The Wonderful New World of Longevity

Celebration or Calamity?

by

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The world has experienced three waves of longevity: Between two and a half million and one hundred thousand years ago fossil evidence suggests a doubling of the size of the cranium and perhaps of intelligence as well. There is also evidence of a doubling of the length of life as hominids evolved to Homo sapiens.

Twelve thousand years ago, during the Neolithic period, animal husbandry and agriculture became established and brought a greater abundance of food. Humankind no longer had to survive as hunter-gatherers. At the same time, a greater density of human settlements created closer contact with animals and insect vectors, and therefore with diseases. The average life expectancy may have been about 20 years.

Beginning in the 17th century, the Industrial Revolution resulted in major increases in longevity. For example, in 1776 in the U.S. the average life expectancy was 35. The average age of the founding fathers was 40. Of course, there was also the wonderful "outlier," Benjamin Franklin, who contributed so much to the Constitutional Convention at the age of 82. In 1900, the average life expectancy was 47. Today it is 76.5. In short, we have gained 40 years of life expectancy since the American Revolution and 30 years of life expectancy since the beginning of the century. The latter exceeds what had been attained during the proceeding 5000 years of human history!

In the 21st century, we're likely to experience a fourth wave of longevity, following effective biomedical research. There are new possibilities for retarding the processes of aging. Less likely – but possible, and even more exciting is the discovery and usability of genes that actually determine the length of life of our species.

Regarding longevity, we haven't seen anything yet. Today we have about 70,000 centenarians and by 2050 we will have close to 900,000.

We're not only living longer, we're living better. There has been a 60% drop in deaths from cardiovascular disease and stroke since 1950, as well as significant decreases in disability rates. In the *Deacon's Masterpiece: The One Hoss Shay* Oliver Wendell Holmes, physician and "Autocrat of the Breakfast Table," alluded to what James Fries at Stanford has called the "compression of morbidity." One study conducted between 1982 and 1994 calculated that the number of disabled persons living in our country was actually over a million less than had been estimated. What an impact further declines in disability rates could have on Medicare costs, to say nothing of quality of life!

The picture of late life itself has changed. It is no longer a portrait of passivity, senility, and sexlessness. Today, it has become one of activity, vigor and intellectual robustness. Studies conducted at the National Institutes of Health and at Duke University in the 1950s resulted in the realization that many of the stereotypes attributed to aging are actually a consequence of disease, social adversity, and even of personality. These studies opened the door to the possibility that aging itself was mutable. We began to understand the underlying mechanisms of aging itself, which became more notable with Leonard Hayflick's finding of the limited number of times a cell could replicate before dying.

I can think of three wonderful illustrations of how late life is being redefined. The first illustration is Morris Rocklin, who was one of the volunteers in our NIH studies. I first met him when he was 94 years of age. I last saw him when he was 101, the year before he died. He

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complained bitterly about his physician, to whom he had gone to report considerable pain in his right knee. His doctor patronizingly said, as doctors do today, “Morris what do you expect at your age?” But Morris answered, “Look here doctor. My left knee is also 101. How come *it* doesn’t hurt?”

Then there’s Jeanne Calment, the French woman who lived to be 122. At the party celebrating her 120th birthday, a French journalist said, hesitantly, “Well, I guess I’ll see you next year.” To which she replied in a flash: “I don’t see why not. You look to be in pretty good health to me.”

And then, of course, there’s John Glenn, going on his remarkable voyage into outer space at 78 and returning to earth without any of the physical problems some predicted he’d have as a result of his journey. I don’t think children are going to look at their grandparents in quite the same way again.

Many terms have been applied to the ongoing redefinition of late life. “Successful aging” is one that Dr. John Rowe and I have used. “Productive aging” is a term I introduced in 1983 to convey the valuable contributions, unpaid as well as paid, that older people make to their family, community and national life. The foundation world has calculated that billions of dollars of equivalent contributions have come from older people who do volunteer work. “Healthy aging”, “optimal aging”, and “vital aging” are other terms. “Active aging” has been adopted by the World Health Organization. It was used in the Denver G-8 Communiqué, at which time aging was identified as an important economic and political issue. Indeed, the impact of longevity and population aging is pervasive. It affects the economy, work patterns, family life, health care, living arrangements, lifestyles, social economic roles, educational systems, government itself, and more.

It is necessary to prepare individuals and society for population aging and longevity and to do so in <u>positive</u> <u>and</u> <u>productive</u> <u>ways</u>. Three big tasks lie before us: to improve and maintain the expectation of a continuing active and healthy life into great old age; to extend the

productive work life and, of course, to contribute to the adaptation of the changing American family. We may soon have four- to five-generation families. Imagine what it will be like on Thanksgiving, going to grandmother's house. It may be necessary to rent a community center!

In what context is this revolution in longevity occurring? On the positive side, we are going through an information revolution. And we are seeing the rise of non-governmental organizations - the civil society - which, for example, has been credited with bringing down apartheid in South Africa. But there has also been a rising inequality of longevity, health, wealth and education and growing concentrations of power around the world. African-American men in Baltimore, for example, do not live as long as Bangladeshi men. The average life expectancy in the developing nations is about 65, which is 10 years less than the industrialized world. And perhaps 20% of Third World lives are lost to disease and disability, although in this global economy it is in the best interests of the industrialized nations to have healthy and productive consumers in the developing world.

Let us maintain some perspective. We *should* be concerned about the Social Security Trust Funds and Medicare costs. But we must look beyond the immediate headlines to the worlds of work and health. Overall, bipartisan agreement exists about the need to preserve the essentials of Social Security and Medicare. So let's look more broadly at the implications of the great social upheaval likely to follow the revolution of longevity. It's instructive for us to think back to 1899 when the average life expectancy was 47 and the normal work week was 60-hours. My chief financial officer would be wearing a green eye shade and my family doctor would drive around town in a horse and buggy.

Now in 1999 the average life expectancy is 76.5 and we have a 40-hour work week, with a minimum wage, Medicare, Social Security, computers, automobiles, air conditioning, air travel and much more.

What's 2099 going to bring? Conceivably people will live for 120 years, having reached the maximum genetically determined life span as a result of biomedical and behavioral

research. Perhaps people will work a 30-hour work week until they are 90, with many choosing to work at home. A National Youth Community Service will delay entry into the workforce. Everyone will go on a sabbatical. Australians already go on "extended service leave" sabbaticals and Norway has been considering a program of one year off every ten years so its citizens can retrain to upgrade their skills.

Here we are in 1999 on the brink of the new millennium and we must conclude that individuals and society are unprepared for longevity.

We haven't yet worked out multiple careers and how we're going to extend the work life.

We have yet to establish affordable, community-based long-term care. Germany and Japan are doing much better in this regard.

Our country does not have geriatric specialization. Only three of our 125 American medical schools have departments of geriatrics compared to Great Britain, which has a geriatrics department in every medical school in the country.

We have a long way to go in developing "magic bullets" that cure specific diseases without untoward side-effects.

Living arrangements and housing have yet to fully meet the requirements of a long-living society for services, safety, and security.

Overall, our citizenry is illiterate when it comes to matters of financial planning. Our children have not been educated to understand savings and investments. And we need new financial instruments as well as the safety net of Social Security.

Transportation has a long way to go. Imagine trying to get in and out of a taxicab these days if you have a touch of arthritis.

Our technology has yet to become truly elder-friendly and our information sources elder-ready.

Our leisure and travel leave much to be desired. All too often people go overseas on the great European tour. They arrive in Paris in the morning, hotel beds are not available, they are

carted off to the Eiffel Tower, exhausted. Inadequate attention is given to jetlag, which becomes more of an issue as we get older.

Our advertising industry, Madison Avenue, still hasn't caught on that 50+ is where the money is, and they continue to devote their energy to the 18 – 49 age group.

And our packaged food and restaurants are not sensitive to health promotion and the special nutritional needs of a diverse population.

At the same time, the field of medicine is going through dramatic changes and is likely to extend longevity further. Regenerative medicine will restore vision to those with macular degeneration. Diabetes will be cured by replacing beta cells in the pancreas, and Parkinson's disease controlled by providing dopamine-bearing cells to the brain. Geriatric medicine will also be an important field of the next century.

Who is responsible for our old age? The family, government, civil society and business all share responsibility. For example, the National Institute on Aging has helped us confront Alzheimer's disease and other debilitating conditions and the Administration on Aging has provided an array of social and nutritional services.

But finally, it is the individual who must prepare. People need to plan for aging in a variety of ways. They need financial planning, intellectual stimulation and a sense of purpose. Meaningful social interactions are especially important. One reason women live longer than men – by nearly seven years - is that women tend to have more secure and intimate social support systems than men. Social interaction also contributes to our maintaining intellectual function.

People of all ages need to establish healthy eating habits. It is difficult to change ingrained patterns. However, a reasonable diet and regular activity are critical for healthy aging. Over 50% of Americans are overweight and a third are obese; and yet we are still eating too much sugar and fat. People need to replace the national fast-food diet with a low fat, complex carbohydrate, fiber diet with fruits and vegetables. Our aerobic activity level must be

tremendously increased along with muscle resistance training, coordination and balance. It is muscle and balance that protect us against fractures.

In addition to anti-gravity exercise our bodies need calcium - 1500 mg per day for women and 1200 mg for men. We're supposed to eat our 5 to 7 fruits and vegetables daily, but we need to be realistic and take vitamins to supplement what our diets lack. Multivitamins (and, for older persons, vitamins without iron), 200 milligrams of Vitamin C, and 400 international units of Vitamin E. Studies undertaken by the National Institute on Aging on the possible benefits of Vitamin E in preventing Alzheimer's disease use 800 international units. And, while we must avoid excessive sun exposure, we must have enough to maintain our Vitamin D levels and appropriate wake-sleep cycle. Finally, at minimum, older persons need a baby aspirin each day.

Happily our prescription for longevity also includes robust exercise for the brain. Brain jogging. People need to remain intellectually active and to continue to challenge themselves. This includes anything from enrollment in adult education classes and Elderhostel to crossword puzzles and bridge clubs, to the development of new interests and the acquisition of new skills – and continue to work!

Parenthetically, head trauma must be avoided in people of all ages. I worry about kids the coach sends back into a game after they have been knocked down and are woozy. Head trauma is a risk factor for Alzheimer's disease in later years.

Vision, hearing and mobility are quintessential requirements for quality of life in later years. Yet we don't offer sufficient testing for glaucoma or caution people about the risk that excess sunlight poses to our eyes. And we haven't addressed noise pollution or been sufficiently cautious about medications that can adversely affect hearing.

Despite the high profile marketing of so-called "anti-aging medicine," there is no solid evidence to support their claims. The human growth hormone, melatonin, DHEA and testosterone are undertested and potentially harmful. Under very special circumstances,

testosterone is useful. Even estrogen replacement, which has been available for fifty years, cannot be used indiscriminately.

We have already made tremendous adjustments to late life in the 20th century. Both the government and the private sector play a vital role. The financial services industry has grown by leaps and bounds. Thirty years ago, who had even heard of mutual funds and 401K accounts? Today, they have helped make the stock market soar. Businesses that focus on older consumers have enormous growth potential. In Japan, they are called the “silver industries,” and include financial services, health care, pharmaceuticals, living arrangements, and travel.

As we move into the next century, 69 million Baby Boomers, beginning in 2011, will begin collecting Social Security and utilizing Medicare. They will probably live for another 20-30 years after 65. It does not seem reasonable that they should retire from active participation in society for those years. It makes sense that now that people are living longer, they should also work longer.

When I was Director of the National Institute on Aging I was asked to testify before Alan Greenspan when he chaired President Reagan’s National Commission for Social Security Reform.

“Since people live much longer since Social Security was first passed, shouldn’t they work longer?” he asked. Keep in mind that the average life expectancy for men in 1935 was about 59 and 63 for women.

My reply was “A qualified yes.”

In some ways retirement has been a 20th century aberration. It was required when the majority of people labored in mines, factories and foundries and it continues to be humane and necessary for individuals who have reasons to stop working after a lifetime of drudgery. But for many of us, retirement must be marked by a new kind of responsible aging. Through paid and unpaid work, people must continue to contribute to society. Since older workers are more expensive, employers need to be offered financial incentives.

In my capacity as head of a U.S. government agency (the NIA) as well as a private citizen, I have traveled to over 50 nations of the world. In discussions with key persons in many countries, several concerns regarding the revolution in longevity emerge. They include the fear that societies will not be able to afford the growing numbers of older persons; that economic stagnation will result; and that intergenerational conflict will be inevitable.

At this time, I find no evidence to validate these concerns. Countries like Sweden, France and Germany, with relatively high percentages of older persons, have not crashed. Insofar as economic downturns are concerned, it is clear that the dips and curves in the business cycle have not been attributable to population aging. Finally, polls taken in a number of countries, including the US and France, do not demonstrate intergenerational conflict.

I would like to draw your attention to the frequent references that are made to the dependency ratio, that is, the rising numbers of older persons compared to the generations of persons employed in the traditional workforce. It is suggested that with the aging of the overall population, the workforce must shoulder an unfair burden in paying for their care. However, the total dependency ratio indicates not only the increase in numbers of older persons but the striking decline in birth rates. With the exception of Ireland and Turkey, most of the developed nations of the world are experiencing this decline. It is almost as though nature has willed that with the extension of life fewer new lives are required. A kind of balance is sought.

In any case, if we look at the total dependency ratio, that is, if we add everyone under 18 and everyone over 65 and divide this number by the number of people in the traditional work force, we come up with the same dependency ratio in 2050 as existed in 1900. Moreover, while it is nearly universal in the United States that children under 18 are not significant wage earners, a significant number of people over 65 are economically able to take care of themselves. And, while the cost of raising a child to age 18 is conservatively estimated to be at least $200,000 (that number rises, conservatively, to at least $300,000 if the child goes to college), the average annual cost of a nursing home is about $40,000 a year with an average stay of 2-3 years.

Most important, the numbers of the dependency ratio are less important than the productivity per capita in evaluating the economic health of the population. One simple example: at the turn of the century 37% of the population was engaged in agriculture. Today, that number is 2%, but we enjoy a plentiful food supply.

The longevity in this century has been extraordinary, hopefully accompanied by quality of life and societal maturity. Longevity has brought greater wealth to our world. Longevity is not a calamity, but it does require a set of adjustments, some of which have already been made, and some of which remain to be accomplished, so that we may fully celebrate this wonderful human achievement.

The bulk of my career as a physician has been devoted to medical research, teaching and the care of patients. I have been motivated by concerns for individual older persons – those suffering from dementia and other debilitating conditions, sentenced to ending their lives in nursing homes. But over the last decade I have also become increasingly sensitive to the extraordinary impact of the unprecedented increase in the length of life and population aging upon older people and upon society as a whole – the family, the economy, the health care system. In short, I am devoted to the population-based public health approach.

Of course, I retain my concern for the lives of older persons. But to enhance their quality of life we must also confront a variety of issues. They range from the fair allocation of resources among the generations to the development of policy issues that guide medical science to bring Alzheimer's disease and other devastating conditions to an end, to the creation of necessary cultural, social and economic roles for all of us at all ages. From these perspectives, the International Longevity Center was born.

To meet the cultural and educational needs of older persons, that is to say, to assist in the search for purpose and meaning in late life, it is essential to change the prevailing images, language and cultural attitudes that society maintains toward this latter stage of life. We must dedicate ourselves to redefining old age and to transforming the views of older persons

themselves toward the aging process. We must encourage artists, writers, scholars and individuals working in the humanities, theater, cinema and the media to explore new ways to communicate the experiences of older persons within the context of the human family.

This is the first time in human history that the prospect of living a long healthy and productive life have become reality for the majority of people in most parts of the world. What was the privilege of the few has become the destiny of many.

And it is likely that this increase in longevity will continue into the next century. Regenerative medicine will make possible the cultivation of replacement cells and tissues for diseased organs. Gene-based medicine will utilize the human genome project to counter both genetic diseases and other diseases in which genes, through their protein products, play a pathogenic role.

Why is their pessimism in some quarters? We hear words like “calamity”. We have already seen remarkable adaptations to longevity in this century. Much more can be achieved. We must find ways to enable older people to continue to contribute to their families and to society as a whole.

Life can be a work of art. As important as liberation by health, as powerful as liberation by law, old people must be liberated, too, from stereotypes that limit their horizons. We are in the midst of the wonderful new world of longevity. It is in our power to make it a celebration.