to properly enforce this, but have been cracking down in recent years. A Florida dentist who pleaded guilty to federal charges of illegally selling HGH over the Internet could face up to five years in prison for each of four counts, and \$1 million in fines. Genentech paid a \$50 million fine in 1999 for improperly promoting its growth hormone, Genotropin, to doctors for anti-aging benefits. However, when Pfizer acquired the company in 2003, this practice was not only encouraged, but also expanded through lavish junkets for physicians and their spouses and substantial "honoraria" as inducements/kickbacks to promote the off-label usage of Genotropin. According to a whistleblower suit filed by a former Pfizer vice president, discounts were provided to doctors working exclusively in the anti-aging area although it was clear that Genotropin was being sold for unauthorized and illegal uses. At least 18 named doctors signed contracts for such price discounts and Pfizer ultimately settled for a fine of \$430 million for this and off-label promotions of other drugs.

Similar anti-aging and health claims are made for DHEA, an adrenal hormone that is a precursor of both testosterone and estrogen. DHEA levels peak in the late twenties and progressively decline, but it is not known what this or the concomitant fall in sex hormones has to do with biologic aging. A Mayo Clinic study that examined DHEA effects in men and women over the age of 60, who took it for two years, found no improvement in markers such

as muscle strength, physical performance, body fat, insulin sensitivity and quality of life, despite increased levels similar to those that had peaked four or five decades earlier. Since DHEA that is made from plants is classified as a supplement, it does not require a prescription. As one authority noted, "It took the Women's Health Initiative trial around five years and \$150 million to find that estrogen may be a problem after menopause." He warned that there are no such long-term studies of DHEA and that without strong safety data, the potential risk of adverse side effects is unknown.

The same problem exists with bioidentical hormones obtained from steroids in plants like wild yam and soybean that can be converted into products having the identical chemical structure as estrogens, progesterone, testosterone, cortisol, DHEA and other natural hormones. These plant products are compounded by pharmacists and are labeled as drugs that do require a prescription. However, despite anecdotal claims by Oprah and other celebrities, there is no scientific evidence to support claims of increased efficacy or safety compared to synthetic estrogens or those obtained from animal sources. The FDA requires manufacturers of approved products containing estrogen and progestins to include a black box warning. But since compounded bioidentical products are not approved by the FDA, they are exempt from having to provide patient package inserts that contain warnings and contraindications for sex hormones, even though it is claimed they are identical. Most compounded products have not undergone rigorous clinical testing for either safety or efficacy and there are concerns regarding their purity, potency, and quality, especially since there may be additional risks unique to the compounding process. Some also make unsupportable claims that their bioidentical hormones are better than FDA-approved menopausal therapy hormones and can be used to prevent and treat serious diseases such as Alzheimer's, stroke, and various forms of cancer. The FDA recently ordered seven compounding pharmacies to stop making such illegal claims, since it regards "bioidentical" as a marketing term that implies a benefit for which there is no medical or scientific basis.

Intravenous chelation therapy using EDTA to treat lead poisoning and remove other toxic metals from the body is approved by the FDA and has been used for over 50 years. It is now being administered by anti-aging doctors not only to promote longevity by allegedly reducing atherosclerosis, but to also treat angina, coronary disease and hypertension by intravenous infusions of EDTA along with various vitamins and minerals. A course of treatment can cost as much as \$2,400 and take up to three months, and although proponents claim it reverses heart disease, these and other benefits have never been proven. Some practitioners promote Che-Zone therapy, which includes administering ozone along with the infusions to enhance their efficacy. Others offer daily oral chelation with EDTA and a

cocktail of vitamin and other supplements that reportedly achieve the same benefits, although there are no supportive clinical studies. In addition, oral EDTA is not only as ineffective as oral HGH, but also more dangerous. Only five percent of EDTA is absorbed, and even though this may minimally increase urinary lead excretion, it removes 10-20 times more of the essential trace elements that help to prevent atherosclerosis.

Marked caloric restriction does have anti-aging benefits in animals. The maximum lifespan of rats has been nearly doubled in some experiments by a nutritious, very low calorie diet. Similar benefits have been demonstrated in spiders, mice, and monkeys that not only live longer, but also remain more youthful, energetic and healthy. In humans, calorie restriction has been shown to improve cardiovascular function, lower blood pressure and reduce blood insulin levels, all of which help to preserve health, but it is not known if this will also increase longevity. Some scientists believe that this is possible based on theories that aging results from an increase in free radical damage to healthy cells and/or glycation, a process in which glucose binding to fat and protein molecules result in sticky aggregates that can contribute to atherosclerosis. Caloric restriction conserves energy so there is less free radical generation from normal metabolic activities as well as lower blood glucose levels. Less blood glucose results in less glycation of lipid complexes that can cause plaque in coronary and other arteries. Conversely, obesity leads to type 2 diabetes and insulin resistance due to chronic blood glucose elevations. In addition, Type 2 and uncontrolled type 1 diabetics frequently manifest various changes that are associated with accelerated aging.

Support for the role of diet and caloric restriction in promoting longevity comes from Japan, which has the highest life expectancy of all nations, and particularly **Okinawa, which has 35 centenarians for every 100,000 islanders in contrast to only 10 in the U.S.** In addition, elderly Okinawans are much healthier, with far lower rates of dementia and less than half the risk for hip fracture than U.S. controls. Death rates are also 82% lower for coronary heart disease and breast cancer and 86% lower for prostate cancer. The traditional Okinawan diet has 20% fewer calories and 25% less sugar than the Japanese average, and much more green and yellow vegetables. It is very low in fat since no meat, eggs or dairy products are consumed and usually less than half a serving/day of fish. Tofu is very popular, especially when mixed with seaweed, and some centenarians attribute their longevity and good health to daily consumption of *awamori*, a local and often homemade rice wine. The average Okinawan lives to 82, (86 for women and 78 for men) but when 100,000 Okinawans migrated to Brazil and began to eat red meat and other local foods, life expectancy dropped from 82 to 65. And Okinawans under 50 who frequent fast food outlets near U.S. military bases have Japan's highest obesity and heart disease rates.

Will Advances In Stress Research Result In Healthy Aging And Longevity?

These observations seemed to confirm the value of caloric restriction so it is no surprise that a book entitled *The Okinawan Program* quickly became a best seller or that coral calcium from Okinawa reefs was described as one of the most successful scams ever. Similar claims made for Japanese who emigrated to Hawaii and California and Stewart Wolf's elegant Roseto study have conclusively demonstrated that increased cardiac mortality or reduced longevity is due to the stress of adapting to rapid sociocultural change rather than dietary factors. **There is no proof that high fat diets cause heart disease and lower longevity, or that caloric restriction increases human life expectancy.** As an old saying goes, "Everyone wishes to live long, but none want to grow old." **Increases in longevity over the past century from medical advances have added years to life, but not necessarily life to years.** It's not how long you live but how well you have lived, that is important to most people. Few would enjoy giving up their favorite foods for a permanent 800 calorie/day diet of tofu and seaweed.

We repeatedly hear of breakthroughs like resveratrol, and a new compound that is a thousand times more powerful is now being tested in humans. There is also research on changing gene expression, boosting mitochondrial function and telomerase. Many are so convinced that these will bear fruit that they have paid huge sums to have their brains or bodies preserved in liquid nitrogen like Ted Williams and other cryogenic enthusiasts. While little can be done to increase life expectancy, there is no doubt that stress reduces it. Longevity is largely determined by genes that are protected by telomeres at the end of each chromosome that shorten each time a cell divides. Telomerase is a natural enzyme that prevents telomere erosion, and, as explained in prior Newsletters, stress decreases telomerase and increases signs of aging, whereas stress reduction techniques that promote parasympathetic activities have the reverse effect. For more on this and the potential anti-aging benefits of telomerase activation — stay tuned!!

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