Anti-Aging, Preventive/ Regenerative Medicine

It is no longer necessary to accept the mental and physical decline associated with aging (including chronic diseases such as dementia, cancer, heart disease, diabetes). A century ago the average life expectancy was 43 to 47 years.[1] Today, life expectancy has almost doubled, due mostly to advances in medicine and technology. Experts observe that the world has entered a unique and irreversible process of demographic transition that will result in older populations everywhere. In most countries, the number of those over 80 is likely to quadruple to nearly 400 million by 2050.[2] This profound demographic shift drives the growth of the antiaging medical specialty worldwide. Around the world, people are seeking medical guidance for ways to stay healthy, active, and vital well into their older year

Thanks to advances in technology and medicine, aging is now no longer inevitable. Anti-Aging/Regenerative medicine is a relatively new filed of medicine which examines the research of what causes illness, aging, and the decline in physical and mental functioning with age. The goal is to extend the healthy lifespan of humans i.e. to increase quality and quantity of life, slow down development and eventually stop aging. While traditional medicine is reactive because it focuses on treating the effects of the aging process, Anti-Aging/Regenerative Medicine is proactive because it treats the underlying causes of aging and aims at alleviating any age-related ailments. Anti-Aging/Regenerative Medicine aims not to just prolong the total years of an individual's life, but to ensure that those years are enjoyed in a productive and vital fashion.

In 1992 Drs. Ronald Klatz and Robert Goldman organized a small group of physicians and scientists devoted to examining scientific research pertaining to the causes of illness, aging, and the decline in physical and mental function with age. Drs. Klatz and Goldman described a change in basic assumptions for health care that focused on the application of innovative scientific and medical technologies for the early detection, prevention, treatment and reversal of age-related dysfunction, disorders, and disease. Thus, the Anti-Aging Medicine specialty was born. The society they formed, the American Academy of Antiaging Medicine, (A4M) is now the fastest growing scientific society in the world. There are over 26,000 members and academies of anti-aging medicine have been established in over 120 countries.[3]

Per Dr. Klatz, Anti-Aging & Regenerative Medicine is the next generation of healthcare, where lifespans of 120 to 150 in superior health may become commonplace, maybe as early as 2029.[4]

The worldwide revolution of anti-aging medicine, which in just the past 25 years has exploded onto the scene, has increased quality of life while improving quantity of life, such that something called the Anti-aging dividend resulted, as published by Harvard School of Public

[1]Retrieved 7, February 2018 from https://www.cdc.gov/nchs/fastats/life-expectancy.htm

[2] Aging, Society, and the Life Course, Fifth Edition, Suzanne R. Kunkel, PhD, Leslie A. Morgan, PhD Springer Publishing Company, Jul 20, 2015

[3] Retrieved 9 February 2018 fromhttps://www.a4m.com/about-a4m-mmi html

[4] Retrieved 8, February 2018 from https://www.worldhealth.net/news/future-predictions-2017-2045

Health, the US Census Bureau, and the New Jersey Department of Public Health. Researchers from the Harvard School of Public Health have found that the anti-aging lifestyle can add almost 25 more years of productive lifespan. The research team discovered that the longest-living Americans are Asian-American women residing in Bergen County, New Jersey USA. They live longer than any other ethnic group in the United States to an average lifespan of 91.1 years. In contrast, the Harvard team found that the shortest-living Americans are Native American populations in South Dakota, despite receiving free or low-cost government provided medical care, living an average lifespan of 66.5 years. A distinguishing characteristic of the Bergen County women's longevity is that they are availing themselves of the state-of-the-art biomedical technologies in advanced preventive care, including preventive screenings, early disease detection, aggressive intervention, and optimal nutrition, all of which are cornerstones of the anti-aging medical model. [5] By utilizing the concepts and practices of anti-aging medical interventions, Americans can now enjoy the longest lifespan on the planet at 90.5 years.

Forty-five years ago, hospital intensive care units were packed with patients aged 50, 60, 65. And it was rare to find anyone living vitally and intact past age 75.[6] [7]Today's survival to 100 is not so unique, and there are many people aged 110 still among us. The record for human longevity stands with Jeanne Calment of France, who lived to age 122 years and 164 days. However, there are many independently reported, but not fully documented accounts from China, Brazil, and India of people living to 135 and older.[8] The 100 years-plus super-centenarians are living proof that prodigious longevity is in fact possible.

The progressive failure of metabolic processes causes aging, which. is likely due to a combination of causes. Several theories exist to answer the question of what causes aging. A few of the major ones include: degeneration of bodily functions due to hormone decline, free radical damage, oxidative stress, chronic inflammation, loss of DNA's ability to reproduce, excess insulin, decreased cellular function, immunological deterioration, increased toxic load and gene mutation. When these events are controlled or prevented, the likelihood of illness and disability is reduced or prevented, and it becomes possible to maintain good general health, strong mental and physical function at any age.

There is no magic pill at present that will retard aging. However, we can learn by studying the habits of the oldest lived peoples. The older Okinawan individuals in Japan have a

[5] ["Bergen County, NJislong in longevity," New York Times, September 12, 2006; "Asian women in Bergen have nation's top life expectancy," Free Republic, September 12, 2006.]

[6] ,7,8 Retrieved 10 February 2018 from www.townsendletter.com/Dec2016/antiage1216.html

[9] Willcox, D. C., Willcox, B. J., Todoriki, H., Curb, J. D., and Suzuki, M. (2006). "Caloric restriction and human longevity: what can we learn from the Okinawans?" *Biogerontology* **7**(3):173-177

lower risk of age-related chronic diseases and mortality when compared to the rest of Japan. Okinawans tend to avoid high calories sugars, saturated fats and processed foods and instead consume more vegetables and fruits, which has likely contribute to their long lifespan (Willcox et al., 2006)[9] Conversely, smoking, excess alcohol, obesity, lack of exercise and high blood pressure are all associated with higher mortality. One study showed that middle aged (45-64 years of age) people who adopted a healthy lifestyle by consuming five or more fruits and vegetables daily, regular exercise, maintaining a healthy weigh and not smoking experienced a prompt benefit in lower rates of cardiovascular disease and mortality (King et al., 2007)[10]. Clearly, not smoking, exercise, moderate alcohol intake and fruit and vegetable intake are associated with lower mortality (Khaw et al., 2008.[11]

Kaplan et al performed a multidimensional measure of health status.[12] They examined the maintenance of exceptionally good health among 2,432 elder Canadians enrolled in the Canadian National Population Health Survey, which tracked participants' health for a ten-year period, 1994 to 2004. The researchers found that the most important predictors of excellent health over the entire decade were:

- absence of chronic illness
- income over US $30,000
- having never smoked
- drinking alcohol in moderation
- maintaining a positive outlook
- managing stress levels

The team comments that: "Many of these factors can be modified when you are young or middle-aged. While these findings may seem like common sense, now we have evidence of which factors contribute to exceptional health [as we age]." [13]

In addition to the traditional comprehensive medical checkup, age-related physical changes as well as signs and symptoms of aging can be identified by examining blood vessels, hormone levels, functions of sensory organs, balance between active oxygen and antioxidant potential,

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[10] King, D. E., Mainous, A. G., 3rd, and Geesey, M. E. (2007). "Turning back the clock: adopting a healthy lifestyle in middle age." *Am J Med* **120**(7):598-603. PubMed

[11] Khaw, K. T., Wareham, N., Bingham, S., Welch, A., Luben, R., and Day, N. (2008). "Combined impact of health behaviors and mortality in men and women: the EPIC-Norfolk prospective population study." *PLoS Med* **5**(1):e12. PubMed

[12] [Kaplan MS, Huguet N, Orpana H, Feeny D, McFarland BH, Ross N. "Prevalence and factors associated with thriving in older adulthood: a 10- year population-based study." J Gerontol A Biol Sci Med Sci. 2008 Oct;63(10):1097-104.]

[13]Orpana HM, Ross N, Feeny D, McFarland B, Bernier J, Kaplan M. "The natural history of health-related quality of life:" a 10-year cohort study. Health Rep. 2009 Mar;20(1):29-35.

toxic load, vitamin and nutritional status, cognitive status, fitness, and stress. These examinations enable early detection and treatment as well as lifestyle guidance to prevent aging-related diseases. It is crucial to identify the signs of aging and intervene appropriately as early as possible. The basic elements of a clinical anti-aging medicine program consist of measures to improve the lifestyle of patients: dietary advice, appropriate use of nutritional supplements and vitamins, an exercise regimen, stress control, detoxification, hormone balance and appropriate diet. The idea is to keep the body in a state of balance.

As mentioned, Anti-Aging Medicine encompasses Regenerative Medicine to aid in achieving human longevity. Regenerative Medicine involves:

Genetic Engineering and Genomics- Advancements that permit the identification and alteration of genetics to ameliorate dysfunctions, disorders, disabilities, and diseases.
Stem Cell Therapeutics-Technologies aiming to beneficially alter the very basic cellular sources of dysfunctions, disorders, disabilities, and diseases
Therapeutic Cloning-A technique for producing consistent organs, tissues, and proteins for biomedical use and transplant in humans.
Artificial Organs-Making plentiful replacement body parts available. Also encompasses 3D Printable Organs which are in process via 3D "bioprint" organ tissues. This is a process that involves depositing a "bio-ink" made of cells precisely in layers, resulting in a functional living human tissue for use in the lab.
Nanotechnology- Deploying micro- and molecular-sized tools (nanobots) to manipulate human tissue biology for microsurgical repair on a gross level. Also, for microscopic nano-biology for repair at the most basic cellular level.
Nerve Impulse Continuity-Communications between the brain and spinal cord.

The advancements offered by Anti-Aging and Regenerative Medicine to improve the quality of, and/or extend the length of the human lifespan, are available because of innovative,, emerging biomedical technologies; and, the exponential growth of medical knowledge. Lifetimes may increase faster than ever before. In fact, many, biotech firms have jumped into the anti-aging movement full force.

Silicon Valley has launched programs that are working to extend the human lifespan well past 120 years of age. Biotechnologists in Palo Alto, the heart of Silicon Valley, are taking on the challenge at full throttle. Their main initiative? To hack the "code of life" and thus "solve ageing," reports Zoë Corbyn of The Guardian.[14] Aubrey de Grey, a member of the Palo Alto

[14] Zoe Corbin, The Guardian, "Live forever: Scientists say they'll soon extend life 'well beyond 120" 11 Jan 2015

Longevity Prize board, tells Corbyn Just as a vintage car can be kept in good condition indefinitely with periodic preventative maintenance, so there is no reason why, in principle, the same can't be true of the human body, thinks de Grey. We are, after all, biological machines, he says is claims about the possibilities (he has said the first person who will live to 1,000 years is probably already alive).

Others such as Oracle co-founder Larry Ellison, for example, has given more than $430 million toward anti-aging research. Entrepreneur Peter H. Diamandis co-founded Human Longevity, which, in conjunction with StartUp Health, launched the Longevity Moonshot, whose mission is "to extend and enhance healthy life by 50+ years and change the face of aging." Google co-founder Larry Page launched a biotech company called Calico, which aims to extend the human life span by a century. PayPal co-founder Peter Thiel created Breakout Labs to fund scientists and start-ups that include some working on achieving immortality, and he invested millions in funding research to treat aging as an engineering problem to be solved at the cellular level by reprogramming cells to stop aging. The anti-aging literature is loaded with technologies to prolong lifespan by 20-40%, at least in lab animals. Interventions such as caloric restriction, rapamycin, stem cells, genetic engineering, nanotechnology, and metformin, to mention a few, have been studied for decades for their anti-aging capacity. Hundreds of anti-aging drugs are now in the pipeline and billions of dollars are being expended to find real answers.

The FDA finally recognized 'Aging' as a disorder that the medical community could target and potentially treat,[15] this is about 15 years after the American Academy of Ant-Aging Medicine (A4M) (www.Worldhealth.net, www.A4M.com) made the declaration. The Anti-Aging/Regenerative Medicine philosophy is that the inevitability of life is a medical problem that can be solved by science.

What can you do right now?

Find a qualified anti-aging medical practitioner (www.Worldhealth.net, www.A4M.com) to guide you to peak physical and mental health right now. Meantime, adapt a healthy lifestyle and other principles, as outlined in this paper.

15 Retrieved 9 February from https://www.frontiersin.org/articles/10.3389/fgene.2015.00205/ful