# The Will To Live | Longevity Research

The Will to Live

\*\*Summary\*\*

This paper will analyze the trend of increasing longevity and its potential across the globe through the use of new technologies such as ‘CRISPR’ that until recently were considered science fiction. Increasing longevity will have a huge impact on the global community and it is extremely important that preparation is taken for what is likely to come.

Keywords: Longevity, CRISPR, Genetic Engineering, Healthspan

\*\*Body\*\*

Throughout the history of life on Earth, one key factor that has allowed life to grow and evolve is the will to survive. The human race has taken the concept of survival to a whole new level through its growth. Up until the nineteenth century it was unlikely for a human being to live past the age of forty years old. Medicine was limited at this point and only a small percentage of the world had the economic means to provide themselves with a sanitated life, (Roser). Over the next hundred years big changes came to the expectancy of a human’s life. Habitants of continents like Europe and North America were expected to live over sixty years old by the year 1950. At this point in history it became clear there was a large divide in global health as continents like Africa still had an average life expectancy of thirty six years old. From 1950 until present day radical changes have been seen as the average global life expectancy is now seventy one years of age with only a handful of countries in Africa having life expectancies under sixty years, (Roser).

https://lh6.googleusercontent.com/qULDlDc8w\_TvLEwjRIDLJ8UwgXV-d3B4hxlYAOqdkHhUTEVuYE7fi8ohgDZVHoPdveLf9zOioIv0DRRGih5moqDJWlDQXzYmZsGc9nin\_1HQe1Qp\_0Sv1THCsSNDrygHZALupoci

(Roser) Two hundred years ago, no matter where you were born, it was very unlikely to make it past the age of forty, if the first ten years of life could even be survived. By the year 1950 a great divide in health equality occurred, meaning that based on the location of birth, life expectancy could vary anywhere from thirty to seventy years. Today this divide has now been significantly decreased and regardless of birth place, a human can be expected to live to at least sixty years old, (Roser). It is not likely that humans will lose the desire to live a longer life and it is likely that life expectancy will continue to increase with time.

Looking at history it is fascinating to see how far the human race has come in such a short period of time. It is even more fascinating to consider what the human race might be capable of accomplishing in terms of life expectancy. It is possible that in another fifty years a life expectancy of seventy years old may be considered very low. If humans continue to keep expanding their life expectancy, it is important to consider at what point age becomes a burden. With current technology, as a human’s lifespan increases, so does the amount of time that a person spends in a state where they are sick, weak, or in need of other’s help, (Himsworth). Most people that live to an old age will spend the final bits of their life in a hospital bed as they watch their last functioning parts deteriorate after living a life of witnessing their older friends and family experience the same death. More processes than can be conceived are taking place within the human body as it uses oxygen and solar radiation while also metabolizing all the energy being put into it, (Himsworth). The human body is capable of repairing the damage done from these processes but over time the ability to repair becomes much less efficient. People do not die just from old age, but rather because a vital function of the body has deteriorated. Really the concept of increasing old age in today’s society equates to spending more of life in pain.

Today in the medical field scientists have become aware of the idea that living to an old age comes with many negative physical consequences. Historically, the ultimate goal in medicine was to maximize the lifespan of a patient. As human’s lifespans continue to increase across the globe scientists realize the importance of maximizing a person’s health span across that life. The only way that this can be done is by eliminating the process that causes nearly all the defects of the human body; aging, (Yang). The science behind anti-aging technologies has made extremely impressive advancements over the past few years and human trials are expected to take place in upcoming years.

Today, genetic engineering has uncovered an incredible technology that will allow humans to manipulate DNA in ways that have never been seen before, CRISPR. It is expected by engineers that this technology will change human’s existence on this planet potentially as much as the internet did. Ever since the discovery of DNA in the 1960s, scientists have been manipulating the genes of plants to gain a more useful version of the plant. Today, CRISPR technology allows for multiple genes to be added or removed from a cell at once while in the past this process had been done gene by gene. CRISPR has sped up the process of gene modification from multiple years to just a few weeks. Not only is CRISPR multitudes more efficient than previous technologies but it is also much cheaper, easier to use, works on all species, and allows for the editing of live cells, (CRISPR).

One implementation of this technology that is beginning to look very promising is the killing of senescent cells. As cells in the human body age, telomeres which protect the DNA of a cell start to decay, leading to a senescent cell. With time more senescent cells are able to form within a human body, leading to diseases like diabetes and organ failures, (Yang). CRISPR allows for a body to recognize when a senescent cell has developed and eliminate it. CRISPR has already seen many human trials in cancer treatment and reported great success as cancer hunting genes are added into bodies to prevent the disease from ever occurring, (CRISPR). This technology holds the potential to eliminate diseases of all magnitudes from humans. While CRISPR may be able to increase a human’s health span by eliminating disease, it may also be able to increase lifespan as aging is directly affected by certain genes. It is likely that these genes can be modified using CRISPR technology and the human body is capable of not aging with the right genetic code implemented as this can be seen through other species in nature. This revolutionary technology will certainly alter the course of the human population in the future.

Longevity for the human race is far from reaching its peak and this boom in age expectancy will cause many changes for society. While this could be an amazing innovation to the world, with every important change it is crucial to consider the long term effects of an action. While extending the health and span of life on Earth may seem like an end goal for the medical field, there are plenty of consequences likely to accompany this feat.

Although life expectancy today has far exceeded the expectations of the past, future predictions seem even more incredible. The United Nations predicts that by the year 2045 there will be more people on the planet above the age of sixty than children for the first time in human history, (Wheeler). It seems like common sense that if people are living for significantly longer in the future that the population will continue to grow at an alarming pace. However, many analysts predict that this will not be the case, rather the world population will start to plateau around eleven billion people, (Cilluffo). As more nations continue to advance and develop, fertility rates are expected to drop to 1.9 in the next eighty years, .2 births below the replacement rate, (Cilluffo). It is likely that the countries who experience the lowest fertility rates will also be the ones developing the technology to prolong healthy lives. However, if less developed countries start implementing age prolonging technologies then they may struggle to economically support their aging population. Another thing to consider is whether the medical field will focus on healthspan or lifespan throughout this longevity boom. If lifespan is the focus then many problems could occur in the future. With more elderly people on the planet then there would be a steep increase in diseases related to aging along with an increase in the cost of health care, (Wheeler). Another consideration to take into account is the concept of having young people able to take care and replace the older population. With a potentially shrinking population in a stage five demographic it may become a very difficult task for younger generations to conceptualize the best way to care for the overwhelming elderly population while also filling all the work positions of previous generations, (Wheeler). On a positive note, families are becoming multigenerational, allowing older generations to pass down their history and traditions of the past. People will also be spending more time on this planet, allowing them to spend more time learning, traveling, experiencing, and evolving as a person.

https://lh6.googleusercontent.com/hh69yPtlNey6L0KieyzymF5A2i1DotaIaU-uINjMqTreN9Fvo6FuC2lklWzARVtf6thOAkqJGYGW4D25B-LhviEfst4L1UOh64879M-j8MnPLir8Frw7pL\_hZlIp1Yp7BY17b4mK

The human race has proven to be a powerful entity on Earth and it’s very persistent when it comes to the will to survive. Life expectancy across the globe has increased significantly over the past two hundred years and with new technology like CRISPR this growth spurt could be just beginning. Although it’s impossible to predict the future, fortunately there are two expectations that should line up, increasing longevity and decreasing birth rates. If these two things do happen then longevity's consequences will be decreased significantly. This is an incredibly interesting time to be a human being and the idea that humans could potentially live forever in their current bodies is absolutely mind blowing. Technology will always continue advancing and it is important that society is prepared for big changes to occur.

Cilluffo, Anthony, and Neil G. Ruiz. “World Population Growth Is Expected to Nearly Stop by 2100.” \*Pew Research Center\*, Pew Research Center, 17 June 2019, www.pewresearch.org/fact-tank/2019/06/17/worlds-population-is-projected-to-nearly-stop-growing-by-the-end-of-the-century/.

“CRISPR Enables Gene Editing on an Unprecedented Scale.” \*WhatisBiotechnology.org\*, [www.whatisbiotechnology.org/index.php/science/summary/crispr](http://www.whatisbiotechnology.org/index.php/science/summary/crispr).

Himsworth, R L, and M J Goldacre. “Does time spent in hospital in the final 15 years of life increase with age at death? A population based study.” \*BMJ (Clinical research ed.)\* vol. 319,7221 (1999): 1338-9. doi:10.1136/bmj.319.7221.1338

Max Roser (2019) - "Life Expectancy". \*Published online at OurWorldInData.org.\* Retrieved from: 'https://ourworldindata.org/life-expectancy'

Wheeler, Regina. “How Will the Longevity Boom Impact Our World?” \*EverydayHealth.com\*, 15 July 2010, www.everydayhealth.com/longevity/longevity-boom-and-its-impact.aspx.

Yang, J., Huang, T., Petralia, F. \*et al.\* Synchronized age-related gene expression changes across multiple tissues in humans and the link to complex diseases. \*Sci Rep\* 5, 15145 (2015) doi:10.1038/srep15145