ANNALS of The New York Academy of Sciences

Pursuing the Longevity Dividend: Scientific Goals for an Aging World

Journal:	*Annals of the New York Academy of Sciences*
Manuscript ID:	annals-1396-050
Volume Title:	3rd International Conference on Healthy Aging and Longevity
Date Submitted by the Author:	30-Jul-2007
Complete List of Authors:	Olshansky, S.; University of Illinois at Chicago, School of Public Health Perry, Daniel; Alliance for Aging Research, Executive Offices Miller, Richard; University of Michigan, Institute of Gerontology, Medical School Butler, Robert; International Longevity Center - USA, Professor of Geriatrics and Adult Development, Brookdale Department of Geriatrics and Adult Development,Mount Sinai Medical Cent
Keywords:	aging, interventions, mortality

Pursuing the Longevity Dividend: Scientific Goals for an Aging World

S. Jay Olshansky, Ph.D., University of Illinois at Chicago
Daniel Perry, Executive Director, Alliance for Aging Research
Richard A. Miller, M.D., Ph.D., University of Michigan
Robert N. Butler, M.D., International Longevity Center

Contact Author:
S. Jay Olshansky, Ph.D., University of Illinois at Chicago
1603 West Taylor Street, Room 885
Chicago, Illinois 60612
1-312-355-4668(voice)
1-847-537-7188 (fax)
sjayo@uic.edu

Keywords: aging, interventions, mortality

Aging for both populations and individuals is on the verge of a new era. Humans are approaching old age in unprecedented numbers as a result of large baby boom cohorts born in the middle of the 20th century that are approaching traditional retirement ages. Increases in the prevalence of age-related disease, frailty, and disability are visible harbingers of the potential costs and social burdens arising from this historic demographic shift. Advances in the scientific knowledge of aging, however, have now created new opportunities that may allow us and those that follow to live healthier and longer lives than our predecessors. We have reached a historical moment as scientists learn enough about aging to allow us to postpone a wide range of fatal and disabling diseases expressed throughout the lifespan, the result of which would be health and economic benefits for current and all future generations.

Why are we so optimistic now? The primary reason is that science has revealed that aging is not the immutable process it was once thought to be. Interventions at a variety of genetic, cellular, physiological, nutritional, and behavioral levels not only increase longevity in laboratory organisms, but also dramatically increase the duration of disease-free life. The realization that some humans retain their physical and mental functioning for more than a century suggests that genes associated with the extension of healthy life already exist within the human genome. Biogerontologists have now gone from merely describing cellular aging and cell death to manipulating the mechanisms responsible for these phenomena. Important strides have also been made toward understanding the effects of hormones on cellular pathways that influence the rate of aging. Since these pathways have similar effects in both humans and laboratory organisms, intervention strategies can be evaluated quickly, in short-lived animals, to find the ones most likely to work in humans. In short, we now believe that extending the duration of healthy life in humans by slowing down the processes of aging is a scientifically plausible goal, and adequate funding in this area might well lead to dramatic advances in preventive medicine and public health within

the next few decades.

Even a minor deceleration in the rate of human aging could have profound benefits for individuals and societies. Because prolonged, chronic illness is a powerful driver of medical costs, enormous cost savings would be achieved if mortality and morbidity could be compressed within a shorter duration of time at the end of life. At least some of the manipulations that appear to slow aging in animal models do just this, maintaining excellent physical and cognitive function well beyond the usual ages at which illness and disability start to affect most untreated individuals. In fact, aging interventions have the potential to do what no surgical procedure, behavior modification or cure for any one major fatal disease can do; namely, extend youthful vigor throughout the lifespan. Extending the duration of physical and mental capacity would permit people to remain in the labor force longer, amass more income and savings, and thereby lessen the effect of shifting demographics on age-based entitlement programs, with a net benefit to national economies. The combined social, economic, and health bonuses accruing from a slowing of the rate of aging is what we call the Longevity Dividend – benefits that might begin with those now alive, and then continue for all generations that follow.

We now have good reasons to think that slowing aging in humans is scientifically plausible, and given sufficient research investment might prove to be within our technical grasp in the foreseeable future. There are a number of compelling reasons why this effort should now be aggressively pursued: 1) the costs, to individuals and to society, of debilitating late life illnesses are already increasing in many countries as the population of elderly people mounts to unprecedented levels, leading to escalating health care costs; 2) compressing mortality and morbidity into a shorter duration of time at the end of life will pay substantial health and financial dividends for members of the first generation to which they can be applied, dividends that will be compounded as new generations benefit from existing and expanding technological advances; and 3) a modest deceleration in the rate of biological aging would produce the equivalent of simultaneous major breakthroughs against every single fatal and non-fatal disease and disorder associated with growing older.

The time has arrived for governments and national and international health care organizations to make research into healthy aging a major research priority, exploiting new discoveries towards the goal of manipulating aging rate to prevent or postpone multiple forms of late life illnesses and disabilities. We look forward to developing a national and international strategy that will lead to the permanent extension of healthy life that would result from a successful effort to slow the rate of aging.

* An expanded version of this manuscript was published in The Scientist [Olshansky, S.J., Perry, D., Miller, R.A., Butler, R.N. 2006. In pursuit of the Longevity Dividend. The Scientist 20(3):28-36.]