

**General Session III: Slowing the Aging Process Discussion
Discussant: Jean-Marc Fix**

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“It is not now as it has been of yore;
Turn wheresoe’er I may
By night or day
The things which I have seen I now can see no more.”

Ode on Intimations of Immortality from Recollections of Early Childhood, William Wordsworth

I have bad news. As you undoubtedly have realized by now, the papers I will be discussing do not give us the recipe for slowing aging. I know we are all disappointed if not entirely surprised. Or should we be disappointed?

The first paper by Dr. Hayflick reflects on the consequences for us and for society if we were indeed able to slow aging.

Reflections on aging and death are probably as old as mankind. In the Greek myth, Tithonus is the beautiful singer and mortal lover of Eos, the goddess of Dawn. Eos asks Zeus to grant Tithonus immortality, which Zeus does. Unfortunately, being a goddess does not guarantee a high IQ and she forgot to ask for youth as well. As he withers and shrinks, he eventually turns into a cicada. Let us now listen to Homer’s Hymn to Aphrodite, as translated by Gregory Nagy, professor of Classics at Harvard and director of the Center for Hellenic Studies- and used here with permission:

“But when the first strands of gray hair started growing
from his beautiful head and noble chin,
Then the Lady Eos stopped coming to his bed
But she nourished him, keeping him in her palace,
with grain and ambrosia. And she gave him beautiful clothes.
But when hateful old age was pressing hard on him, with all its might,
and he couldn’t move his limbs, much less lift them up,
then in her thûmos she thought up this plan, a very good one indeed:
She put him in her chamber, and she closed the shining doors over him.
From there his voice pours out-it seems never to end-and he has no strength at all,
the kind he used to have in his limbs when they could still bend.”⁽¹⁾

This is probably one of the earliest examples of a long term care plan. It illustrates some of the problems that might come with aging and not answering some of the problems that needs to have been addressed.

(1) Homeric Hymn to Aphrodite, translation by Gregory Nagy, reprinted by kind permission of the translator and of the Center for Hellenic Studies of Harvard University, permanent link: <http://chs.harvard.edu/cgi-bin/WebObjects/workbench.woa/wa/pageR?tn=ArticleWrapper&bdc=12&mn=1166>.

Dr. Hayflick's paper is not truly a research paper but answers a really fundamental question for all research that has the potential to affect major societal changes. What if we could do what the research leads us to look for?

The paper by Dr. Hayflick reflects on the consequences, for us and for society, if we were indeed able to slow aging. But before we can reflect, it is best to know what we are reflecting about. There is no rigor possible in your thought process if your definitions are unclear. Dr. Hayflick helps with this by highlighting the difference between related but different concepts: aging, longevity determinants and age associated disease.

These distinctions are so fundamental that they bear repeating. To paraphrase a famous aphorism "aging happens." We cannot slow it down because we cannot slow time down. What does happen is that the consequences of those changes for individuals vary greatly. We can think of ourselves like the vases in the proverbial china shop before the bull is released. Some of us will be stronger, some will be luckier and some will have access to glue.

What makes us different in the face of death are the longevity determinants. Do we have more reserves to start with? A better repair mechanism? A better way to get rid of the deleterious consequences of aging? Dr Hayflick ponders those questions and identifies these as promising research avenues. There is an important caveat: many of these determinants are present at birth. Can they be changed after birth?

One argument made by Dr Hayflick that I have not seen in the public debate is happening right now: the powerful, but not necessarily the good have access, to the best health care. What does that imply for society? I will not go over the political and societal ramifications, but bear them in mind.

Some less compelling arguments relate to the timing of taking the magic pill that would slow aging down. The postulate that happiness would drive the taking of the pill is highly suspect. Some of the societal upheaval the pill will generate also could bear a more rigorous look.

As for the timing of the choice, if I had a pill right now and offered it for sale for a modest \$1,000, I think most of the people in the audience would be takers. Of course, this audience is not entirely representative of the whole cross-section of the United States, but nonetheless I think the choice would be fairly easy to make if the pill promises a longer, healthy life even if the cost might be later of a potentially unhealthy life for a longer time period than would otherwise have been the case.

What are the societal implications of an increasingly aging population, on birth rates, on work, on retirement?

Dr. Hayflick focuses on what should be a key question for biogerontology: why are cells in old bodies more vulnerable than cells in young bodies? This fundamental question may well hold the answer to curing diseases such as cancer and cardiovascular disease, which are more common among the aging population. Finally, in these days of limited budget, the lack of

funding on true aging research that Dr. Hayflick mentioned may indicate that a lot of the resources are not spent where they are needed to go to do the most good.

The second paper by Brown, MacKenzie and Prus addresses how fast we will become Tithonus. I was disappointed at my first read of the paper. This is all obvious stuff. Yet upon rereading it I realized that “obvious” is the most consistent obstacle to the advance of knowledge.

The source of their data is a Canadian longitudinal survey that is starting to bear fruits now. It takes a while for longitudinal data to become useful for us, from a mortality perspective.

Brown, MacKenzie & Prus take a solid set of Canadian population data and look at a variety of variables, both medical and not, and chart the evolution of good health through time. The variables selected are the usual suspects, and the conclusion that older people are more likely to lose their good health than younger ones is not a surprise. The contribution of the authors is that we move from impression to fact.

The more interesting conclusion is that the quantification makes it possible to compare the impact of different variables that are not generally studied together. Their impact relative to each other is quantified and allows us to put each of the risk factors in its proper perspective.

The variables are grouped in three dimensions that are generally studied in different scientific fields: socio-demographic, behavioral and psychosocial. There are also three age groups: 20-44, 45-64 and 65 and over.

There are of course issues with self reporting and surveys that make them less robust sources of information. This survey, because of its consistency does provide valuable insights on what is happening with the Canadian population and maybe developed countries as a whole.

Something that I had not seen addressed myself at the symposium was the impact of immigration on mortality. Unfortunately that is very dependent on the country and the picture of immigration in Canada is very different than what it is in the United States. Nonetheless that was a very interesting factor because the healthy immigrant effect that we are familiar with does not work in the older ages in Canada.

Finally, the fact that from a socioeconomic perspective, they were able to separate education and income, is very important. As Dr. Beltran-Sanchez said, it is very hard to get good socioeconomic data from many surveys. You may use education as a proxy for socioeconomic variables but it is not a good proxy. Education itself has an effect as Jay pointed out in his paper, so it is a good thing to see them separate and side by side.

We now know that the details of the aging equation that we all have perceived:

$$1 \text{ year at } 65 = 2.5 \text{ years at } 45 = 5 \text{ years at } 25$$

at least from a perspective of maintaining our good health.

Three factors cut across all age groups and stand out by their significance. The first one is the impact of smoking and the knowledge of this impact has been well established even among the general public. The second is the impact of income, which ties to Dr. Hayflick's remarks above and Dr. Olshansky's remark we will cover below. The third one may seem more paradoxical. Relaying that message to the public must be crafted carefully so as not to give rise to significant misunderstanding. The third factor is that regular alcohol consumption is...good for you.

An aspect that is missing in those factors is the genetic aspect which may explain some of the results we see on the age 65 group. Much of the deleterious behavioral aspects are mitigated by the survivorship effect. For instance, if smoking was bad for you and you smoked for 40 years, you would probably be dead now. If you are not, then smoking is probably not (as) bad for you and you are one of the lucky few.

Nonetheless Brown, MacKenzie and Prus may have given us the best answer so far to the question about slowing the aging process although no one will like the answer:

- Stop smoking
- Earn more
- Drink regularly, but I would like to add, in moderation

The final paper was by Dr. Olshansky. I was surprised not to find any mention of "150" anywhere in that paper.

He addressed a topic that I haven't heard him address here and that Dr. Beltran-Sanchez addressed yesterday and that is the impact of education and race on mortality. It illustrates the danger of grouping data without really understanding some of the fundamentals behind your data.

There is always a danger, when you look at things from too far a distance, that everything looks homogeneously gray when, in reality, the individual dots making the picture may be of a very wide range of colors. This is not an infrequent pattern if you look at data with sufficient granularity. I was doing some obesity research and if you look at BMI for African-American females you see that the data is not a unimodal distribution. It is in reality a bi-modal distribution. It is important to look at your data in sufficient detail to see what's really in it. Summaries will miss a lot of information.

Life expectancy is increasing (good news), but life expectancy is a very misleading number, especially life expectancy at birth, and especially life expectancy for the whole population. I want to expand a little on my pet peeve of using life expectancy at birth. The danger of using life expectancy is that it camouflages as a number that seems understandable. It is a very misunderstood number in the press and it is a very misunderstood number anywhere else. People do not appreciate how much mortality improvement is necessary to move a life expectancy at birth from 76 to 78. It is a surprisingly large improvement and life expectancy minimizes the impact of how much progress is needed.

Life expectancy is also not an intuitive measure as it may be hiding what happens to the different components of the population. So it is important to look at those issues of fairness between components as Kenneth mentioned yesterday at lunch and to be ready to address the consequences of having that disparity.

I think it is unfortunately not news that African-Americans have increased mortality compared to non-African-Americans. It is also not news that education has an impact on mortality, and you don't see that in the life expectancy number for the whole population.

One aspect that was not addressed in the paper that is important to address is: what is the real impact of education versus other socioeconomic factors in those dynamics? It's a lot easier to measure education than some of the other socioeconomic variables that might be also a factor. That does not necessarily mean it is the right variable to use

Most people do not appreciate what a big difference a couple of years in life expectancy really means for mortality. The picture that Jay paints is much more vivid: there are significant segments of the U.S. population that still live in the 1950s as far as mortality is concerned! That measure struck a real chord with me. One sees the numbers and sometimes does not appreciate the difference, but there's quite a bit of difference between the 1950s and today as far as medical science is concerned.

I have a couple of general concerns that the papers we discussed brought into focus. The first is the funding issue highlighted by Dr Hayflick: significant funding is spent looking at the diseases of aging one by one but this will not help with the common link between those diseases: what does aging really do to the cells and how does it do it? The second is that we look at longitudinal studies. They take a long time to come to fruition and they are very expensive to conduct. We looked at some data today from fairly long studies. Where is the data that we will be looking at 20 years down the road? Where is the better quality data coming from? Where are the longitudinal surveys that will give us the results that we need to see in the future? The funding for those is very important as well, as it is hard to draw good conclusions from nonexistent data.

For those who want it, I have a sample of Dr. Austad's longevity pill in my pocket here, and it is not for sale. The good news is that it is easily available, but it's not that easy to accumulate in therapeutic quantity. It has been scientifically proven, in this symposium and elsewhere, to extend one's life: it is the old "greenback." It only works in the United States, but Canadians have their equivalent pill. If you have enough of those, that is probably one of the best things to, if not to literally slow aging, at least slow death considerably.