

Medical, scientific, and technological progress is stronger than ever. However, this has not been enough to improve Healthy



Life Expectancy. In 2020 and 2021, we had the first decrease in life expectancy at the world level in the last 75 years. To overcome this loss in life expectancy, we need better scientific cooperation, increased research, and more government-level commitment to progress. Second Brussels Declaration for Radical Healthspan Extension: After Covid times, rejuvenation times. <u>6th Eurosymposium on Healthy Ageing. November 2022</u>.

This month's theme: Frequently Asked Questions about Healthy Longevity

Since 2016, the Organisation "<u>Partei für Gensundheitsforschung</u>" presents candidates for the German elections. On their <u>website</u>, they present a long text with dozens of frequently asked questions on how to defeat aging. Below, you will read a selection of five of those questions (with slight adaptations).

Q. What is meant by "longevity escape velocity"?

The "first generation" therapies for humans will not be perfect. So they will repair some ageing damage very well, some less than that while others might not work at all. If we simply keep applying the same therapies - no matter how often or thoroughly - the less well or unrepaired damage will continue to accumulate. Ultimately, we will only experience age-related decline and death at an older age.

So, to keep ageing at bay permanently, it is not enough to repeat the therapies at regular intervals. We have to improve them and apply the improved version the next time. This is where the concept of "longevity escape velocity" (LEV for short) comes into play. The term refers to the rate at which we need to improve the thoroughness of repair over time in order to prevent the overall level of damage in the body from increasing further - in other words, to keep our biological age, defined as the amount of damage in our body, constant or to reduce it. If we achieve this rate, we would therefore increase the remaining life expectancy of people receiving the treatment faster than time passes during it (for example, by more than one year per year). A 52-year-old who has a life expectancy of 80 years (i.e. 28 years remaining) would therefore add more than one year of life during his or her 53rd year. His or her life expectancy would increase to more than 81 years, and the next year to more than 82. The expected (age-related) end of their life would thus move away from people faster than they approach it.



It is to be expected that once we reach LEV, (global catastrophes and similar scenarios excepted) we will never fall below this rate again because as therapies become more thorough, the amount of damage that needs to be repaired continues to decrease (after all, the complexity of ageing is finite, not infinite). As a result, the remaining damage takes more and more time to reach a critical level and the speed needed to improve therapies also decreases.

Comparison with jumping off a cliff: the remaining life expectancy of a human being is currently constantly decreasing due to ageing, just as the distance to the ground decreases in a fall due to gravity. If you jump with a jet engine on your back, the situation is comparable to regular "rejuvenation" spurts: At first, it is inactive - so you fall. If you activate the jet engine in time (i.e. if you are not too old when the first therapies are available - we won't be able to save them with the first therapies because they will already have accumulated too much damage), it will give you lift, slow down the fall and eventually let you climb further and further.

Q. I won't live to see that anyway, will I?

Encouraging progress is being made and therefore it is not unlikely that a large proportion of the population alive today will benefit from rejuvenation therapies - this is true even for those already at a relatively advanced age.

The objection that people have been trying in vain for millennia to find a fountain of youth or immortality is correct. But the same is true of flight, access to space, the ability to restore paralyzed limbs and freedom from smallpox, polio, and tuberculosis: All these things have been impossible for hundreds of thousands of years until the technology needed was available and used. Now they are already available for most of the human population and are being extended to the rest.

Suppose we do nothing today to accelerate rejuvenation research. In that case, we run the risk of spending our last days wondering if we could have saved ourselves and millions of other people years of unnecessary suffering if only we had decided to act sooner.

Even if these treatments may come too late for some of us, it is still our moral duty to enable our descendants to live without age-related diseases and suffering, and that can only be done if we get to work today.

Q. How close are we?

According to US inventor and futurist Ray Kurzweil, we will reach LEV (longevity escape velocity) in ten to twelve years (as of 2018).

Bioinformatician and theoretical biogerontologist Aubrey de Grey says that we have a 50% chance of reaching LEV <u>around the year 2036</u>. This would mean that people who are healthy



enough at that time and subsequently regularly take advantage of the latest rejuvenation therapies will never die from age-related causes.

This is based, among other things, on de Grey's estimate that we will realize <u>RMR</u> (robust mouse rejuvenation) with a 50% probability in three to five years. According to de Grey, this estimate is based on an assessment of the following factors:

- how fast the individual sub-areas are progressing
- how much research funding will be available in the future
- how often we find out something surprising about ageing
- how often we develop new technologies that make the work we need to do easier
- how difficult it will be to combine therapies when they work individually
- how much we need to rejuvenate people to give scientists time to rejuvenate them better and stay one step ahead of damage

Regardless of these estimates, rejuvenation is a rapidly growing field of research that, as you can read under the next question, has already seen some breakthroughs. The first components of a comprehensive anti-ageing therapy, such as <u>senolytics</u>, are already being tested in clinical trials. Others are on the verge. This should give us confidence that we are in for a revolution in biomedical research - and subsequently in human life - in the next few decades.

Q. Are there already successes?

Yes. The SENS Research Foundation, the leading research institution in the field of the SENS approach to rejuvenation, <u>has a list on its homepage of all publications in scientific</u> journals that originate either from its in-house laboratory or from research projects funded by the foundation.

This Wikipedia article is very helpful in tracing the history of the research field so far.

Here is a roadmap showing which <u>stages of development the individual components of the</u> <u>targeted therapies are in</u>. Not only the scientific but also the <u>organizational</u>, <u>public</u>, <u>and</u> <u>political progress</u>.

Q. What can I do today to age more slowly?

Although there is evidence that some molecules can delay or even reverse individual ageing processes, there is no currently available intervention that has been shown to slow ageing in humans. Leading candidates among currently available interventions include caloric restriction, rapamycin, SGLT-2 inhibitors (especially in men), and 17-alpha-oestradiol (again in men). Even if they work, however, their potential is much lower than that of the direct harm-reversal therapies of the SENS approach, and they cannot be replicated in a similar way.



Q. How can I accelerate progress in this area?

If you want to contribute to the faster development of more effective rejuvenation medicine, you can start in small ways: Creating broader public awareness of rejuvenation therapies by talking about them with friends, school or work colleagues or family members, donating books on the subject to libraries, doctors' offices or hospitals, and donating money to organizations dedicated to fighting ageing (some of which can be done for free, for example through AmazonSmile).

Of course, if you are a billionaire, a scientist, or a student in fields potentially useful for rejuvenation, or if you have more time for activism, today may be the first day of the rest of your life as a professional longetivist. You could one day save many lives, including your own, your parents or your children's.

The good news of the month: 1,000 mice will live as long as possible in good health and a promise of total commitment to longevity

Longevity trials on mice were announced by Aubrey de Grey and the <u>Longevity</u> <u>Escape Velocity Foundation</u>. They should begin as soon as January 2023 with 1,000 mice 18-month-old who will follow 4 different therapies. We should have results before the end of this year.

Alex Zhavoronkov expressed a beautiful Longevity Pledge : (...) In my opinion, there is no cause more urgent, more altruistic, more impactful, more important, and more ambitious than enabling humans to improve continuously. (...) Therefore, I would like to pledge everything I have now, and what I will get in the future, to only one cause — extending healthy productive longevity for all human beings. Instead of donating just a portion of my wealth and energy to this cause, I would like to do more. I pledge to spend 100% of my time and personal resources to accelerate research and clinical deployment of longevity technologies. (...)

For more information

- <u>Heales</u>, <u>SENS</u>, <u>Longevity Alliance</u>, <u>Longecity</u> and <u>Lifespan.io</u>
- Heales Monthly Science News
- Source of the image