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ReCent medical news

somewhat different

Will there be more super old people in the future?

Supercentenarians

Did you know?

47

The number of verified supercentenarians living worldwide today.

Supercentenarians[1] are indeed interesting to study as they tend to live an extraordinarily long life free from age-related diseases. Today, only 1 out of 1,000 centenarians[2] reaches their 110th birthday[3] but, with increasing life expectancies being recorded in many countries, are we likely to see many more of these extreme survivors in the future?

Up to now, only one individual in history has passed their 120th birthday and that was twenty years ago. What does that tell us? Is there a limit to the human lifespan that cannot be extended? Or will cutting-edge research open the way to eternal life?

The aim of this article is to offer a small window into this fascinating field of research that may, or may not, change the playing field for the insurance industry.

Who lives this long?

The individual with the longest verified human lifespan is a lady from France, who died in 1997 at the age of 122. Data show that supercentenarians tend to have a long healthy life that approximates their total lifespan. This is exemplified by the life of the French lady, who took up fencing at the age of 85 and rode her bicycle until the age of 100. Her diet included a lot of olive oil, port wine and 1 kg of chocolate weekly. She lived on her own until the age of 110 when she suffered a fall due to poor eyesight, but stayed cognitively intact until the end of her life. However, only four people in history have reached the next oldest ages of 117-119. Three of those died in the 1990s.

These findings call for a review of the literature to check whether the recent improvements in survival also extend to supercentenarians.

Where do people live long?

Blue Zones (BZ) are rather limited and homogeneous geographical areas where the population shares the same lifestyle and environment and the average life expectancy is exceptionally high[4].

[1] Person living to or beyond their 110th birthday
[2] Person living to between their 100-104th birthday
[3] See Maier H., et al. Supercentenarians. Max Planck Institute for Demographic Research. Springer, 2010

[4] See Poulain M, et al. Identification of a geographic area characterized by extreme longevity in the Sardinia island: the AKEA study. Experimental Gerontology 39 (2004) 1423–1429

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So far, the six geographical areas below have been classified as BZ:

- Italy, Sardinia: home to the longest-living men on the planet
- Japan, Okinawa island: home to the longest-living women on the planet
- USA, Loma Linda
- Costa Rica, the Nicoya Peninsula
- Greece, Icaria island
- Sweden, the regions of Öland, Småland and Skåne

On reviewing the 47 currently living supercentenarians[5], Figure 1 shows the following geographical spread (November 25, 2016).

Fig. 1: World map of supercentenarians

Theories on maximum lifespan

Observational research

One research community argues that there is a natural limit to human life[6]. In a recent article, Dong and colleagues hypothesized that were there no limit the age group showing the greatest improvement in survival should shift towards older cohorts, a hypothesis that was refuted by their data. In addition, even though more people have reached their 100th birthday since the mid-1990s, their data showed no increase in the maximum reported age at death (MRAD).

Taking an opposite viewpoint, some argue that the human lifespan is going to expand either through improvements in health at younger ages (80-100 years) – resulting in more people reaching very old ages[7] – or through as yet unknown advances in technology, the prevention and treatment of diseases associated with old age or genetic research[8].

Bio-technology research

Since the completion of the human genome project in 2003, interventional science has become a part of gerontology. Researchers in the field of interventional science study suicide genes and the insertion of nano-robots and they work with enzymes that eliminate cellular waste products[9]. Their aim is to prolong a healthy life to an astonishing 200-400 years.

Interventions to slow down ageing

The idea of slowing down ageing itself by addressing its root mechanisms through bio-technology research is expected to expand the number of healthy years as well as the maximum lifespan.

Within a couple of decades, we may have nanobots in our blood stream. These are basically robots smaller than the size of a human cell[10] that may keep us healthy at the cellular and molecular level. As an example, researchers at MIT study nanobots that can scout out cancer cells in the bloodstream and destroy them[11]. In the future, these devices may become much more powerful and contribute to a radical life extension.

Future technology might hold the potential to increase the health span[12], the average life expectancy and the maximum lifespan. However, any intervention should preferably be implemented in people not yet affected by old age. As a consequence, significant effects on MRAD will probably not be seen within the next 50 years.

[5] See Gerontology Research Group. GRG World Supercentenarian Rankings
[6] See Carnes B.A., et al. Gerontology A 68, 136-142 (2013)
[7] See Vaupel J. Biodemography of human ageing. Nature. 2010
[8] See Christensen K., et. al. Lancet 374,1196-1208 (2009)
[9] See De Grey A. SENS Research Foundation
[10] See Saxena S, et al. Design, architecture and application of nanorobotics in oncology. Indian J Cancer. 2015 Apr-Jun
[11] See MIT - Harvard Center of Cancer Nanotechnology Excellence. National Cancer Institute.
[12] Number of years free from chronic disabilities and diseases

Can we expect someone to break the world record?

Dong's research suggests that the annual likelihood of a person making it to their 125th birthday is less than 1 in 10,000. Although these conclusions may be correct, they are based on the context of current health care and medical technology. Furthermore, they do not account for an increase in survival rates seen in younger age groups that may lead to more people reaching the age of 110.

A Hannover Re analysis based on the currently small number of supercentenarians shows that the likelihood of anyone passing their 120th birthday within the next 10 years is very small, even if there is no limit to the human lifespan. However, if the human lifespan lies beyond the age of 120 and if many more people reach their 110th birthday, the likelihood of an increasing maximum reported age (MRA) would suddenly become quite realistic.

The model used the following assumptions: a fixed 50% mortality after age 110 [13], a survival threshold of 50% (if the absolute number of survivors in any of the birth cohorts drops below 0.5, that birth cohort was considered to be extinct).

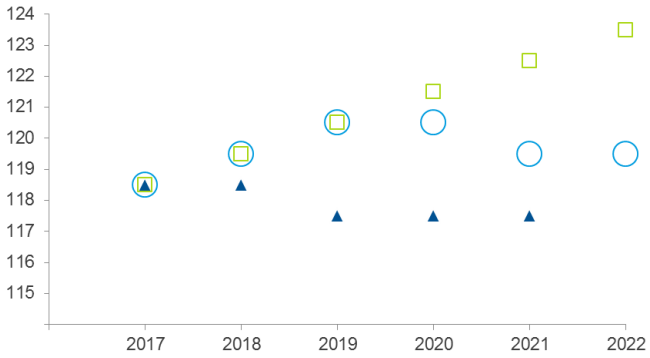
Financial aspects of extreme survivors

A potential boom in the numbers of supercentenarians could have an overwhelming financial effect on pension liabilities as well as LTC insurance since most elderly persons need some form of assistance with activities of daily living (ADL).

However, studies of today's supercentenarians show that they remain independent in ADLs for about 10 years longer than a typical centenarian[14]. Understanding the contributory factors here could have important public health implications and it underscores the need for predictors of healthy ageing in the very old.

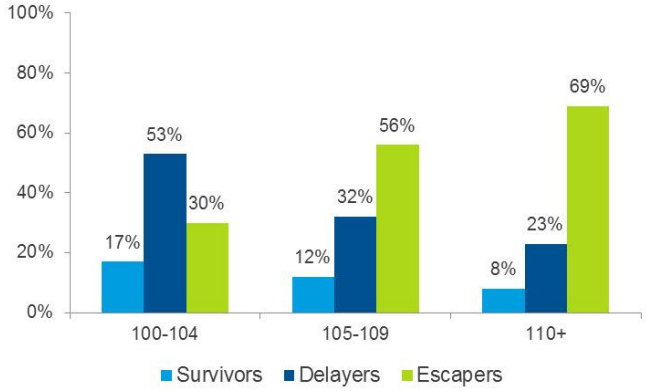
Due to the expected low prevalence, the supercentenarians will probably not contribute substantially to pension liabilities. However, the situation looks more troublesome when considering the increasing population of people reaching the ages of 95-105.

Fig. 2: MRA over the next 5 years by number of supercentenarians in 2016



Simulation by Hannover Re: MRA 2017-2022
Triangles: Data based on the 47 currently living supercentenarians
Circles: Effect on MRA should each of the currently living persons be multiplied by five (n=235)
Squares: Effect if multiplied by one hundred (n=4700)

Fig. 3: Percentage of survivors, delayers and escapers among three age groups



Percentage of survivors (light blue: those with the onset of at least one disease prior to age 80), delayers (dark blue: onset of at least one disease between ages 80-90), and escapers (green: onset of at least one disease after age 100) among three age groups: centenarians (100-104 years), semi-supercentenarians (105-109 years) and supercentenarians (110+ years).

Diseases were cancer, cardiovascular disease, chronic obstructive pulmonary disease, dementia, diabetes and stroke.

[13] See GAMPE J. H., MAIER H., et al. (eds.), Supercentenarians, Demographic Research Monographs
[14] See WILLCOX DC, et al. Aging gracefully: a retrospective analysis of functional status in Okinawan centenarians

Conclusion

Current research supports opposing views in relation to survival beyond the age of 110. As there are so few supercentenarians in today's society, the likelihood of anyone passing their 120th birthday within the next 10 years is small. In comparison to the much larger population of people "only" living to age 100, the financial implications of supercentenarians are expected to be quite limited due to a relatively low prevalence and the fact that supercentenarians tend to live a long life free of age-dependent diseases.

However, looking 20-30 years ahead and if we assume that there is no absolute limit to the human lifespan and that there will be more supercentenarians, the likelihood of people passing the current world record increases.

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