

**The A4M Twelve-Point
Actionable Healthcare Plan:
A Blueprint for A Low Cost, High Yield
Wellness Model of Healthcare**

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Dedication

The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare presents a comprehensive program to reform and advance healthcare in the United States. Garnering support from 35 professional medical organizations and educational institutions, this White Paper received invaluable input from the 24,000 physician, health practitioner, and scientist members of the American Academy of Anti-Aging Medicine (A4M; www.worldhealth.net) who represent 110 nations worldwide.

The contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* owe a debt of gratitude to World Economic Forum and its Founder & Executive Chairman, Professor Dr. Klaus Schwab, which provided the impetus and inspiration for the drafting of this White Paper. Founded in 1971 and based in Geneva, Switzerland, the World Economic Forum is an independent international organization committed to improving the state of the world by engaging leaders in partnerships to shape global, regional and industry agendas.

Dr. Ronald Klatz, M.D., D.O., President of the American Academy of Anti-Aging Medicine (A4M; www.worldhealth.net), and Executive Editor of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare*, proudly serves as an appointed member of the World Economic Forum's Global Action Council on the Challenges of Gerontology, tasked to assess the factors contributing to demographic shifts, generate predictions on imminent population changes, and find novel solutions critical to business and political leaders regarding the impact of the globally aging population on the world economy. At The World Economic Forum Summit convened in the fall 2008 in Dubai, the Global Action Council on the Challenges of Gerontology focused its valuable discussion time debating the social aspects and semantics of gerontology. Regrettably, the work product of the 2008 meeting of the Global Action Council on the Challenges of Gerontology failed to identify specific actionable items to repair and reinvigorate the failing US healthcare system and address the real-world solvable problems associated with a globally aging population.

Thus, the contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* felt compelled to draw upon our real-world clinical experience and technical expertise in the treatment of aging related disorders, to construct a comprehensive set of actionable items to augment the report of the World Economic Forum's Global Action Council on the Challenges of Gerontology and provide practicable "here and now" solutions to the crisis of global aging.

The contributing editors, authors and endorsing organizations to *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* submit this White Paper as a low-cost, high-yield solution to the healthcare dilemma facing our nation and many other countries that are grappling with the economic, social, and political shifts associated with an aging population. We submit that the anti-aging medical model brings forth actionable ideas to positively, tangibly, and dramatically benefit society. Thus, *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* aims to significantly improve and extend the healthy human lifespan, while delivering a profound net economic savings in terms of the conservation of worker productivity and the reduction of disability and hospitalization costs, and the burden of costs associated with chronic long-term medical conditions.

Executive Summary

The U.S. spends \$2.2 trillion per year on health care, equating to a \$7,421 burden on every man, woman, and child in this nation. US healthcare spending is nearly twice the average of other developed nations. Left unchecked, the Congressional Budget Office warns that by 2025, 1 of every 4 dollars in the nation's economy will be tied up in the healthcare system. ["Health Care," U.S. White House [http://www.whitehouse.gov/issues/health_care/; accessed 21 July 2009.]

Indeed, economists warn that rising health care costs represent a serious threat to our long-term fiscal security. As President Obama explained at a landmark speech presented at the American Medical Association's annual meeting in June 2009, the time has come for healthcare reform, because "If we fail to act ..."

- Insurance premiums will climb higher, benefits will erode further, the rolls of the uninsured will swell to include millions more Americans;
- In 30 years, one out of every three dollars will be spent on healthcare-- a trend that will mean lost jobs, lower take-home pay, shuttered businesses, and a lower standard of living for all Americans;
- Federal spending on Medicaid and Medicare will grow over the coming decades ... [to] swamp our federal and state budgets, and impose a vicious choice of either unprecedented tax hikes, or overwhelming deficits, or drastic cuts in our federal and state budgets. "

["Why reform, why now?"; <http://www.whitehouse.gov/blog/Why-Reform-Why-Now/>; accessed 21 July 2009.]

At this writing, legislators on Capitol Hill are actively debating a \$1.65 trillion, 10-year plan to overhaul the nation's healthcare system. The majority of the plan focuses on how to pay for health insurance, rather than formulating a comprehensive plan of action to reform healthcare itself. The contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* submit that the underlying philosophy of healthcare in this nation must be reformed in revolutionary new ways. In place of the disease-based approach that treats people after they exhibit signs of illness, we submit that it is time for the nation to adopt a wellness-oriented model to healthcare. Such a model stresses very early detection of illness and promotes disease prevention, yielding opportunities for the best prognoses and economical treatments. As reported by the Congressional Budget Office, up to one-third of this nation's healthcare spending -- more than \$700 billion -- does not improve Americans' health outcomes. [Lobban R "Early detection via telehealth: falls, infections, nutrition, dental." *Caring*. 2009 Mar;28(3):48-50.]

To compound the issue of healthcare reform, the United States is a driving force in a trend of unprecedented global aging. The average age of the world's population is increasing at an unprecedented rate. The number of people worldwide ages 65+ was 506 million as of midyear 2008; by 2040, that number will hit 1.3 billion. Thus, in just over 30 years, the proportion of older people will double from 7% to 14% of the total world population. ["An Aging World: 2008," US Department of Census, www.census.gov/prod/2009pubs/p95-09-1.pdf; accessed 21 July 2009.]

In the United States, men and women ages 65+ represented 12.4% of the population in the year 2000, with that age bracket projected to swell to stand at 20% of the population by 2030. [“Aging Statistics,” US Administration on Aging, http://www.aoa.gov/AoARoot/Aging_Statistics/index.aspx; accessed 21 July 2009.] In 2007 in the United States, six major diseases among Americans ages 65+ resulted in medical and lost productivity costs of more than \$196 billion. In the coming years, the cases of these six diseases, namely -- chronic lung disease, ischemic heart disease, stroke, lung cancer, pneumonia and gastrointestinal illness -- are expected to surge as the population ages, potentially sending the costs of age-related diseases skyrocketing. [RTI International, October 22, 2008; reported by Washington Post, 30 October 2008.] Steps to prepare the nation to address the social, economic, and personal ramifications of a graying society now, are urgently necessary.

As urged by President Obama, “we need ... to figure out what works, and encourage rapid implementation of what works into [doctor’s] practices. That’s why we’re making a major investment in research to identify the best treatments for a variety of ailments and conditions.” [“Why reform, why now”; <http://www.whitehouse.gov/blog/Why-Reform-Why-Now/>; accessed 21 July 2009.]

Anti-aging medicine is the pinnacle of biotechnology joined with advanced clinical preventive medicine. The specialty is founded on the application of advanced scientific and medical technologies for the early detection, prevention, treatment, and reversal of age-related dysfunction, disorders, and diseases. It is a healthcare model promoting innovative science and research to prolong the healthy lifespan in humans. As such, anti-aging medicine is based on principles of sound and responsible medical care that are consistent with those applied in other preventive health specialties. The anti-aging medical model aims to both extend lifespan as well as prolong healthspan -- the length of time that we are able to live productively and independently.

Universally, those involved in healthcare, or those whose fields of expertise intersect with healthcare issues, support anti-aging medicine as a healthcare model promoting innovative science and research to prolong the healthy human lifespan. Public policy organizations and government agencies in a number of nations are now embracing anti-aging medicine as a viable solution to alleviate the mounting social, economic, and medical woes otherwise anticipated to arrive with the trend of unprecedented global aging.

Anti-aging medicine is now practiced by thousands of physicians in private medical offices, as well as at some of the most prestigious teaching hospitals around the world. Involving a patient base in the hundreds of thousands worldwide, anti-aging medicine is achieving demonstrable and objective results that beneficially impact the degenerative diseases of aging.

On the basis of input from the 120,000+ practicing physician and health practitioner members of The American Academy of Anti-Aging Medicine (A4M; www.worldhealth.net), the world's largest professional organization dedicated to advancing research and clinical pursuits that enhance the quality, and extend the quantity, of the human lifespan, and its international educational affiliates, the contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* are confident that technologies exist today which can reliably and objectively improve the quality of life for hundreds of millions of people in the developed world, while concurrently increasing the quantity of the healthy productive lifespan as well.

Hundreds of scientific research studies clearly prove that modest interventions in diet, exercise, nutrition and single-gene modulation in the laboratory setting beneficially and significantly impact healthy function in old-age. Many of these interventions also modify maximum lifespan by 20 to 800% as well. With over the near-daily advancements in biomedical technologies related to research specifically focused on elucidating treatments for aging-related disorders and modulating the metabolic dysfunctions associated with old age, we are likewise confident that effective interventions will become widely available to modulate the aging process itself in humans clearly within the immediate and foreseeable future.

The A4M Twelve-Point Actionable Healthcare Plan will significantly improve and extend the healthy human lifespan. Each of the points of this Program will also deliver a profound net economic savings via three major mechanisms:

1. Conservation of worker productivity
2. Reduction of disability and hospitalization costs
3. Reduction of the burden of costs associated with chronic long-term medical conditions.

The potential benefits of each of the Twelve Points is based on the collective knowledge and expertise of the authors, the 24,000 physician, health practitioner, and scientist members of the American Academy of Anti-Aging Medicine (A4M; www.worldhealth.net) who represent 110 nations worldwide. These projected gains are synergistic in nature, in that the Twelve Points are interdependently connected and that net results from one Point may concomitantly contribute to benefits from another Point. The following table summarizes the projected gains to result from implementation of the Twelve Point Plan:

Point	Point Item	Projected Extension in Healthspan / Lifespan: ADDITIONAL YEARS PER PERSON	Projected Savings to Healthcare System: US \$ DOLLARS
I	Point of Care (POC) Laboratory Testing	2	\$ 6.75 Billion
II	Biomarkers of Aging and Health Measurement	5	\$ 119.5 Billion
III	Free Biannual Comprehensive Metabolic Testing	3	\$ 154.6 Billion
IV	24/7 Telemedicine Consultation Access	3	\$ 400 Billion
V	Aging Intervention Drugs	3	\$ 39.2 Billion
VI	Stem Cells, Nanotechnology, Genetic Engineering	4-12	\$ 197.1 Billion
VII	Personalized Genetic Testing and Nutrigenomics	2	\$ 292.3 Billion
VIII	Free/Subsidized Access to Gym, Spa, Detoxification, and Physical Rehabilitation Facilities	2	\$ 23.4 Billion
IX	Online Electronic Database on Aging Intervention	5	\$ 2.4 Trillion
X	Free Online Medical Education		
XI	The World Center for Anti-Aging Medicine		
XII	The Leisure Class		
TOTAL IMPACT, Points 1 through 12		29+ years	\$ 3.64 Trillion

Introduction to Anti-Aging Medicine

Anti-aging medicine is founded on the application of advanced scientific and medical technologies for the early detection, prevention, treatment, and reversal of age-related dysfunction, disorders, and diseases. It is a healthcare model promoting innovative science and research to prolong the healthy lifespan in humans. As such, anti-aging medicine is based on principles of sound and responsible medical care that are consistent with those applied in other preventive health specialties. The phrase "anti-aging" is, as such, a euphemism for the application of advanced biomedical technologies focused on the early detection, prevention, and treatment of aging-related disease.

Anti-aging medicine is scientifically based and well documented in leading medical journals. A number of human studies support the efficacy, validity, and safety of anti-aging medicine.

Researchers from the Harvard School of Public Health have found that the anti-aging lifestyle can add 24.6 more years of productive lifespan. The research team found 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 armament of 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. ["Bergen County, NJ is long in longevity," *New York Times*, September 12, 2006; "Asian women in Bergen have nation's top life expectancy," *Free Republic*, September 12, 2006.]

A team from Cambridge University (United Kingdom) has found that healthy lifestyle choices can extend lifespan by 14 years, Kay-Tee Khaw and colleagues followed 20,000 men and women, ages 45 to 79, for 13 years. They questioned the study subjects about their lifestyles and conducted blood testing to measure Vitamin C levels (an indicator of daily fruit and vegetable intake). Those study subjects with the lowest number of healthy behaviors were four-times more likely to die, most notably from cardiovascular disease. The team found that study participants with the lowest healthy lifestyle scores had the same risk of dying as someone with the highest healthy lifestyle scores who was 14 years older. The lifestyle change with the biggest benefit was smoking cessation, associated with an 80% improvement in lifespan. The second most significant change was increased consumption of fresh fruits and vegetables. Thirdly, moderate drinking; and fourthly, staying physically active, rounded out the four most beneficial lifestyle choices to extend lifespan. [Khaw KT, Wareham N, Bingham S, Welch A, Luben R, Day N. "Combined Impact of Health Behaviours and Mortality in Men and Women: The EPIC-Norfolk Prospective Population Study." *PLoS Med.* 2008 Jan 8;5(1):e12. [Epub ahead of print].]

Harvard School of Public Health researchers find that healthy living cuts premature death risk in half. Rob van Dam and colleagues analyzed data from 80,000 women nurses spanning two decades. Over the study period, 1,790 women died from heart disease and 4,527 from cancer. In analyzing the study participants' records of diet, physical activity, alcohol consumption, weight, smoking, and disease history, the team determined 55% of the deaths could have been avoided if the women had never smoked, exercised regularly, eaten a healthy diet (low in red meat and trans

fats), and maintained a healthy weight. Smoking was by far the factor to play the biggest role in premature deaths, with the team estimating that it was directly responsible for 28% of the deaths.[Rob M van Dam, Tricia Li, Donna Spiegelman, Oscar H Franco, Frank B Hu. “Combined impact of lifestyle factors on mortality: prospective cohort study in US women.” *BMJ* 2008;337:a1440; published 16 September 2008, doi:10.1136/bmj.a1440.]

A first-ever study reveals the secrets of exceptional health in old age. Mark Kaplan, from Portland State University (Oregon, USA), and colleagues utilized the Health Utilities Index Mark 3 (HUI3), a multidimensional measure of health status, to examine 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].” [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.]

The Intersection of Anti-Aging Medicine and Sports Medicine

From its inception seventeen years ago, the field of anti-aging medicine is a direct extension of sports medicine. Just as sports medicine aims to keep the athlete’s body functioning at its optimum level, anti-aging medicine seeks to keep the body functioning at its peak. In other words, the similar principle, of extending and maximizing the healthy human lifespan, is at the core of both anti-aging medicine and sports medicine.

As such, the premises of fitness and physical activity factor prominently into the anti-aging medical model, as well as into *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare*. Healthcare spending on overweight/obesity in the United States has skyrocketed, swelling more than 80% over a five-year period. The Agency for Healthcare Research & Quality reports that healthcare spending on the heaviest Americans rose to stand at \$303.1 billion in 2006, up from \$166.7 billion in 2001. This increased spending on healthcare for overweight/obese Americans parallels the general rise in the condition in the US, which is now home to 58.9 million overweight/obese adults, representing 27.2% of the total US population.

Overweight/obesity is one of the most significant health issues today. A primary and direct result of the increasingly sedentary western lifestyle, overweight/obesity is associated with increased rates of cardiovascular disease, cancers, diabetes, kidney disease, and other serious medical conditions. It is necessary for each of us to take charge of our health destinies and stay vigilant to minimize our risks of succumbing to otherwise preventable diseases.

By slashing the epidemic of overweight/obesity, we can potentially slash our nation's healthcare costs significantly while promoting extended health and quality of life for all Americans. Indeed, fitness is a key element in *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare*, factoring in to:

- Point II, Biomarker Measurements
- Point III, Free Biannual Comprehensive Metabolic Testing
- Point VIII, Free/Subsidized Access to Gym, Spa, Detoxification, and Physical Rehabilitation Facilities

Indeed, fitness has a far greater importance in lifespan and healthspan than simply maintaining a lean physique. Alzheimer's Disease is the most common form of dementia and currently affects more than 13 million people worldwide. The number of people with Alzheimer's Disease and dementia continues to rise, and is reaching epidemic levels in the very oldest segments of the global population, stressing healthcare systems with burdensome care costs. Experts estimate that the worldwide societal cost of dementia stands at \$315.4 billion. [Alzheimer's Disease International, March 2009 conference, <http://www.medicalnewstoday.com/articles/143551.php>; accessed 21 July 2009.] Researchers from Jönköping University (Sweden) have found that excess weight in midlife may increase the risk of impaired memory and thinking skills later in life. Anna Dahl colleagues studied participants in the Swedish Adoption/Twin Study Aging to examine the association between being overweight in midlife as measured by body mass index (BMI) and cognitive ability assessed over time. They found that those subjects with higher midlife BMI scores had significantly lower general cognitive ability and significantly steeper longitudinal decline than their thinner counterparts. [Anna Dahl, Linda B. Hassing, Eleonor Fransson, Stig Berg, Margaret Gatz, Chandra A. Reynolds, and Nancy L. Pedersen. "Being Overweight in Midlife Is Associated With Lower Cognitive Ability and Steeper Cognitive Decline in Late Life," *J Gerontol A Biol Sci Med Sci*, Advance Access published on April 6, 2009; doi: doi:10.1093/gerona/glp035.] In a separate study, a team from University of California San Francisco has found that exercise keeps the mind sharp as one ages. Alexandra Fiocco and colleagues examined 2,509 independently living seniors living in three major metropolitan areas in the United States, testing for cognitive skills four times over an eight-year study period. Over the study's eight-year duration, the team found 30% of the participants to maintain cognitive function, 53% to show minor decline, and 16% experienced major cognitive decline. The team found several contributing factors to the cognitive differences. Leading the way was the finding that men and women who exercised moderately to vigorously at least once a week were 30% more likely to maintain their cognitive function over time (as compared to those who exercised less often). [Yaffe K, Fiocco AJ, Lindquist K, Vittinghoff E, Simonsick EM, Newman AB, Satterfield S, Rosano C, Rubin SM, Ayonayon HN, Harris TB; Health ABC Study. "Predictors of maintaining cognitive function in older adults: the Health ABC study." *Neurology*. 2009 Jun 9;72(23):2029-35.]

Anti-aging medicine applies advanced biomedical technologies focused on the early detection, prevention, and treatment of aging-related disease. Anti-aging medicine is the following:

- **It is scientific.** Anti-aging diagnostic and treatment practices are supported by scientific evidence and therefore cannot be branded as anecdotal.
- **It is evidence-based.** Anti-aging medicine is based on an orderly process for acquiring data in order to formulate a scientific and objective assessment upon which effective treatment is assigned.
- **Is well-documented by peer-reviewed journals.** As of this writing, the National Library of Medicine hosts more than 2,000 peer-reviewed articles on the subject of anti-aging medicine.

In short, anti-aging medicine is advanced preventive medicine, aiming to both prolong the total years of an individual's life and ensure that those years are enjoyed in a productive and vital fashion. As such, it offers a viable model of specific attainable goals on which a comprehensive and integrated program of healthcare reform may be based.

I. Point of Care (POC) Laboratory Testing

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 2 years/person

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: US \$ 6.75 Billion

Based on the following assumptions:

- 902 million physician office visits (2006 year) [“Ambulatory care use and physician visits,” US CDC FastStats, <http://www.cdc.gov/nchs/fastats/docvisit.htm>; accessed 7 July 2009.]
- An estimated 15% of all physician office visits are for the primary purpose of follow-up laboratory testing re-evaluation

Point-of-care testing (POCT) is defined as testing at or near the site of patient care. The goal of POCT is to allow more rapid and effective diagnosis and triage, leading to improved patient outcomes, reduce morbidity and mortality, and slash health care costs. Today, there are accurate and efficient POCT for cardiac markers, glucose levels, coagulation, cholesterol, and drugs-of-abuse.

POCT slashes healthcare costs. The effective use of POCT has the potential to lower economic costs by facilitating early detection and treatment. [Kost GJ, Tran NK, Louie RF. Point-of-care testing: principles, practice, and critical-emergency-disaster medicine. In: Meyers RA, ed. Encyclopedia of Analytical Chemistry. 2008; DOI: 10.1002/9780470027318.a0540.pub2.] With POCT devices, specimen type and reagent use are minimized, thereby decreasing the overall cost of diagnostic testing. In addition, rapid diagnosis and treatment facilitated by POCT reduces the time impact on both doctors and other medical personnel. A recent study conducted by Dr. G.F. Mendez, and colleagues evaluated the impact of using POCT to identify cardiac biomarkers in the Emergency Department (ED) in Mexico City. Results showed that POCT used in the ED effectively reduced turnaround-time (TAT) in patients with chest pain, while simultaneously reducing direct medical costs for patients when compared to conventional central laboratory. [Mendez GF, Castillo P, Galicia G, et al. Point-of-care testing improves clinical-effectiveness by reducing turn-around-time in emergency department of a high technology cardiology hospital in Mexico City. *Point of Care*. 2008;7(3):150.] [Medical Laboratory Observer, http://www.mlo-online.com/features/2009_june/0609_coverstory.aspx; accessed July 1, 2009.]

POC technologies have the potential to help reduce the economic costs on the healthcare system, while simultaneously heightening the standards of patient care by facilitating evidence-based medical decisions. The proper integration of POCT information into diagnosis and treatment will effectively reduce mortality and morbidity rates worldwide. Immediate feedback is medically necessary and helpful to assess patient compliance, guide and titer therapies, and encourage helpful new behaviors. Such biofeedback methods have proven remarkably effective in diabetes patients utilizing at-home blood sugar measurements, and in hypertensives who use automated at-home blood pressure measurement devices.



The DCA Vantage™ Analyzer, a point-of-care immunoassay analyzer for diabetes management, tests for glycosylated hemoglobin (HbA1c), Microalbumin/Creatinine and Albumin-to-Creatinine ratio, thereby enabling the accurate monitoring of a patient's glycemic levels. Further, the unit enables clinicians to provide early detection of kidney disease, the most common complication in patients with diabetes. In addition, there is an onboard Glomerular filtration rate (GFR) calculator to assist in kidney

disease staging. The unit helps physicians to encourage patient compliance by delivering actionable test results during a patient visit.

In the United States, the direct costs of diabetes includes \$27 billion for diabetes care, \$58 billion for chronic diabetes-related complications, and \$31 billion for excess general medical costs, totaling \$116 billion. [American Diabetes Association, <http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp>; accessed 7 July 2009.]

Estimating that 25% of the direct costs relate to the daily monitoring of the condition, as well as long-term supervision to avert further complications from diabetes, this POCT apparatus may save \$29 billion or more.

[Immediate feedback of HbA1c levels improves glycemic control in Type 1 and insulin-treated Type 2 diabetic patients. Cagliero E, Levina DV, Nathan DM. *Diabetes Care* 1999;22:1785-9.]

Near patient testing in diabetes clinics: appraising the costs and outcomes. Grieve R, Beech R, Vincent J, Mazurkiewicz J. *Health Technol. Assess.* 1999;3(15):1-74.]

[Siemens Healthcare Diagnostics, http://diagnostics.siemens.com/webapp/wcs/stores/servlet/PressReleaseView~q_catalogId~e_-111~a_catTree~e_100011,13839~a_langId~e_-111~a_pageId~e_94209~a_storeId~e_10001.htm; accessed July 1, 2009.]

“Point-of-care testing (POCT) is becoming a major force in the future evolution of healthcare,” writes Michael Bissell, from Ohio State University Medical Center, College of Medicine and Public Health, The Ohio State University (Columbus Ohio, USA). He further states that: “It has the potential to expand further by increasing the accessibility, speed and accuracy of results.”

[Bissell M, Sanfilippo F. Empowering patients with point-of-care testing. *Trends Biotechnol.* 2002 Jun;20(6):269-70.]

Indeed, the global Point-of-Care Testing market represents a tremendous and imminent evolution of diagnostic assessment, with prospects for even greater expansion of accessibility, speed, and accuracy of results expected in the next 2 to 10 years. Both noninvasive and minimally invasive POCT technologies are projected to continue to expand. According to an IntelLab Corporation industry report distributed by Life Science Intelligence (LSI), the worldwide Point-of-Care Testing (POCT) market is forecast to grow from \$10.3 billion in 2005 to \$18.7 billion by 2011. Due to an increasing adoption of self-testing products by individuals, as well as increasing physician demands for more efficient testing approaches, POCT is experiencing robust market share growth, outpacing the overall in-vitro diagnostics market at a significant rate

[http://www.redorbit.com/news/health/1090009/global_pointofcare_testing_market_forecasted_to_grow_to_over_187/index.html; accessed 1 July 2009.]



We propose funding for development of a comprehensive, all-in-one POC laboratory testing device which will measure a set of standardized medical biomarkers of aging and thus enable the very early detection risk factors for aging-related disease. Such biochemical laboratory markers would include simple self-tests for:

- Chronic stealth infections
- Hormone deficiencies associated with aging
- Immune function
- Antioxidant levels
- Inflammatory markers of metabolic disease: including C-Reactive Protein
- HbA1C, a blood marker for Stage 1 Diabetes
- DNA breakdown products
- Mitochondrial function
- Liver and kidney function
- Very early detection of cancer
- Very early identification of dementia including Alzheimer's Disease, via automated cognitive testing and psychometric evaluation

II. Biomarkers of Aging and Health Measurement

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 5 years/person

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: US\$ 119.5 Billion

Based on the following assumptions:

I. Heart disease and stroke – saves \$87.6 Billion

- Coronary heart disease and stroke are the first and third leading causes of death in the United States and major causes of disability. The American Heart Association and the American Stroke Association estimate that the total direct and indirect cost of cardiovascular disease (CVD) in the United States in 2007 was \$438 billion. Much of the burden of heart disease and stroke could be eliminated by preventing or reducing 7 major risk factors — high blood pressure, high cholesterol, obesity, tobacco use, diabetes, physical inactivity, and poor diet . For example, a reduction in systolic blood pressure of 12 to 13 mm Hg over 4 years of follow-up can reduce heart attacks by 21%, strokes by 37%, and all deaths from coronary vascular disease by 25% . Furthermore, a 10% decrease in total cholesterol may reduce the incidence of coronary heart disease by as much as 30%. [Matson Koffman D, Granade SA, Anwuri VV. “Strategies for establishing policy, environmental, and systems-level interventions for managing high blood pressure and high cholesterol in health care settings: a qualitative case study.” *Prev Chronic Dis* 2008;5(3). http://www.cdc.gov/pcd/issues/2008/jul/07_0218.htm; accessed 22 July 2009.]
- Biomarkers program promotes very early, highly accurate CHD/stroke detection, slashing number/cost of cases by 20%

II. Cancer – saves \$8.71 Billion

- In 2004 in the US, \$72.1 Billion was spent on cancer treatment, up 75% from 1995 spending. An additional \$15 billion was spent on cancer screenings in 2004. [“Cancer Trends Progress Report,” http://progressreport.cancer.gov/doc_detail.asp?pid=1&did=2007&chid=75&coid=726&mid=v; accessed 22 July 2009.]
- Biomarkers program promotes very early, highly accurate cancer detection. Reduce/supersede 10% of cancer screenings and eliminate cases/decrease treatments by 10%

III. Type-2 Diabetes – saves \$23.2 Billion

- In the United States, the direct costs of diabetes includes \$27 billion for diabetes care, \$58 billion for chronic diabetes-related complications, and \$31 billion for excess general medical costs, totaling \$116 billion. [American Diabetes Association, <http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp>; accessed 7 July 2009.]
- Biomarkers program promotes very early, highly accurate type-2 diabetes detection, slashing number/cost of cases by 20%.

A common misconception about the aging process is that aging is synonymous with illness. On the contrary, in the past decade, scientists have discovered that many chronic conditions need not be a natural consequence of aging. Indeed, there are two principal factors responsible for the onset and severity of many chronic degenerative conditions: one’s genetic makeup (see Point # VII, below), and lifestyle. Lifestyle modification is ultimately the goal of a program of Biomarkers of Aging and Health Measurement.

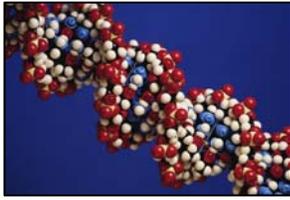
A Biomarkers of Aging and Health Measurement program aims to extend independent living by accomplishing two primary objectives, namely:

1. Prolong vitality, by retarding or reversing the biological deterioration processes that are most often experienced by people once they reach 40 and beyond; and
2. Postpone disability, by reducing the risk for preventable chronic conditions, such as heart disease, Type-2 diabetes, hypertension, osteoporosis, memory and cognitive decline, and more.

There are two types of age: chronological and biological. Chronological age is reflected by the number of candles on your birthday cake, or – put otherwise, the odometer reading on a car. Biological age is reflects one’s functional performance, as compared to others of the same age. A Biomarkers of Aging and Health Measurement program establishes a set of reliable objective scientific markers to quantify biological age.

It is generally accepted that there are several aspects of biological age that can be beneficially altered, ranging from muscle mass to strength to bone density to inflammatory proteins. Thus, a complete, state-of-the-science Biomarkers of Aging and Health Measurement program must include both laboratory markers and physical parameters. There remains some debate on the exact parameters to measure, but the following table presents the biological markers found by anti-aging physicians to be of critical importance in prolonging vitality and postponing disability:

Laboratory Markers	Physical Biomarkers
• Mitochondrial energy production	• Body composition and body fat
• Production of intrinsic intracellular antioxidant molecules (demonstrating antioxidant protection/buffering capacity)	• Bone density
• Collagen crosslinking histology; intracellular matrix changes secondary to aging effects of connective tissue	• Carotid ultrasound
• Cortisol levels and diurnal variation	• EKG, R1-R2 variability, and response to stress and load
• pH of body fluids	• Peripheral vascular circulation
• Telomerase	• Cardiac output
• Human Growth Hormone (hGH)	• Pulmonary function
• Testosterone	• Brachial/popliteal and femoral.radial pulse pressures
• Estrogen	• Kidney filtration/renal function
• Progesterone	• Grip strength
• DHEA	• Memory and cognitive function (math, spatial, verbal, and visual skills), and timed test-taking performance
• Thyroid hormone	• Functional psychometric analysis
	• Psychological disposition
	• Nerve conduction velocity
	• Sensory function: including olfactory, taste, hearing, tactile, visual accommodation, and vibrational sense
	• Balance and coordination
	• Reaction time



Studies on biomarkers of aging have looked for changes in cells, hormones, genes, and even behaviors to find a predictor of the rate of aging. At the cellular level, a potential biomarker of aging may be the presence of senescence, a cellular condition associated with permanent growth arrest. It is believed that senescent cells accumulate with aging, and may even cause aging. The length of telomeres, the endcaps of

chromosomes, has been suggested as a biomarker of senescence. When, with cell division, telomeres become too short to allow the cell to continue to divide, causing the cell to become senescent, the cell reaches its maximum limited reproductive span.

In a study by University of Utah researchers testing the length of telomeres in blood DNA of 143 persons over the age of 60, it was found that subjects with shorter telomeres were 3 times more likely to die of heart disease and 8.5 times more likely to die from infectious disease than those with longer telomeres. This research supports the idea that telomere shortening affects lifespan. [Richard M Cawthon, Ken R Smith, Elizabeth O'Brien, Anna Sivatchenko, Richard A Kerber PhD. "Association between telomere length in blood and mortality in people aged 60 years or older." *Lancet*, Vol. 361 No. 9355 pp 393-395 (Feb 01, 2003).]

In May 2009, researchers from the University of California San Francisco determined that elderly people with shorter telomeres in peripheral white blood cells have fewer years of healthy life, as compared to matched counterparts with longer telomeres, suggesting that telomeres may serve as a biomarker of quality of life and independent living. [Njajou OT, Hsueh WC, Blackburn EH, Newman AB, Wu SH, Li R, Simonsick EM, Harris TM, Cummings SR, Cawthon RM; for the Health ABC study. "Association Between Telomere Length, Specific Causes of Death, and Years of Healthy Life in Health, Aging, and Body Composition, a Population-Based Cohort Study." *J Gerontol A Biol Sci Med Sci*. 2009 May 12. [Epub ahead of print].]

At a landmark speech presented at the American Medical Association's annual meeting in June 2009, President Obama explained that "a recent study found that only half of all cardiac guidelines are based on scientific evidence -- half. That means doctors may be doing a bypass operation when placing a stent is equally effective; or placing a stent when adjusting a patient's drug and medical management is equally effective -- all of which drives up costs without improving a patient's health. ["Why reform, why now"; <http://www.whitehouse.gov/blog/Why-Reform-Why-Now/>; accessed 21 July 2009.]



We propose the establishment and deployment of a complete, state-of-the-science Biomarkers of Aging and Health Measurement program, to accurately assess biological age. Such data quantitatively demonstrates the benefits of various therapies for lifestyle intervention that may exert a positive effect on slowing or mitigating the degenerative process of aging. Indeed, a comprehensive "Age Test" Assessment Panel would yield invaluable life-improving, and possibly life-saving, data and allow for the rapid identification of true anti-aging drugs and therapies. This "Age Test" Assessment Panel could be deployed across the population, thus making it possible to judiciously allocate resources wisely and efficiently, focusing particularly on those who can benefit most in terms of diagnosis and prevention.

III. Free Biannual Comprehensive Metabolic Testing

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 3 years/person

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: \$154.6 Billion

Based on the following assumptions:

I. Type-2 Diabetes – saves \$23.2 Billion

- In the United States, the direct costs of diabetes includes \$27 billion for diabetes care, \$58 billion for chronic diabetes-related complications, and \$31 billion for excess general medical costs, totaling \$116 billion. [American Diabetes Association, <http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp>; accessed 7 July 2009.]
- Prevention may slash costs by 20%

II. Metabolic Syndrome – saves \$131.4 Billion

- Metabolic Syndrome is a group of health risk factors that are associated with cardiovascular (CVD) disease and diabetes. Factors include enlarged waist circumference, high blood pressure, elevated triglycerides, low HDL (“good”) cholesterol, and high fasting glucose levels.
- Metabolic syndrome is estimated to affect 47 million Americans, 25% of the total population. [http://www.nhlbi.nih.gov/health/dci/Diseases/ms/ms_what.html; accessed 22 July 2009.]
- Metabolic Syndrome is a primary cause of cardiovascular disease (CVD), which affects 80 million American adults. [“Heart Disease and Stroke Statistics 2009, <http://www.americanheart.org/presenter.jhtml?identifier=3037327>; accessed 22 July 2009.] Direct and indirect cost of CVD in the United States in 2007 was \$438 billion. [Matson Koffman D, Granade SA, Anwuri VV. “Strategies for establishing policy, environmental, and systems-level interventions for managing high blood pressure and high cholesterol in health care settings: a qualitative case study.” *Prev Chronic Dis* 2008;5(3). http://www.cdc.gov/pcd/issues/2008/jul/07_0218.htm; accessed 22 July 2009.]
- Metabolic Syndrome is a primary cause of diabetes, which affects 23.6 million Americans, 8% of the total population. [<http://www.diabetes.org/diabetes-statistics.jsp>; accessed 22 July 2009.] Direct and indirect costs of diabetes total \$116 billion annually. [American Diabetes Association, <http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp>; accessed 7 July 2009.]
- Thus, we project the costs of Metabolic Syndrome to be half the costs of CVD, or \$219 Billion; plus double the costs diabetes, or \$232 billion.
- Prevention may slash costs by 20%.

The goal of anti-aging medicine is not to merely prolong the total years of an individual's life, but to ensure that those years are enjoyed in a productive and vital fashion. When the field of anti-aging medicine was created with the establishment of The American Academy of Anti-Aging Medicine (A4M; www.worldhealth.net) in 1992, anti-aging medicine was very much based as a direct extension of sports medicine. Just as sports medicine aims to keep the athlete's body functioning at its optimum level, anti-aging medicine seeks to keep the body functioning at its peak. In other words, the similar principle, of extending and maximizing the healthy human lifespan, is at the core of both anti-aging medicine and sports medicine.

In that anti-aging medicine and sports medicine share many core principles, the latter lends a number of basic functional tenets with the former. Metabolic testing, comprised of a battery of individual tests, compiles data that helps to effectively train and treat endurance athletes.

Metabolic testing typically assesses:

1. **VO₂ Fitness:** Ascertain one's VO₂max, or the maximum amount of oxygen that can be consumed each minute during exercise. It is an indicator of cardiopulmonary fitness and a predictor of endurance potential.
2. **Anaerobic Threshold (AT):** Represents the transition from predominantly aerobic to predominantly anaerobic metabolism in the working muscles. Also known as the lactate or ventilatory threshold. AT signifies the point at which there is a sudden increase in CO₂ production, ventilation, and blood lactate levels. Maximum athletic performance is reached when one's anaerobic threshold is at a high percentage of their VO₂max.
3. **Aerobic Threshold (AeT):** Signifies the point when the active muscles begin to use more glycogen than fatty acids to provide energy during exercise. This occurs at about 60-65% of VO₂max in a well trained athlete. Training close to the aerobic threshold teaches the body to rely on and after adaptations that occur following training, store more triglycerides within the muscle and increase the amount of oxygen getting into the muscle.
4. **Resting Metabolic Rate (RMR):** Measures one's VO₂ at rest determines your RMR or the amount of calories you need to maintain the body's vital functions at rest. Very relevant for determining individual metabolism and balancing one's caloric intake to shed excess weight.

The concept of metabolic testing in sports medicine can be transferred to apply to the anti-aging medical setting. In doing so, anti-aging medicine establishes Comprehensive Metabolic Testing (CMT) to provide an immediate accurate medical snapshot of one's functional health. Indeed, CMT aims to address the growing epidemic of overweight/obesity, arguably one of the most significant health issues today. A primary and direct result of the increasingly sedentary western lifestyle, overweight/obesity is associated with increased rates of cardiovascular disease, cancers, diabetes, kidney disease, and other serious medical conditions. As such, CMT promotes the ability of physicians to construct specific therapeutic recommendations to delay or treat metabolic disorders, including Metabolic Syndrome X, prediabetes, diabetes, hyperlipidemia, and more. A proactive CMT program also may enable very early cancer detection, potentially identifying the disease at stage I when almost all cancers are 95% curable.



High blood glucose is now identified as a predominant cause of deaths in the United States. Previously, prospective studies have shown significant associations between fasting plasma glucose and mortality, and underlying metabolic dysfunction has often complicated a clear assessment of the role of high blood glucose levels on the risk of death. Goodarz Danaei, from Harvard School of Public Health (Massachusetts, USA), and colleagues scoured data on risk factor exposures in the US population from

nationally representative health surveys and disease-specific mortality statistics from the National Center for Health Statistics. The team assessed a set of twelve dietary, lifestyle, and metabolic risk factors in causes of preventable death, and found that high blood glucose levels were more perilous than high HDL cholesterol, high intakes of dietary salt, low omega-3 levels, high trans-fat intake, alcohol use, and low levels of fruit and vegetable consumption. By the group's calculations, up to 217,000 mortalities in 2005 were attributable to elevated blood glucose, and these deaths could have been avoided by proper lifestyle interventions. [Danaei G, Ding EL, Mozaffarian D, Taylor B, Rehm J, Murray CJ, Ezzati M. "The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors." *PLoS Med.* 2009 Apr 28;6(4):e1000058. Epub 2009 Apr 28.]

Twice-yearly CMT establishes the effectiveness of any self-care program. First, an initial CMT measurement (conducted prior to start of therapies) establishes baseline; follow-up CMT documents progress of deployed therapies. CMT also renders an insightful snapshot to promote aging-related disease prevention, in those individuals with the capacity for self-care.



We propose the establishment of a Twice-yearly Comprehensive Metabolic Testing program, comprised of parameters including:

- Body Mass Index, a measurement of one's weight in relation to one's height
- Body Fat Distribution, identifying where fat is stored in the body (those with body fat above the hips generally have a higher risk for developing heart disease, stroke, and diabetes (as compared to those storing fat below the hips))
- Basal Metabolic Rate, a measure of one's caloric expenditure at-rest
- Glucose Tolerance, reflecting insulin sensitivity and the risk of Type-2 diabetes
- Aerobic capacity, including VO₂max, AT, and AeT

When subsidized by national government, a free biannual Comprehensive Metabolic Testing program minimizes the onset and/or severity of metabolic disorders, including Metabolic Syndrome X, prediabetes, diabetes, hyperlipidemia, certain cancers, and more. Such a population-wide CMT program also greatly augments quality of life by sparing individuals from these life-draining diseases.

IV. 24/7 Telemedicine Consultation Access

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 3 years/person **PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: \$400 billion/year savings**

Basis for projection: “Telehealth-supported innovations in offer the potential for yielding significant savings in the U.S. health care system--by some estimates, annual savings of 20 percent or more (Deloitte, 2008). That would amount to \$400 billion a year. [Moore R., American TeleCare, Inc. “Prevention priorities for telehealth in health system reform.” Caring. 2009 Mar;28(3):26-9.]

With the near-universal distribution and implementation of computerized information processing and high-speed Internet connectivity, it is now possible for most individuals to access medical consultations with physician experts in various medical specialties, via telemedicine. Telemedicine encourages equitable accessibility to specialty diagnostic personnel and services, enabling those residents in rural areas to secure the highest quality care typically offered at metropolitan, university-affiliated hospitals.

Telemedicine uses advanced telecommunication technologies to exchange health information and provide health care services across geographic, time, social, and cultural barriers. Telemedicine encompasses computer technologies using narrow and high bandwidths for specific types of information transmission, broadcast video, compressed video, full motion video, and even virtual reality. There are many types of common medical devices that have been adapted for use with telemedicine technology, and many clinical services can be provided via telemedicine to patients who live in physician shortage areas. [Myers MR. “Telemedicine: an emerging health care technology.” Health Care Manag (Frederick). 2003 Jul-Sep;22(3):219-23.]



Telemedicine is particularly promising in the area of reduction of acute care and long-term disability costs. Many elderly have health issues which make falling a significant likelihood. Falls may result from a variety of conditions such as mobility, difficulty from arthritis, vertigo from poor circulation, negative reactions to medication, etc. whatever the cause, more than one third of seniors will fall 1n a given year. This means that in the

U.S. alone, 12 million seniors will fall this year. [Otto CA, Chen X. “Automated fall detection: saving senior lives one fall at a time.” Caring. 2009 Mar;28(3):44-6.] An estimated 15% of the community-dwelling elderly who fall sustain a serious injury. In a study by a team at the Research Centre on Aging, Sherbrooke Geriatric University Institute, Department of Kinesiology (Canada), deployed an algorithm to detect fall events during simulated fall conditions with a success rate of 93% . The researchers comment that: “Reliable automated fall detection can increase confidence in people with fear of falling, promote active safe living for older adults, and reduce complications from falls.” [Boissy P, Choquette S, Hamel M, Noury N. “User-based motion sensing and fuzzy logic for automated fall detection in older adults.” Telemed J E Health. 2007 Dec;13(6):683-93.]

While it is undeniable that telemedicine contributed to the improvement of the prevention, diagnostic and treatment of disease, as well as the access to health care [...] it is not enough that things are technically possible and medically desirable to be simple. Telemedicine faces, as do most other radical technological innovations, cultural, structural, economical, organizational and legal obstacles that undermine its full deployment. [Yaya S, Raffelini C. "Technological transformations and evolution of the medical practice: current status, issues and perspectives for the development of telemedicine." Rev Med Brux. 2009 Mar-Apr;30(2):83-91.] Indeed, by eliminating restrictive archaic and monopolistic traditional regulatory barriers, and utilizing the existing computing technologies and infrastructure, it is possible to provide low-cost, high-tech healthcare to almost all members of the developed world.

On July 15, 2009, UnitedHealth Group Inc. the country's second-largest health insurer, and Cisco Systems Inc. announced a partnership to build a network linking patients and physicians across the country via video and medical-information technology. The announcement comes on the heels of other big moves in the telemedicine field, including an alliance formed by Intel Corp. and General Electric Co. in April to invest more than \$250 million over five years in technology to help care for the elderly and chronically ill in their homes remotely. According to market-research firm Datamonitor, the U.S. telemedicine market is expected to grow to more than \$6 billion by 2012 from \$900 million in 2007. [UnitedHealth, Cisco to Build Telehealth Network, <http://online.wsj.com/article/SB124768777882847287.html>; accessed 15 July 2009.]

Indeed, telemedicine will be a major force multiplier in healthcare, substantially increasing the ability for patients to have unencumbered access to their choice of medical specialists, irrespective of geographic, time, social, and cultural considerations. The technology will also significantly lower the price point for a specialty consultation, slashing it an estimated three- to five-fold as compared to today's in-office consultation rates.

"Telemedicine is the common element to make reform succeed," observes Ronald Merrell, Professor of Surgery, Virginia Commonwealth University. "Telemedicine involves stunning new technologies that go well beyond just using electronic health records, which can ensure both quality care and cost savings if this technology is widely applied throughout health systems. Telemedicine applications have been tested and proven through years of research and are ready for scalable expansion to serve the entire country and make healthcare reform a reality and a success." [<http://goodnewsarchive.blogspot.com/2009/06/nationwide-telemedicine-networks-are.html>; accessed 14 July 2009.]



We propose the development of a nationwide telemedicine platform for advanced preventive medicine, to include features such as:

- Electronic medical records database, to warehouse patient data in a central, secure location
- Moderate-resolution real-time diagnostic imaging
- High-resolution diagnostic snapshot teleimaging
- Virtual reality disease modeling and simulation
- Secure, fast, and reliable Internet connectivity to link specialists together, and to link the patient to specialist(s)
- All of the above to comply with HIPAA (Health Insurance Portability and Accountability Act) regulations

V. Aging Intervention Drugs

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 3 years/person

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: US\$ 39.2 Billion

Based on the following assumptions:

- In 2007 in the United States, six major diseases (chronic lung disease, ischemic heart disease, stroke, lung cancer, pneumonia and gastrointestinal illness) among Americans ages 65+ resulted in medical and lost productivity costs of more than \$196 billion. [RTI International, October 22, 2008; reported by Washington Post, 30 October 2008/]
- Aging intervention drugs have the potential to reduce medical and lost productivity costs of the leading diseases plaguing older Americans by 20%

According to the Pharmaceutical Researchers and Manufacturers Group of America, PhRMA, there are now more than 900 pharmaceutical drugs currently under development specifically to treat aging-related disorders and modulate the metabolic dysfunctions associated with old age, including:

- 146 for heart disease and stroke, the nation's #1 killer
- 399 for cancer, the second-leading cause of death in the US
- 27 for Alzheimer's disease, projected to affect upwards of 16 million people worldwide
- 19 for depression, which affects an estimated 6.5 million Americans 65 and older.
- 48 for diabetes, of which half of all cases occur in people over age 55.
- 20 for osteoporosis, a major health threat for an estimated 44 million Americans age 50 and older.
- 17 for Parkinson's disease, 60,000 new cases of which are diagnosed each year.
- Dozens of other medicines are in-development target bladder and kidney diseases, eye disorders, gastrointestinal disorders, osteoarthritis, pain, prostate disease, respiratory and lung disorders, rheumatoid arthritis, skin conditions and other conditions of aging.

[“2005 Survey: Medicines In Development for Older Americans,” Pharmaceutical Researchers and Manufacturers Group of America, <http://www.phrma.org/files/New%20Meds%20for%20Older%20Americans.pdf>; accessed 14 July 2009.]



Anti-aging physicians typically treat disorders including:

- Hormone deficiencies, including menopause
- Joint and bone disorders
- Cardiovascular disease
- Obesity/overweight
- Diabetes
- Sexual dysfunction
- Mood disorders, including depression and anxiety

As such, anti-aging physicians write a wide assortment of prescriptions for drugs that relate to specific conditions commonly found with aging. The A4M estimates a breakdown by-category as follows:

Rx Category	Number of Prescriptions	Percentage
	Written (per 1,000 Rxs)	of Total
Hormones	300	30%
Cardiovascular Agents	260	26%
Antiarthritic/Analgesic Agents	180	18%
Dermatologicals	90	9%
Respiratory Agents	50	5%
Central Nervous System Agents	40	4%
Anti-infective Agents	30	3%
Gastrointestinal Agents	20	2%
Sexual Dysfunction Agents	15	1.5%
Anticancer Agents	10	1%
Other	5	0.5%

Of the Top Twenty (highest selling) drugs in the nation (2007), six may be considered as anti-aging pharmaceuticals:

Rank	Product	US Sales (U.S.\$ Billions)	Purpose
1	Lipitor	\$ 6.165	Elevated cholesterol
2	Nexium	\$ 4.355	Gastrointestinal discomfort
3	Advair Diskus	\$ 3.390	Breathing difficulties
5	Plavix	\$ 3.082	Prevent blood clots
7	Seroquel	\$ 2.518	Depression
20	Celebrex	\$ 1.416	Arthritis

[<http://www.drugs.com/top200.html>; accessed 14 July 2009.]

Additionally, the remaining Top Ten (highest selling) prescription medications also crossover as anti-aging medicines:

Rank	Product	US Sales (U.S.\$ Billions)	Purpose
4	Prevacid	\$ 3.315	Gastrointestinal discomfort
6	Singulair	\$ 2.863	Breathing difficulties
8	Effexor XR	\$ 2.464	Depression and anxiety
9	Lexapro	\$ 2.304	Depression
10	Actos	\$ 2.229	Blood sugar regulation

[<http://www.drugs.com/top200.html>; accessed 14 July 2009.]

The pharmaceutical industry approach to aging parallels that of the anti-aging medical specialty. Many of the drugs that are available today, and those 900 new drugs in-development to treat aging-related disease, are core products in the anti-aging medical approach to healthcare. With the continued rise in longevity and steady increase in the older population, anti-aging medicine represents an essential and expanding arena for drug discovery and development. In other words, the newfound economic opportunities afforded by aging intervention will bring a financial boon to the pharmaceutical industry that propels anti-aging as a direct and targeted effort, rather than a low-priority objective.

Dr. Valter Longo and colleagues at University of Southern California remarked that viable techniques to extend the human lifespan by 20 years or more could be "standard procedure 30 or 40 years down the road," but by prompting "as many people as possible to get into this novel way of looking at disease prevention, anti-aging drugs could be available in the next ten years." [Valter D. Longo and Caleb E. Finch "Evolutionary Medicine: From Dwarf Model Systems to Healthy Centenarians?" *Science* 28 February 2003 299: 1342-1346 [DOI: 10.1126/science.1077991].]



For all practical purposes, the authors submit that a primary segment of the pharmaceutical industry arguably is involved in discovering, developing, and bringing to-market drugs that ameliorate the disorders and diseases referable to the aging condition. Thus, we urge the nation to address a critical two-fold problem in the arena of drug development for aging intervention, namely that:

1. Establish a category of drugs under the terminology "aging intervention pharmaceuticals." Doing so will promote directed and focused research into aging intervention, as compared to the serendipitous discoveries on which anti-aging pharmaceutical therapeutics currently relies. The new category of "aging intervention pharmaceuticals" will also mandate governmental regulatory bodies to recognize drugs to treat the aging process and condition itself, thereby promoting safety of prescription and use.
2. Fast-track the discovery, development, and approval process for aging intervention pharmaceuticals. At present, this process is arduous, tedious, and extremely time-consuming. PhRMA reports that it takes 10-15 years on average for an experimental drug to travel from the lab to US patients. Only five in 5,000 compounds that enter preclinical testing make it to human testing. One of these five tested in people is approved. ["2005 Survey: Medicines In Development for Older Americans," Pharmaceutical Researchers and Manufacturers Group of America, <http://www.phrma.org/files/New%20Meds%20for%20Older%20Americans.pdf>; accessed 14 July 2009.] With projections estimating that by the year 2050, the older population in the United States will account for 21% of the total national population. [U.S. Administration on Aging (www.aoa.gov)]. It is thus critical to expedite the process of discovery, development, and approval process for aging intervention pharmaceuticals.

VI. Stem Cells, Nanotechnology, Genetic Engineering

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: 4-12 years

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: US\$ 197.1 Billion

Based on the following assumptions:

- Three leading causes of death in the US (2006) are as follows:
 - Heart disease: 631,636 deaths
 - Cancer: 559,888
 - Stroke (cerebrovascular diseases): 137,119[“Leading causes of death,” US CDC FastStats, <http://www.cdc.gov/nchs/FASTATS/lcod.htm>; accessed 22 July 2009.]
- CVD and stroke cost \$438 billion in direct and indirect costs. [Matson Koffman D, Granade SA, Anwuri VV. “Strategies for establishing policy, environmental, and systems-level interventions for managing high blood pressure and high cholesterol in health care settings: a qualitative case study.” *Prev Chronic Dis* 2008;5(3). http://www.cdc.gov/pcd/issues/2008/jul/07_0218.htm; accessed 22 July 2009.]
- Cancer costs \$219 billion in direct and indirect costs. [<http://www.cdc.gov/cancer/npcr/about.htm>; accessed 22 July 2009.]
- Biomedical technologies could slash the number of cases, or forestall the onset, of CVD, stroke, and cancer by 30%

Thanks to the near-daily advancements in biomedical technologies, near-miraculous medical breakthroughs are now occurring practically every day. The three most promising biomedical technologies that offer an exciting potential for cures of previously incurable conditions, such as stroke, cancers, diabetes, Alzheimer’s Disease, Parkinson’s disease, arthritis, blindness, spinal cord injury, paraplegia, ALS and other crippling neuromuscular disorders associated with the aging process, are:

1. Stem Cells: Stem cells are unspecialized cells that can be induced, under certain physiologic or experimental conditions, to become tissue- or organ-specific cells with special functions. Stem cells also have the unique capacity to renew themselves through cell division, sometimes after long periods of inactivity. As such, stem cells have a remarkable potential to develop into many different cell types in the body. Of particular scientific interest is human embryonic stem cells, which are derived from human embryos and grown in the laboratory, as they have been found to possess therapeutic capacities via use as cell-based therapies. On March 9, 2009, President Obama issued Executive Order (EO) 13505, entitled “Removing Barriers to Responsible Scientific Research Involving Human Stem Cells,” changing the mandates regarding federal support of human stem cell research. The Executive Order states that the Secretary of Health and Human Services, through the Director of National Institutes of Health (NIH), may support and conduct responsible, scientifically worthy human stem cell research, including human embryonic stem cell (hESC) research, to the extent permitted by law and conducted in an ethically responsible and legal fashion. [<http://stemcells.nih.gov/index.asp>; <http://stemcells.nih.gov/policy/2009guidelines.htm>; accessed 15 July 2009.]

In May 2009, Salk Institute (La Jolla, California) researchers discovered a way to utilize gene therapy to correct genetically diseased cells, to reprogram them to become stem cells capable of forming any tissue in the body. Hailed as a major demonstration of the merging of gene therapy with stem cell technology, this advancement represents a major advancement in addressing the problem of supplies of stem cells. Juan Carlos Izpisua Belmonte, from the Salk

Institute, and team harvested fibroblast cells from the skin of patients with the bone marrow disease Fanconi anaemia, then used standard gene-therapy viruses to replace the defective genes with normal ones. The researchers then used a second virus to "reset" the cells to their embryonic condition. These induced pluripotent stem cells, or iPS cells, are capable of differentiating into any of the tissues of the body. Indeed, the researchers showed that given the right stimuli, their iPS cells differentiated into disease-free progenitors of bone marrow stem cells. This technique offers a promise of limitless supplies of genetically healthy stem cells derived from each individual patient. With those cells – and the know-how to transform them into whatever tissue is needed – new treatments could emerge for a wide variety of genetic defects\.

[Nature DOI: 10.1038/nature08129, reported by <http://www.newscientist.com/article/dn17214-diseased-cells-transformed-into-healthy-stem-cells.html>; accessed 16 July 2009.]

In animal models of human disease, stem cells extend life and delay disease. In October 2006, Neuralstem, Inc. reported that human neural stem cells (hNSCs) significantly extended the lives of rats with a genetic mutation that gives them a disease analogous to amyotrophic lateral sclerosis (ALS), and delayed disease onset. In the study, conducted at the Johns Hopkins University Medical Institutes, laboratory-grown human neural stem cells (hNSCs) isolated from a fetal spinal cord region were grafted into the spinal cord of 16 rats with a genetic mutation (SOD1 G93A) that gives them a disease like a particularly aggressive form of ALS. An additional 11 SOD1 rats constituted the placebo group. At the end of the study, the hNSCs showed robust engraftment into their host environment and excellent long-term survival. 70.4 percent had differentiated into neurons. Additionally, the human NSCs made synaptic contact with, and were able to release motor neuron growth factors to, the host motor neurons. The rats transplanted with hNSCs lived an average 11 days longer (149 days versus 138 days) than the placebo group and experienced disease onset by an average of 7 days later (122 days versus 115 for the placebo group). “These stem cells not only survived in an extremely adverse environment, but may have actually produced and delivered motor neuron growth factors, which promote growth and function, to the sick motor neurons,” said Dr. Vassillis E. Koliatsos, whose lab conducted the study. “Beyond the clinical results of extended life span, the possibility that the presence of these stem cells may have aided degenerating neurons is very promising.” “This is the first time we have seen evidence that human neural stem cells can be effective in delaying the onset of ALS in an animal model,” said chief scientific officer Dr. Karl Johe, a co-author of the study. “Previous studies seemed to indicate that stem cells were not able to differentiate into neurons in the spinal cord and therefore would not be useful for treating spinal cord diseases. In contrast, our transplanted stem cells were able to differentiate robustly into mature neurons and to provide significant functional benefit.”

[<http://www.stemcellresearchnews.com/absolutenm/anmviewer.asp?a=315&z=5>; accessed 15 July 2009.]

2. *Nanotechnology*: Nanotechnology is the creation of useful materials, devices, and systems through the manipulation of matter on a scale of a billionth of a meter (1/80,000 of the width of a human hair). Nanomedicine applies nanotechnology to manipulate human biology at its most cellular level, by employing a variety of nanodevices to enter cells and conduct specific therapeutic objectives. Nanotechniques may be our most promising armament to eradicate stubborn diseases such as cancer and diabetes. Indeed, the National Cancer Institute reports that nanodevices in-development hold potential to improve cancer detection, diagnosis, and treatment:

- **Cancer detection**: Detection of cancer at early stages is a critical step in improving cancer treatment. Currently, detection and diagnosis of cancer usually depend on changes in cells and tissues that are detected by a doctor's physical touch or imaging expertise. Instead, scientists would like to make it possible to detect the earliest molecular changes, long before a physical exam or imaging technology is effective. To do this, they need a new set of tools.

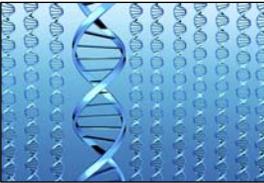
- Improve Testing Speed: Miniaturization will allow the tools for many different tests to be situated together on the same small device. Researchers expect that nanotechnology will allow them to run multiple diagnostic tests simultaneously.
- Treatment sensitivity: In order to successfully detect cancer at its earliest stages, scientists must be able to detect molecular changes even when they occur only in a small percentage of cells. This means the necessary tools must be extremely sensitive. The potential for nanostructures to enter and analyze single cells suggests they could meet this need.

[<http://www.cancer.gov/cancertopics/understandingcancer/nanodevices>; accessed 15 July 2009.]

In December 2008, Massachusetts Institute of Technology (MIT) researchers reported the development of a drug-delivery system using gold nanoparticles that, when exposed to infrared light, can release delivers up to four drugs, and can be controlled externally. When exposed to infrared light, the gold nanoparticles melt, releasing drug payloads attached to their surfaces. The new technique, holds promise to providing better control of diseases commonly treated with more than one drug, suggest the researchers; [“Team designs gold nanoparticles to deliver multiple drugs,” <http://www.healthfinder.gov/news/newsstory.aspx?docid=622828>, accessed 15 July 2009.]

3. Genetic engineering: Genetic engineering allows scientists to extract DNA genetic material, from one type of organism and combine them with genes of a second organism. In this way, relatively simple organisms such as bacteria or yeast can be induced to make quantities of human proteins to promote immune function; as well as proteins to develop vaccines.

[www.cancer.gov/cancertopics/understandingcancer/immunesystem/allpages; accessed 15 July 2009.]



Major medical breakthroughs in stem cell therapies, nanotechnology, and genetic engineering are occurring at a rapid pace. These biomedical technologies offer a promise of cures for crippling and debilitating disorders associated with the aging process:

In February 2009, Michel F. Levesque, from the Los Angeles Neurological Institute, and colleagues reported on the long-term successful effect of stem cell therapeutics to ameliorate the debilitating symptoms of Parkinson’s Disease (PD) in a human patient. In the case, a male subject with advanced PD, the researchers obtained cortical and subcortical tissue samples, isolated and expanded them in vitro for several months, and at nine months after harvesting, microinjected autologous cell suspensions containing differentiated dopaminergic and GABAergic neurons into the brain. Over the next 36 months, the overall Unified Parkinson’s Disease Rating Scale (UPDRS) improved by 81% while “on” medication and 83% while “off” medication. At five-years post-operatively, clinical motor scores returned to baseline. At three and twelve months post-operatively, dopamine uptake increased markedly in the implanted left putamen. [Michel F. Levesque, Toomas Neuman, Michael Rezak. “Therapeutic Microinjection of Autologous Adult Human Neural Stem Cells and Differentiated Neurons for Parkinson’s Disease: Five-Year Post-Operative Outcome.” *The Open Stem Cell Journal*, Volume 1, pp.20-29 (10); doi: 10.2174/00000.]

On July 1, 2009, Eduardo Marbán, from Cedars-Sinai Heart Institute in Los Angeles, and colleagues reported the first-in-man transplant of autologous stem cells derived from heart tissue as part of a phase I trial. In a novel technique developed by Dr. Marbán, a small piece of myocardial tissue is harvested through a catheter placed in the jugular vein under local anesthesia. Extensive preprocedural imaging is used to target the location and severity of scarring

in the heart. The heart biopsy sample is cultured over a period of about four weeks until approximately 10 to 25 million cells are available for reimplantation into the coronary arteries. In this initial patient, a 39-year old man who suffered a heart attack on May 10, caused by a 99% blockage in the left anterior descending artery that left scarring over 21% of the heart muscle, he received the transplant on June 26th. While all transplant patients require a minimum six-month follow-up to definitively establish results, the researchers are hopeful that this represents a landmark in progress in clinical stem cell therapeutics. [“First Stem Cell Transplant Directly from Heart Tissue Reported,” <http://www.medpagetoday.com/PublicHealthPolicy/StemCellResearch/14924>; accessed 15 July 2009.]

In June 2009, two studies were published that suggest the practical application of genetic engineering in the near future. James Liao, from the University of California- Los Angeles, and colleagues published findings that suggest the utility of a molecular shunt to control weight in an animal model. The team inserted a molecular shunt into the liver cells of 94 mice, which then ate high-fat foods that mimicked a human fast-food diet; the mice with the genetically engineered shunts stayed skinny, compared with mice without the shunts. The researchers explain that the shunt, which contained an enzyme normally found in bacteria and plants but not in mammals, acted as an "artificial engine" that enabled liver cells to burn more fat. Instead of accumulating in the blood or being stored by the body, the fat was metabolized, converted to carbon dioxide and exhaled. In a separate study, Christian Bjorbaek, from Harvard Medical School, and colleagues restored blood glucose levels in obese, severely diabetic mice to normal by added leptin receptors to a particular type of neuron (pro-opiomelanocortin neurons) in the hypothalamus of the brains of mice lacking leptin, a hormone involved in appetite regulation and metabolism, and the brain receptors for it. As a result, blood glucose levels dropped to normal. In addition, the mice became more active, ate less, and lost some weight. [“Making Obese Mice Slim, Without Diet or Exercise,” <http://www.healthfinder.gov/news/newsstory.aspx?docID=627608>; accessed 15 July 2009.]



We urge national funding to encourage development of clinical applications of stem cell therapies, nanotechnology, genetic engineering, and other biomedical technologies. Additionally, it is imperative to eliminate the regulatory barriers to the widespread utilization thereof. Such encouragement will have a profound effect on the neuromuscular disorders associated with the aging process and deliver dramatic beneficial economic effects.

VII. Personalized Genetic Testing and Nutrigenomics

PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 2 years/person

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: US\$ 292.3 Billion

Based on the following assumptions:

- The leading causes of death (excluding accidents) in US totaled \$974.2 billion, as follows:
 - Heart disease and stroke: \$438 billion [Matson Koffman D, Granade SA, Anwuri VV. “Strategies for establishing policy, environmental, and systems-level interventions for managing high blood pressure and high cholesterol in health care settings: a qualitative case study.” *Prev Chronic Dis* 2008;5(3). http://www.cdc.gov/pcd/issues/2008/jul/07_0218.htm; accessed 22 July 2009.]
 - Cancer: \$219 billion [<http://www.cdc.gov/cancer/npcr/about.htm>; accessed 22 July 2009.]
 - COPD: \$176.6 billion [<http://www.medicalnewstoday.com/articles/44235.php>; accessed 22 July 2009.]
 - Diabetes: \$116 billion American Diabetes Association, [<http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp>; accessed 7 July 2009.]
 - AD: \$24.6 billion [http://alzheimers.about.com/od/financialissues/a/Costs_Alzheimer.htm; accessed 22 July 2009.]
- Genetics factor 30% into many disease conditions, with the remaining 70% attributable to lifestyle. Such is the case for Alzheimer’s disease, which was responsible for 72,432 deaths in the US and is now the 7th leading cause of death in the nation. [“Leading causes of death,” US CDC FastStats, <http://www.cdc.gov/nchs/FASTATS/lcod.htm>; accessed 22 July 2009. Dimitrios Avramopoulos. “Genetics of Alzheimer's disease: recent advances.” *Genome medicine*, Vol. 1, No. 3. (27 March 2009)]

Personalized genetic testing is performed on blood and other tissue to identify abnormalities in chromosomes, genes, or proteins, which subsequently manifest as disease. Genetic testing is helpful to:

- Detect possible genetic diseases in unborn babies
- Determine if an individual carries people carry a gene for a specific disease and might pass it on to their children
- Screen embryos for disease
- Test for genetic diseases in adults before they cause symptoms
- Confirm a diagnosis in a person who has disease symptoms

Today, an estimated 900 genetic tests are available.

The costs of individual assessment to establish one's genetic profile has dropped dramatically over the past 5 years, from US \$1 Million to stand at less than \$1,000 today. With several new promising technologies personalized genetic testing may soon become available for less than \$100 by 2012. Consequently, accurate prognostic profiles of disease in an individual will likely become quite affordable and widely accessible, thereby allowing for:

- Prospective identification of major disease processes including heart disease, cancer, diabetes, Alzheimer's Disease, etc, such that appropriate interventions may be deployed at the earliest stage possible
- Tailored selection of prescription medications and nutritional therapies, improving efficacy and safety, while reducing waste and delaying treatment

As for the psychological effects of being advised of a risk for a disease, a study published in July 2009 finds no increase in anxiety or depression at receiving such news. Researchers involved in the Risk Evaluation and Education for Alzheimer's Disease (REVEAL) Study, recruited subjects who had a parent or sibling suffering from Alzheimer's Disease (AD) and who signed up to learn about their apolipoprotein E (APOE) genotype, which puts people with the gene variant e4 at a 3- to 15-fold increased risk of developing AD. REVEAL researchers found that those study subjects who learned they were at increased risk for AD were no more depressed, anxious, or distressed than subjects who were unaware of their APOE genotype. Further, one year after receiving the news, the 34-positive group was still no more depressed than when they started the study. In fact, 98% of the e4-positive subjects said they would still get tested if they had the choice again. [Robert C. Green, M.D., M.P.H., J. Scott Roberts, Ph.D., L. Adrienne Cupples, Ph.D., Norman R. Relkin, M.D., Ph.D., Peter J. Whitehouse, M.D., Ph.D., Tamsen Brown, M.S., Susan LaRusse Eckert, M.S., Melissa Butson, Sc.M., A. Dessa Sadovnick, Ph.D., Kimberly A. Quaid, Ph.D., Clara Chen, M.H.S., Robert Cook-Deegan, M.D., Lindsay A. Farrer, Ph.D., for the REVEAL Study Group. "Disclosure of APOE Genotype for Risk of Alzheimer's Disease," *New England Journal of Medicine*, Volume 361: Number 3, 245-254; July 16, 2009.]

Genetic testing is the gateway to nutrigenomics (nutritional genomics), an emerging science that studies how genes and nutrients interact. Nutrigenomics seeks to investigate how the foods we eat interact with our genes to affect our health. In the subfield of nutrigenetics, researchers aim to understand why and how common variations found throughout the human genome contribute to individual differences in response to dietary intake. Seeking to answer, for example, the question of why some people can eat a high fat diet and have no problem with their cholesterol levels while others experience the exact opposite response. Nutrigenomics is also concerned with investigating how nutrients and bioactive components in food turn on or off certain genes — these genes impacting important metabolic and physiologic processes in the body. For example, researchers have identified that sulforaphane molecules in broccoli can increase the transcription and translation of an enzyme in the body that assist the body to detoxify some of the harmful chemicals to which we may be exposed.



Overweight people's genes respond differently to dietary changes

The fat cells of overweight people may react differently to dietary changes than in their lean peers, reported a 2008 study by Marjan van Erk and colleagues from TNO Quality of Life. The technique is an example of nutrigenomics research, and it allowed investigation of the effect of complex mixtures of functional food ingredients on fat tissue.

The researchers recruited 10 lean and 10 overweight men and assigned them to consume a specially-designed spread and a control spread for nine days.

Both spreads contained the same amount of fat, but the fat composition was different. The special spread contained higher levels of medium chain triglycerides, short-chain polyunsaturated fatty acids (C18:2 and C18:3) and conjugated linoleic acid (CLA: C18:2). Subcutaneous fat tissue biopsies taken from the volunteers showed that the activity of the genes differed significantly between lean and overweight men. They found that the special spread was associated with a higher expression of genes related to energy metabolism. It was also linked to a lower activity of inflammatory genes and higher activity of genes related to lipid metabolism.

The team's first findings show that genes in fat tissue are sensitive to diet changes. The result also strengthens the hypothesis that fat tissue is actively involved in the development of obesity-related disease. The results could lead to the development of better dietary strategies for keeping slightly overweight people healthy for a longer period of time.

The research suggests that making changes in dietary choices may lead to noticeable health improvements, on two fronts. Up-regulation of the energy metabolism genes may decrease fat tissue mass. Reductions of the inflammatory processes has potential benefits since chronic inflammation has been linked to range of conditions linked to heart disease, osteoporosis, cognitive decline and Alzheimer's, type-2 diabetes, and arthritis.

[M.J. van Erk, W.J. Pasman, H.M. Wortelboer, B. van Ommen, H.F.J. Hendriks. "Short-term fatty acid intervention elicits differential gene expression responses in adipose tissue from lean and overweight men." *Genes & Nutrition*, December 2008, Volume 3, Numbers 3-4, Pages 127-137, doi 10.1007/s12263-008-0096-z.]



If subsidized by national governments, population-wide personalized genetic testing, will fast-track the field of nutrigenomics, thereby rapidly elucidating novel natural therapeutics that can improve the health of broad segments of the population. It is time to abandon the manpower-intensive research into blanket interventions which generally only benefit just a small percentage of people at great cost per-individual treated.

VIII. Free/Subsidized Access to Gym, Spa, Metabolic Detoxification, and Physical Rehabilitation Facilities

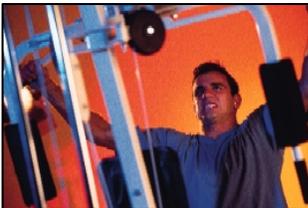
PROJECTED EXTENSION IN HEALTHSPAN / LIFESPAN: Up to 2 years/person

PROJECTED US\$ SAVINGS TO HEALTHCARE SYSTEM: US \$23.4 Billion

- Total cost of obesity in the United States in 2000 was estimated to be \$117 billion, as \$61 billion for direct medical costs and \$56 billion for indirect costs. [http://www.cdc.gov/nccdphp/publications/factsheets/prevention/obesity.htm; accessed 22 July 2009.]
- Free/Subsidized Access to Gym, Spa, Metabolic Detoxification, and Physical Rehabilitation Facilities has the potential to slash the number of cases/cost of obesity by 20%.

Thanks to modern conveniences reducing our need to venture far from work or home, a preponderance of fast food establishments, and enticing entertainment options that promote sitting in a chair for most evenings, the nation's population has become quite sedentary. In most Americans, this has led directly to a slump in physical activity, which in-turn manifests in a number of medical issues:

- **Overweight/Obesity:** Overweight is having extra body weight from muscle, bone, fat, and/or water. Obesity is carrying a high amount of extra body fat. Overweight/Obesity increases an individual's risk of serious disease, such as heart disease, stroke, high blood pressure, type-2 diabetes, elevated cholesterol, metabolic syndrome, certain cancers, osteoarthritis, sleep apnea, reproductive difficulties, and gallstones.
- **Sarcopenia:** An overall weakening of the body caused by changes in body composition in favor of fat and at the expense of muscle.
- **Mental lethargy:** Cognitive deficits develop when the brain, a muscle, is not exercised by challenging mental activity



Lack of Physical Activity Accelerates Aging

Telomeres are the endcaps on chromosomes, and telomeric shortening is thought to govern the number of times a cell can divide. In white blood cells (leukocytes), telomere shortening is used as a marker of biological age. Lynn Cherkas, from King's College London (United

Kingdom), and colleagues, studied 2,401 twins, tracking their physical activity level, lifestyle habits, and examining the length of the telomeres in the subjects' white blood cells (leukocytes). The team found telomere length decreased with age, and men and women who were less physically active in their leisure time had shorter leukocyte telomeres than those who were more active. The mean difference in leukocyte telomere length between the most active subjects (who performed an average of 199 minutes of physical activity per week) versus the least active subjects (16 minutes of physical activity per week) was 200 nucleotides. This translated to mean that "the most active subjects had telomeres the same length as sedentary individuals up to 10 years younger, on average."

[Cherkas LF, Hunkin JL, Kato BS, Richards JB, Gardner JP, Surdulescu GL, Kimura M, Lu X, Spector TD, Aviv A. "The association between physical activity in leisure time and leukocyte telomere length." Arch Intern Med. 2008 Jan 28;168(2):154-8.]

This nation must, proverbially speaking, “get off its feet” and engage in regular physical activity, and public gyms and spas can help achieve this goal. For those with ailments precluding regular exercise, it is important to establish a judicious program of physical rehabilitation. To complement these functions, therapeutic community pools, saunas, spas, can help to relieve musculoskeletal disorders common and ubiquitous to the aging process, such as arthritis, back, knee, and hip pain, and mobility issues.

Metabolic detoxification is based on the principle that illnesses can be caused by the accumulation of toxic substances (toxins) in the body. Metabolic detoxification has been found to be helpful for those patients suffering from many chronic diseases and conditions, including allergies, anxiety, arthritis, asthma, chronic infections, depression, diabetes, headaches, heart disease, high cholesterol, low blood sugar levels, digestive disorders, mental illness, and obesity. It also has been shown to be of value for those with conditions that are influenced by environmental factors, such as cancer, as well as for those who have been exposed to high levels of toxic materials due to accident or occupation. Metabolic detoxification can be used as a beneficial preventative measure and as a tool to increase overall health, vitality, and resistance to disease.

By prevention and early treatment of musculoskeletal problems associated with the aging process, as well as rejuvenating and regenerating diseased muscle and nerve tissues, the nation will reap economic benefits of a multi-beneficial and cost effective social medical program. Such benefits are manifold, as is evidenced by New York residents who engage walk on a daily basis and enjoy extended life expectancy. Eleanor Simonsick, from National Institute on Aging, extrapolated from results of a study involving 3,075 seniors and suggests that New Yorkers, who walk at faster paces for longer distances (as compared to suburban residents), enjoy better health in their later years. [“Why New Yorkers Last Longer,” <http://nymag.com/news/features/35815/index1.html>; accessed 17 July 2009.]

Indeed, by eliminating the economic barriers to prevent and treat the neuromuscular disorders common and ubiquitous to the aging process, we as a nation can become fit, functional, and empowered. Proximity to parks and physical activity sites has been linked to an increase in active behaviors, and positive impacts on health outcomes such as lower rates of cardiovascular disease, diabetes, and obesity. In June 2009, researchers from Lehman College of the City University of New York found that, regardless of socioeconomic status, ease of access to a public park can promote opportunities for active behavior and beneficial health outcomes. [Maroko AR, Maantay JA, Sohler NL, Grady KL, Arno PS. “The complexities of measuring access to parks and physical activity sites in New York City: a quantitative and qualitative approach.” *Int J Health Geogr.* 2009 Jun 22;8:34.]



We urge the nation’s government to subsidize widespread free access to gym, spa, metabolic detoxification, and physical rehabilitation facilities. Such access promotes self-treatment of musculoskeletal disorders common and ubiquitous to the aging process, such as arthritis, back, knee, and hip pain, and mobility issues, as well as promote the rejuvenation and regeneration of diseased muscle and nerve tissues. As a result, much of the costs associated with aging-related disabilities can be prevented and/or ameliorated. Such services would also dramatically reduce the large proportion of society which now is classified as disabled and would ensure that a large majority of its citizens can remain healthy and able-bodied late into life, far beyond 70 or 80 years of age.

IX. Online Electronic Database on Aging Intervention

POINTS 9-12, COLLECTIVE PROJECTED EXTENSION IN HEALTHSPAN /

LIFESPAN: Up to 5 years/person

POINTS 9-12, COLLECTIVE PROJECTED US\$ SAVINGS TO HEALTHCARE

SYSTEM: US\$ 2.4 Trillion

Based on the following assumptions:

- By the promotion of physician and practitioner continuing education, and empowerment of patients, we achieve a society of individuals who are responsible for, and take control of, their health destinies. Such education and empowerment motivates healthcare professionals while boosting compliance among patients.
- The benefits of an effective education and empowerment program may be estimated to stand at 25% of that found to be exemplified by the disparity in longevity as manifest in differing socioeconomic demographics. Researchers from Harvard School of Public Health found 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. This equates to a gain of 24.6 years of productive lifespan in populations that avail themselves of the armament of state-of-the-art biomedical technologies in advanced preventive care, have advanced educations, and are working professionals. [“Bergen County, NJ is long in longevity,” New York Times, September 12, 2006; “Asian women in Bergen have nation’s top life expectancy,” Free Republic, September 12, 2006.]
- Kevin Murphy and Robert Topel of the University of Chicago Business School used a value per-life of \$5 million (extrapolated from accident payouts by insurers) to calculate what the six years' gain in average life expectancy during 1970-1990 alone were worth across the total U.S. population. Their calculations produced the astounding discovery that the change in life expectancy over the twenty-year period was worth \$57 trillion in 1992 dollars. Converted into a yearly valuation, the Murphy and Topel study assigns a \$2.4 trillion a year value on longevity for the U.S. alone. [Murphy K, Topel R. "The health effect," The Economist, June 3, 2000, p. 78.]

The rapidly changing and developing advancements in medical knowledge warrants an online electronic database on aging intervention. Such a repository, freely accessible 24/7 worldwide, would provide invaluable data to physicians, health practitioners, and scientists, as well as serve as an objective resource for journalists and members of the general public.

Framed on the Wikipedia online encyclopedia concept, which as of this writing, contains nearly 13.5 million articles and serves on-average more than 14 million page views per hour, clinicians, practitioners, therapists, and scientists will contribute to the online electronic database on aging intervention empirical knowledge from a diverse array of preventive medical specialties including endocrinology, internal medicine, neurology, hematology, nutrition, folk medicine, complementary/alternative medical (CAM) therapies, Eastern/Traditional Chinese Medicine (TCM), Ayurvedic, and emerging biomedical technologies. This rich and diverse database of information will rapidly expand our global knowledge base of aging interventions and allow for a

rapid tract information highway. While the online electronic database on aging intervention would welcome and permit contributions from all sources involved in the research and/or delivery of healthcare, a body of experts representing the preventive medical specialties will moderate and peer-review the content in the database. This step assures quality and objectivity of information.

The online electronic database on aging intervention will conduct the following:

- Gather voluminous input on signs and symptoms of disease
- Chart the effects of implemented therapeutic interventions
- Engage automated computer algorithms to analyze the compiled data and identify common trends

In this manner, hundreds of aging interventions may be examined and evaluated concurrently, with the safest, most effective, and most economical of these approaches rising to the forefront.



NIH AND Wikimedia Foundation Collaborate to Improve Collaborative Online Health Information [NIH Announcement July 14, 2009]

In mid-July 2009, The National Institutes of Health (NIH) and the Wikimedia Foundation, the operators of the Wikipedia online encyclopedia, announced a first-ever collaboration to “make health and science information more accessible and reliable.” To satisfy the public's growing need for reliable health information, NIH and the Wikimedia Foundation submit this collaboration will increase the availability of accurate medical and health information available to the public. At the same time, they hope to establish strategies to interlace the distinct cultures of Wikipedia and the research community.



We encourage the establishment of an online electronic database on aging intervention. Doing so will enable the worldwide medical community to arrive more expeditiously at innovative approaches to disease. Such large-scale data collection promotes analyses that lead to evidence-based therapeutic successes in treating aging-related disorders, dysfunctions, and diseases.

X. Free Online Medical Education

The 2008 Sloan Survey of Online Learning, a collaborative effort between the Babson Survey Research Group, the College Board and the Sloan Consortium, and widely considered to be the leading barometer of online learning in the United States, revealed that enrollment in online education rose by more than 12% from just one year earlier. The survey of more than 2,500 colleges and universities nationwide finds approximately 3.94 million students were enrolled in at least one online course in fall 2007. [The Sloan Consortium, <http://www.sloan-c.org/publications/survey/index.asp>; accessed 20 July 2009.]

In May 2009, the US Department of Education issued a report on the state of online learning. Analyzing 51 factors associated with learning efficacy, and reviewing a number of research studies undertaken from 1996 to 2008, the Department of Education concluded that:

- Students who took all or part of their class online performed better, on average, than those taking the same course through traditional face-to-face instruction.
- Studies in which learners in the online condition spent more time on task than students in the face-to-face condition found a greater benefit for online learning.
- Online learning appeared to be an effective option for undergraduates, graduate students, and professionals in a wide range of academic and professional studies.

[“Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies,” www.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf; accessed 20 July 2009.]

A program of free online medical education will provide Internet-based e-learning to physicians, health practitioners, and scientists, and members of the general public, with the goal to educate as to diagnosis, prevention, and treatment of aging-related disorders.



The A4M and its international network of educational affiliates have embarked on the London Medical project, a Postgraduate Medical E-Learning and Certification program of interactive multimedia classes and certification for an international audience of physicians, scientists, health practitioners, and allied health personnel. Specializing in courses on a diverse array of topics in advanced preventive and clinical medicine, this project aims to provide innovative e-learning environment for postgraduate medical education on

biomedical sciences, breaking technologies, and preventive health issues relating to the detection, prevention, and treatment of aging related disease and methods to retard and optimize the human aging process, improve quality of life, and extend maximum human performance. Visit www.londonmed.net to view the prototype of this Postgraduate Medical E-Learning and Certification program.



We propose federal support to develop Postgraduate Medical E-Learning and Certification programs, much like the London Medical project described above. Such an invaluable educational resource serves two objectives:

1. Empower patients to serve as their own health advocates
2. Educate health professionals to keep them updated on the wide array, and rapidly changing environment, of advanced preventive medicine.

XI. The World Center for Anti-Aging Medicine

Worldwide, it is estimated that there are over 500,000 health professionals and physicians who are actively involved in the prescription and treatment of aging-related disorders for millions of people, all of whom are engaging the judicious application of anti-aging therapeutics. Today, these professionals treat based largely on empirical information and patient outcome data. The anti-aging medical profession has matured to the point where there is a pressing need for a World Center to coordinate research, education, and clinical training under one roof as an academic and scientific Center of Excellence.

The World Center is envisioned as a world-class, university affiliated research and treatment facility unique in its focus on the investigation and application of diagnostic and treatment protocols that extend the length, and enhance the quality, of the human lifespan. By merging clinical and research objectives in an innovative vision of the future of medicine, World Center researchers will elucidate discoveries to revolutionize the very early detection, treatment, and rejuvenation of aging-related disorders and work alongside clinicians delivering multi-therapeutic interventions designed to slow, stop, and/or reverse the process of human aging.

The World Center will be the leading facility established to realize effective interventions that alter the detrimental course and impact of the degenerative diseases of human aging. Thus we strongly urge funding for The World Center, which will rapidly become the focal point of innovations in science-based healthcare that may be replicated in countries around the world, thereby making this advanced model of medicine available to all.



The World Center reflects the multi-modal anti-aging medical model for enhancing the healthy human lifespan. At the World Center, clinicians and researchers will follow The Twelve Pillars of Anti-Aging Medicine, which are:

- Anti-Aging Endocrinology & Hormone Replacement Therapy
- Antioxidant Analysis & Optimized Supplementation
- Maximized Immune Function
- Detoxification
- Cardiovascular Protection
- Cognitive Function Assessment & Repair
- Metabolic & DNA Repair
- Skin De-Aging & Repair
- Lifestyle Modification
- Musculoskeletal Rehabilitation-Sports Medicine-Conditioning
- Biomarkers of Aging Assessment
- Prospective Advanced Diagnostics



We urge federal funding for a World Center for Anti-Aging Medicine, at which a coordinated program of research, education, and clinical training will expedite the development and implementation of safe and effective anti-aging therapeutics for all mankind.

XII. The Leisure Class

The global financial meltdown of 2008 has led to an accelerated adjustment of economic reality for billions of people worldwide. Indeed, automated technologies such artificial intelligence, voice recognition, virtual secretaries/personal assistants, and service industry robotics will become more utilized and thus displace the need to have humans in 7 out of 10 of jobs in the service, administrative, and support sectors. As a result, millions of people will not be needed in the workforce, thus giving rise to The Leisure Class.

The inevitability of the Leisure Class is a pressing concern. With the restructuring of global economics and the advent of advanced automation and artificial intelligence, service and support jobs simply are too expensive and too destructive to the ecology because unnecessary workers deplete resources (such as water, oil, electricity, roads and highways, transportation, housing, office space, telecommunications etc.) and will rapidly become an insupportable burden to modern society. For example, bank automation has slashed the need for tellers and service representatives.

Soon, robotics will become sufficient to replace humans in many more industries. Currently in the United States with an approximate population of 300 million, only 130 million are presently registered as part of the workforce. Of this 130 million, over 50% are now involved in the administrative or service industry, as the majority of manufacturing and farming has been outsourced or eliminated due to automation. So much so, that it has been estimated that in the near future, the US economy could produce all the goods and services generated today with as few as 2 in 10 current workers on the job.

Rather than be straddled with burdensome numbers of unemployed depleting public resources, federal subsidization of the unemployed with free housing, food, entertainment vouchers, and education will be far less expensive and disruptive to ecology and society. With such governmental support, these people remain at home and enjoy the leisures of life afforded by modern technology at nearly 100% of their former economic status when they were employed.



Technologies such as 500 channel, two-way high definition television and teleconferencing will provide the opportunity for any member of society to participate in any educational level opportunities including PhD and higher status programs. Through the Open CourseWare platform, MIT offers 1,900 courses online and at no cost, with topics from Aeronautics to Women's Studies. [<http://ocw.mit.edu/OcwWeb/web/home/home/index.htm>; accessed 20 July 2009.] Stanford University School of Engineering offers free online versions of the school's most popular engineering sequences, including a three-course Introduction to Computer Science, and seven more advanced courses in artificial intelligence and electrical engineering. [<http://soe.stanford.edu/contact/index.html>; accessed 20 July 2009.]

As a result, work becomes optional and functions as a performance incentive for those people who must work to satisfy their psychological make-up. leading to a leaner and more efficient workforce. However, for the remainder of society, all the goods and services they enjoy, as well as a full and robust virtual experience -- be it education, entertainment, or participating in a virtual-reality intergalactic exploration of Mars -- could be enjoyed at no cost to the individual. These early retirees may also wish to pursue community-oriented activities such as mentoring, hospice work, and other volunteer activities. The yoke and onus of the 40-hour workweek necessary for survival will thus be eradicated. Indeed, The Leisure Class gives rise to a new crop of artists, poets, philosophers, scientists, and similar creative minds to fuel the next Renaissance Age.

We stand at a crossroads in the history of mankind: Shall we allow modern technology to enslave humanity under a ceaseless torrent of limitless security, defense, fear-directed war, and restraint? Or do we opt to leverage modern technological and biotechnological advancements to enable us to build a society of freedom, vitality, productivity, and longevity? As a society, we have an unprecedented opportunity – and obligation -- to choose a path that promotes the best qualities in individual residents, be they work-oriented or creative engagements.



The arrival of The Leisure Class is an inevitable reality. According to the Consumer Electronics Association (CEA) the global revenue for consumer electronics was projected to rise by 10% in 2008 and reach \$700 billion by 2009. In its Worldwide Consumer Electronics Sales & Forecast report, the CEA says that consumers will spend \$42 billion more in 2009 than they did in 2008, despite the credit crunch. [<http://www.daniweb.com/blogs/entry2780.html#>; accessed 21 July 2009/] Forward planning to provide adequate care and living to support The Leisure Class is an emerging societal concern. It will become necessary for nations to establish a Social Contract for The Leisure Class, which subsidizes free education, entertainment, housing, food, and healthcare for this segment of the population and provides incentives for them to still be positive contributors to society at-large.

Further savings to society will be realized by the elimination of unnecessary infrastructure no longer needed by the stay-at-home Leisure Class. Roads, automobiles, gasoline, power, computers, office furniture, and conceivably up to 25% of the business-related infrastructure may be eliminated by the rise of the Leisure Class. This net savings will help to reorganize society in order to better utilize the resources of a new generation whose existence revolves around the pursuit of creative endeavors.

Concluding Remarks

The contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* submit that healthcare itself, not the health insurance system, requires a much-overdue rehaul.

The costs of health care impose an enormous burden on the economy. The latest projections from the Centers for Medicare & Medicaid Services show that annual health-care expenditures in the United States are expected to reach \$3.1 trillion by 2012, growing at an average annual rate of 7.3% during the forecast period or 17.7% of gross domestic product, up from 14.1% today. [Centers for Medicare & Medicaid Services, <http://cms.hhs.gov/>, via <http://www.ortcc.org/PDF/BenefitsofTelemedicine.pdf>; accessed 14 July 2009.]

To compound the spiraling costs of healthcare, the nation's physicians are discontent with the business of medicine. In the fall 2008, the Physician's Foundation surveyed 12,000 primary care doctors and specialists nationwide, and found that nearly half – a staggering 49% -- said they would consider leaving medicine. Many said they are overwhelmed with the bureaucratic red-tape of insurance companies and government agencies. For a significant number of those physicians surveyed, it has become financially unattractive to operate a medical practice. In addition, an American Medical Association survey found that new medical school graduates are shying away from family medicine, with only 2% of the 2009 graduating year planning to enter primary care medicine. [“Half of primary care doctors in survey would leave medicine,” CNN.com, 18 November 2008.]

Today, the climate of the practice of medicine is daunting. Mark Linzer, from the University of Wisconsin, and colleagues surveyed 422 internists and family physicians, studying patterns of dissatisfaction as a function of work environment and quality of care. The researchers found that 53.1% reported time pressures during the patient consult, and 48.1% reported chaotic working environments. Only 23.7% felt that quality was a strong emphasis of the patient-physician encounter. Nearly one-third of the physicians (30.1%) said they were likely to leave their practices within two years. [“Poor working conditions for docs may affect quality of care,” MedPage Today, 7 July 2009.]

The national healthcare system is crippled by burdensome regulations and paperwork, declining financial incentive for physicians, and a dominating disease-based approach. It also suffers from the demands of an ever-graying population, as the number of Americans aged 45-64 – who will reach 65 over the next two decades – increased by 38% from 1997 to 2007. [Profile of Older Americans, http://www.aoa.gov/AoARoot/Aging_Statistics/Profile/2008/2.aspx ; accessed 22 July 2009.] Indeed, a number of public policy experts predict that Medicare will be bankrupt by 2019.

It is generally agreed that the value to the economy of improvements in life expectancy is about as large as the value of all other consumption goods and services put together. The notion that social productivity of healthcare spending might be many times that of other spending warrants further consideration. The contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* hope this White Paper will open such dialogue. [“Economic Trends: Health Care's Economic Payoff - Longevity gains are worth a lot”, http://www.businessweek.com/magazine/content/02_17/c3780034.htm, Edited by Michael J. Mandel, Business Week, April 29, 2002; via <http://www.ortcc.org/PDF/BenefitsofTelemedicine.pdf>]

The contributing editors, authors and endorsing organizations of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* urge this nation to adopt a wellness-oriented model to healthcare. Such a model stresses very early detection of illness and promotes disease prevention, yielding opportunities for the best prognoses and economical treatments. Aging poses a costly burden to this nation, in terms of personal, financial, and societal costs. Anti-aging medicine addresses aging as a treatable medical condition, aiming to reduce or eliminate the disabilities, diseases, and dysfunctions we have simply assumed are a part of growing older. The anti-aging medical model submits that the disorders, dysfunctions, and diseases typically associated with age are, in many cases, amenable to prevention and treatment. By systematically revitalizing the biological processes involved in aging, the human life span can be increased while the quality of life is maintained or improved.

Adoption of the anti-aging medical model also delivers the best of advanced preventive medicine to all Americans, not merely our older population segments. The elements of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* will significantly improve and extend the healthy human lifespan. Each of the points of this Program will also deliver a profound net economic savings via three major mechanisms:

1. Conservation of worker productivity
2. Reduction of disability and hospitalization costs
3. Reduction of the burden of costs associated with chronic long-term medical conditions.

Indeed, the implementation of *The A4M Twelve-Point Actionable Healthcare Plan: A Blueprint for A Low Cost, High Yield Wellness Model of Healthcare* may **save our society a projected \$3.64 Trillion in healthcare costs, and extend the healthy lifespan of each of our nation's residents by up to 29 productive, vital years.**

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The American Academy of Anti-Aging Medicine, (A4M; www.worldhealth.net), a US federally registered 501(c)3 non-profit medical organization comprised of 24,000 physician, health practitioner, and scientist members from 110 nations worldwide. The A4M is dedicated to the advancement of technology to detect, prevent, and treat aging related disease and to promote research into methods to retard and optimize the human aging process. The A4M educates physicians, scientists, and members of the public on biomedical sciences, breaking technologies, and anti-aging issues. While the A4M seeks to disseminate information concerning innovative science and research as well as treatment modalities designed to prolong the human lifespan, the A4M does not promote or endorse any specific treatment nor does it sell or endorse any commercial product.

Endorsing Organizations

American Academy of Anti-Aging Medicine (A4M)
World Anti-Aging Academy of Medicine (WAAAM)
Academy of Anti-Aging Medicine - China
Academy of Anti-Aging Medicine - Iberia
Academy of Healthy Aging
Academy of Optimal Aging
Academy of Successful Aging
American Academy of Age Management
American Academy of Longevity Medicine
American College of Longevity Medicine
American Society of Longevity Medicine
Asia-Oceania Federation of Anti-Aging Medicine (AOFAAM)
AustralAsian Academy of Anti-Aging Medicine (A5M)
European Organization of Scientific Anti-aging Medicine
European Society of Anti-Aging Medicine (ESAAM)
German Society of Anti-Aging Medicine (GSAAM)
German Society of Hemotoxicology
Hellenic Academy of Antiaging Medicine
Indonesian Society of Anti-Aging Medicine
International Academy of Anti-Aging Medicine
International Academy of Longevity Medicine
Japan Anti-Aging Medical Spa Association (JAMSA)
Japanese Society of Clinical Anti-Aging Medicine (JSCAM)
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Spanish Society of Anti-Aging
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