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# 2020 DEBATES

First Edition



**THE FUTURE OF HEALTH:**  
The first person who will live to 150 has already been born

AGAINST

FOR

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# CONTENTS

- 02 TECHNOLOGICAL ADVANCES WILL DRIVE OUR QUEST TO LIVE LONGER**  
By Dr. Nicole Sirotin, Chief, Internal Medicine Department; Director,  
Executive Health Program, Cleveland Clinic Abu Dhabi
  
- 04 WILL LIVING TO 150 BECOME THE NEW NORMAL?**  
By Dyala Sabbagh, Partner & COO, Gulf Intelligence
  
- 06 AS HUMAN LIVES GET LONGER, THE QUESTION IS: CAN WE AFFORD IT?**  
By Chris Bagnall, Chief Underwriting Officer & Head of Claims,  
Zurich International Life Ltd.
  
- 08 THE FUTURE OF HEALTH:**  
The first person who will live to 150 has already been born
  
- 10 *For the Motion***  
By Dr. Nicole Sirotin and Chris Bagnall
  
- 12 *Against the Motion***  
By Quan Ho Vuong and Dr. E. Murat Tuzcu
  
- 14 RESULTS**  
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# TECHNOLOGICAL ADVANCES WILL DRIVE OUR QUEST TO LIVE LONGER

**71.4**  
The global average of years that an individual is expected to live today.

**1,000**  
Has the first person to live to quadruple digits already been born as Aubrey de Grey claims?

**1815**  
The capability of medicine has soared since the first stethoscope was introduced in the early 1800s.

**80%**  
The anticipated growth in the global market value of nanotechnology in medical devices between 2016 & 2021.

**M**edical technologies that have long been detailed in science fiction are becoming a reality in the world's laboratories and hospitals, which makes extending the average lifespan to triple digits a much more viable forecast. Momentum is growing within medical and scientific circles that technology can 'cure' the ageing process in humans, especially considering how the rapid evolution of healthcare tools has lengthened life expectancy over the last two decades. Since 1900 alone, life expectancy has doubled to 71.4 years today. The first stethoscope in 1815, the X-ray in 1895; the pacemaker in 1936; the mechanical heart in 1952; DNA sequencing in 1992 and the modern-day implementation of bionic eyes for visual impairment are quick-fire examples of a much broader wave of innovation.

Aubrey de Grey, the Chief Science Officer of the California-based Sens Research Foundation (SENS), says that the first person to reach 1,000 years old is likely to already be alive, while scientists from the Albert Einstein College of Medicine said a maximum global age limit is around 115 years. Whatever the number, efficient and cost-effective medical technologies will be highly valued as the United Nations (UN) expects the global population to rise by 30% to 9.7 billion people by 2050. As the pressure on the global healthcare sector grows, research and development (R&D) must sustain high international standards and aim to cater for different geographic climates, socio-economic demographics and ethical norms. The diversity in the world's health portfolio must be reflected by a range of technological offerings. It is not a case of one size fits all.

The diagnostic cost of sequencing our DNA has drastically fallen from \$100 million in 2001 to less than \$1,000 today, which opens the gateway to a new era of personalized medicine. The price could slide to the low triple digits in a few years. Nanotechnology uses nano-robots to make cellular repairs and operate within dimensions that are often no thicker than the width of a human hair, which includes delivering drugs straight to trouble spots. The global market value of nanotechnology in medical devices is projected to swell from \$5.8 billion in 2016 to \$10.45 billion by 2021, at a compound annual growth rate of 12.5%, according to Market Data Forecast. Medical staff, especially trauma specialists, can use head-mounted Google Glass technology to have handsfree access to the Internet and instantaneous access to patients' medical history, medical checklists

**"THE DIVERSITY IN THE WORLD'S HEALTH PORTFOLIO MUST BE REFLECTED BY A RANGE OF TECHNOLOGICAL OFFERINGS. IT IS NOT A CASE OF ONE SIZE FITS ALL."**

and the availability of resources in the hospital. Patients could also soon be issued 'insideables', which are chips planted just under our skin, and 'ingestibles', which will be tiny sensor pills that we swallow. Plus, a 'health check chair' could bolster efficiency by automatically and simultaneously checking patients' vital signs – pulse, blood pressure and vision, for example – while they sit in one spot. Technology is also crucial in the global effort to predict and counter epidemics, which have the potential to escalate into a global threat and derail the quest for longevity. Delaware-based WeRobotics plans to battle the spread of the Zika virus, which began in Latin America, by using drones to carry and distribute sterile mosquitoes into hard-to-reach zones. The same process can be applied worldwide to fight malaria, or transport food and medicine parcels to extreme

and remote geographical terrain, such as mountains, forests, or desert lands. Digital data analytics can be used to launch preventative measures in high risk areas, with such information possibly provided by local communities via a centralized reporting application on their mobile phones. **Medical technologies** must also counter the risk posed by the world's growing aviation and shipping sectors, which inevitably increases the threat of cross-border infections. The frequency of global travel was a major concern during the Ebola outbreak in 2014 and 2015 and remains a key challenge in efforts to contain the current outbreak of the Zika virus. There are also worrying signs that reports of Yellow Fever in central Africa could accelerate.

Medical technologies can also be used to improve the misuse of existing healthcare. A system that automatically monitors patients' self-administered medications would slow what is a damaging trend. Antibiotics revolutionized medical care when they were introduced 90 years ago, but doctors and patients' overuse of the drug means the rate of resistant bacteria is rising. The World Health Organization (WHO) said 480,000 people worldwide are developing multi-drug resistant Tuberculosis (TB) every year, for example. There are undoubtedly challenges, but the trick to increasing the global average life expectancy to triple digits is to plug the current gap in healthcare between developing and developed countries. All countries and societies need to benefit. Otherwise, extraordinary medical innovations will be a victory for a few, instead of a new era in global healthcare. ♦



Dr. Nicole Sirotni, Chief, Internal Medicine Department; Director, Executive Health Program, Cleveland Clinic Abu Dhabi

# WILL LIVING TO 150 BECOME THE NEW NORMAL?

**T**here is a universal desire in all socio-economic groups in the world's 196 countries to live good lives for longer. But, what is a simple mission statement raises some of the world's most thought-provoking questions.

At what point do our ethics stop pushing our biological limits through experimental science? How much is too much?

Medical and scientific experts unequivocally agree that humans' average life span can continue to rise, but there is little consensus on exactly how much. There are few comparisons to work off. Humans' current average life expectancy has doubled since 1900 to 71.4 years. This is long when compared to mayflies' lifespan of one day, short when compared to a 400-year-old Greenland shark and a blink of an eye when compared to a 11,000-year-old deep-sea sponge. Chimpanzees, with whom 98.5% of our DNA is identical, typically live under five decades.

Aubrey de Grey, the Chief Science Officer of the California-based Sens Research Foundation (SENS), argues that society has a fatalistic attitude to longevity and that the first person to reach 1,000 years old could already be alive. Elizabeth Blackburn, who won the Nobel Prize in 2009 for research on telomeres and the genetics of ageing, said raising the average lifespan to triple digits is not overly ambitious.

A study by scientists at the Albert Einstein College of Medicine said it may not be possible to extend life beyond the ages that have already been recorded, with 115 years likely being humans' maximum average limit. The odds that in any given year at least one person in

the world will live past their 125th birthday are less than 1 in 10,000. Frenchwoman Jeanne Calment, who is the world's oldest person having lived for 122 years and 168 days up to 1997, may be the record holder for a long while.

Most specialists argue that it is too soon to pin down a maximum lifespan when medical experimentation has so often pushed the boundaries of what we thought possible, even when it challenged ethical norms.

The transplant of organs from a deceased, or living donor to a recipient and in vitro fertilization (IVF) to aid reproduction are two prominent procedures that trigger ethical debates. The idea of organ transplants, for example, was initially criticized by some saying that using human body parts like a robot – swapping and switching functions to make the whole system work – failed to value human life. But, since the first organ transplant in 1954 of a kidney, the vast benefits and manageable risks of the procedure mean it is now largely accepted by society as a normal operation.

Aversions to new medical procedures can stem from concerns over patient care, the necessity of the treatment, an aversion to animal testing, religious beliefs, or a lack of confidence in the risk-reward ratio of the treatment. While experimentation is integral to growth, what is the distinction between pioneering care and reckless treatments? Answering this question will prove increasingly valuable in order for the healthcare industry to cope with the 30% increase in the world's population to 9.7 billion by 2050, especially if birthday celebrations for 115 year olds become commonplace this century.

For example, Italian Professor Sergio Canavero is the Director of the Turin Advanced Neuromodulation Group and, along with researchers at Harbin Medical University in China, said in January this year that the first successful head transplant using monkeys had been completed. The spinal cord was not reconnected so the monkey, which was euthanized on day one for ethical reasons, was left paralyzed. But, Canavero and his team still plan to carry out the procedure on a human by the end of 2017 in the long-term hope of giving mobility to patients who are paralyzed, or have muscle wasting diseases.

The radical concept of joining the 'mind' and 'body' from two different bodies is ethically challenging for most people. Those in some scientific and medical circles appreciate the potential longevity and enhanced lifestyle that a successful patient could experience, but there are concerns that the science is misleading as the nervous system of the 'new' being could be redundant. Many experts feel that the procedure would benefit from more research trials before being applied to humans.

**The human lifespan** is often referred to as a global average. But, the World Economic Forum's (WEF) 2016 Global Competitiveness Survey said Hong Kong has the highest average life expectancy at 84 years old and a multitude of other data sources point to Chad as having the world's lowest lifespan at just under 50 years old. Is it right to question the ethical guidelines of living to 115 years old when millions of people are still not living to see their sixth decade? ♦

**"HUMANS' CURRENT AVERAGE LIFE EXPECTANCY HAS DOUBLED SINCE 1900 TO 71.4 YEARS. THIS IS LONG WHEN COMPARED TO MAYFLIES' LIFESPAN OF ONE DAY, SHORT WHEN COMPARED TO A 400-YEAR-OLD GREENLAND SHARK AND A BLINK OF AN EYE WHEN COMPARED TO A 11,000-YEAR-OLD DEEP-SEA SPONGE."**



Dyala Sabbagh, Partner & COO, Gulf Intelligence

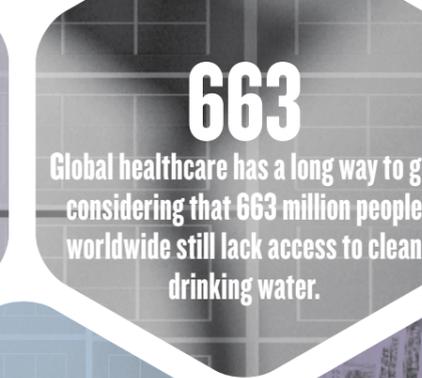
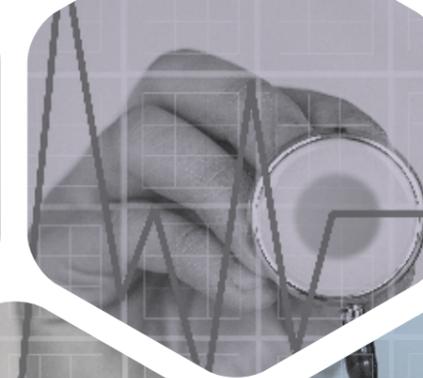
**122**  
Frenchwoman Jeanne Calment, who was 122 years old when she died in 1997, credited chocolate and wine for her longevity.

**1954**  
The world's first official organ transplant – a kidney – was completed in the mid-1950s despite criticism.

**84**  
Hong Kong tops the global list of life expectancy with 85 years, which is 30 years more than Chad.

**11,000**  
The lifespan of a deep-sea sponge – it will be a while till humans can compete.

**98.5%**  
Humans share a vast majority of their DNA with chimpanzees, who typically live less than 60 years.



# AS HUMAN LIVES GET LONGER, THE QUESTION IS: CAN WE AFFORD IT?

**30%**  
The global population is expected to increase by nearly a third to 9.7 billion people by 2050.

**663**  
Global healthcare has a long way to go, considering that 663 million people worldwide still lack access to clean drinking water.

**1.3**  
Dubai expects 1.3 million medical tourists to visit the emirate by 2021.

**5%**  
The financial toll of the Ebola outbreak hit Guinea, Liberia and Sierra Leone hard at nearly 5% of the countries' combined GDP in 2014.

**3.5**  
The Zika virus cost the Latin American and Caribbean region \$3.5 billion in 2016.

**25%**  
Climate change could reduce global crop yields by a quarter at the same time as the World Bank says the rising population requires 50% more food.

06

**P**rofit-driven economic goals often conflict with the human nature of medical care. But, weak economics would mean that regularly having more than 100 candles on a birthday cake remains a pipedream.

The economics of potentially increasing humans' average lifespan – forecasts range from 115 years to a more radical 1,000 years – must make sense before anything else will. There are four key pieces to the financial roadmap that is required to add decades to the current global average lifespan of 71.4 years.

Firstly, living for longer means the cost of 'bread and butter' medical care will rise. Copious more accident and emergency services and ambulance fleets, for example, are already required to cope with the United Nations (UN) forecast that the global population will swell by 30% to 9.7 billion people by 2050 and 11.2 billion by 2100. These cost implications will climb further if longevity increases.

The world's intensifying appetite for healthcare is accelerating the growth of emerging medical tourism hubs, such as the UAE, which supports the country's transition into a knowledge-based economy. The Dubai Health Authority (DHA) has projected an influx of nearly 1.3 million medical tourists to the emirate by 2021, which is especially significant when considering the current population is only 2.6 million.

**Secondly, the financial** strain caused by epidemics – unpredictable by their nature – can be high. The fiscal impact of the explosive Ebola outbreak in the West African countries of Guinea, Liberia and Sierra Leone in 2014 totaled more than half a billion US dollars, which is nearly 5% of the countries' combined GDP, according to the World Bank. The Bank added that the short-term economic impact of the Zika virus epidemic in the Latin American and the Caribbean region (LCR) reached \$3.5 billion this year.

As part of a preventative measure against epidemics, fifty-five countries have joined the US-led Global Health Security Agenda (GHSA), which was established in 2014. Part of GHSA's work includes seventeen identified at-risk countries receiving \$1 billion in US assistance and a collective commitment by G7 leaders – US, UK, Canada, France, Germany, Italy and Japan – to assist 76 countries and regions.

Thirdly, living for longer will require a steady flow of funds to support increasingly ambitious research and development (R&D) to create innovative medical technologies. Efforts must also focus on bolstering the efficiency of existing technologies, as reducing current costs will free up more capital for exploratory medical work. While expensive, the long-term pay back of early investments into medical R&D often justify the cost.

**Key hole surgery**, for example, is now commonplace and leads to quicker recovery times for patients, a faster

**"WHAT HAPPENS TO THE AVAILABILITY AND COST OF THE WORLD'S RESOURCES IF THE AVERAGE PERSON LIVES FOR ANOTHER 40 YEARS?"**

turnover of valuable hospital beds and fewer outpatient hours.

Lastly, what happens to the availability and cost of the world's resources if the average person lives for another 40 years? At today's population of 7.4 billion, water scarcity has already been flagged by the World Economic Forum (WEF) as the biggest threat facing the planet over the next decade and the World Health Organization (WHO) estimates that 663 million people still do not have access to clean drinking water. Significant volumes of capital have long been allocated to improving water security and the global percentage of those with clean drinking water has risen from 76% in 1990 to 91% today.

But, can world governments and financiers sustain this level of investment with a double whammy of natural population growth and the additional pressure of increasing longevity? The same conundrum applies

to food security, as the World Bank warns that 50% more food must be produced globally by 2050 at the same time as climate change could reduce crop yields by 25%.

Accessible and robust financial structures, such as private-public partnerships, will be required to meet the intensifying need for efficient, innovative and cost-effective healthcare. Mubadala, an investment arm of the Abu Dhabi Government, has invested in Imperial College London Diabetes Centre, Cleveland Clinic Abu Dhabi, Abu Dhabi Telemedicine Center and the primary care and multi-speciality hospital Healthpoint in recent years, for example. Research published by London-based BMC Medicine earlier this year highlighted that every additional Dhs4.58 (GBPE1) of public money invested in the UK's medical research results in the return of Dhs4.5 (GBPE0.99) of investment from the private sector.

A report from a UN panel in September this year called for life-saving and life-enhancing medication to be made more accessible to different socio-economic groups around the world. It is a valid rally cry, but one that makes financiers' delicate balancing act a little harder. Most juggle the desire for greater profits against accessible healthcare well, but an extreme case occasionally highlights the difficulties. This was most recently illustrated by a global public backlash against an American company that raised the price of a drug used to treat immune-related diseases by 5,000% in 2015 from \$13.50 per pill to \$750.

**There are endless** complexities to the multifaceted economic structures required to provide sustainable and innovative healthcare worldwide, but figuring out the answers is the only way of giving a stamp of credibility to bullish scientists' forecasts. ♦



Chris Bagnall, Chief Underwriting Officer & Head of Claims, Zurich International Life Ltd.

07

# THE FUTURE OF HEALTH:

*The first person who will live to 150 has already been born*

**FUTURE SUPER-RESOURCES WHO WANTS TO LIVE FOREVER?**  
**NOW LONGEVITY SOCIO-ECONOMICS**

**SOCIAL INEQUALITY ETHICS BECOME THE CEO OF YOUR OWN HEALTH RICH VS POOR TAILOR-MADE MEDICATION**



# FOR THE EMOTION

## Dr. Nicole Sirotin



**"LIVING TO 150 YEARS OLD IS A FOREGONE CONCLUSION, BUT HOW WE GET THERE IS UNDERPINNED BY A THOUGHT PROVOKING QUESTION: WHAT DOES IT MEAN TO BE ALIVE?"**

**Unprecedented advances in genetic technology** are pushing our understanding of the human body to a new level. With more clarity than ever before, scientists can look at genomes and identify the drugs that will most benefit that individual and their risk of specific diseases. Such transparency has given us all incredible power to shape our bodies and lifestyles to prevent diseases before they happen. Recent breakthroughs in medical technology means we can remove and replace specific genes at exact locations – this is a real gamechanger.

Some will pause and say: do we really want that? I encourage us all to ask this question, as such developments mark a fundamental shift in our evolution as a species. Equally, I doubt that anyone can argue against the value of removing a gene that causes breast and ovarian cancer, for example. We already have advances in robotics and prosthesis that are brain-controlled and integrated into existing bone and muscle. We have no problem designing these for people who are amputees, or who have suffered from accidents. So, at what point is aging a legitimate reason?

We are in the process of growing a human heart and can use our own DNA to grow new organs that could help

us live longer. As technology advances, such medical tools will become cheaper and more accessible – just think about how rapidly your cell phone has changed over the last decade. But, we cannot expect medication, robotics and gene therapy to ensure we live longer lives. It is what we do in our daily lives that affects so much of our health outlook. Many diseases in society are now non-communicable – such as diabetes, obesity and heart disease – thanks to prosperity. Lifestyle choices and subsequent diseases have a huge impact on the people who experience them, but they are avoidable and many are reversible.

**Identical twins** who have obviously been born with the same genome develop different diseases as adults; it is fair to assume that this disparity is due to individual lifestyle choices. One spends quality time with family and eats few processed foods and sugars, for example, while the other is sedentary and enjoys fast foods. Which one do you think develops diabetes? We can prevent up to 90% of diabetes and scientific studies detail how eating a handful of nuts everyday can cut the risk of heart disease by 30% and premature death by 22%.

Emma Morano, who is the world's oldest living person at 117 years old, said not overeating has been her secret to longevity. Human and animal studies have looked at increased longevity, increased cognitive function and decreased cancer with various forms of fasting. The one that has been most studied is a routine where one eats less than 500 calories a day for two non-consecutive days a week, with a Mediterranean diet for the remaining five days.

**Living to 150 years** old is a foregone conclusion, but how we get there is underpinned by a thought provoking question: what does it mean to be alive? We need to approach longevity with an eye on how we can all contribute to creating a world that is worth living in.

We have many reasons to be optimistic. Junk food companies are losing business as consumers are demanding healthier and sustainable options, for example. This trends has been illustrated by many of my patients in Abu Dhabi losing ten kilograms just by being more active and cutting out sugar and eating healthier carbohydrates. This is just one of many inspiring stories that maps out a longer and healthier future for us all. ♣

## Chris Bagnall



**"INSTEAD OF ASKING WHETHER SCIENCE WILL ALLOW US TO LIVE TO 150 YEARS OLD, PERHAPS WE SHOULD BE ASKING IF WE CAN AFFORD TO?"**

**Confronted with the mortality of her 98-year-old** great-grandmother last year, my daughter turned to me and asked: "Daddy, how old do you think I will live to be?" None of us have crystal balls to fully answer this question yet, but I did share the secrets of living a long and healthy life with her. Taken from a study sponsored by the National Geographic, I recalled an interview with a 99-year-old lady from Okinawa in Japan. Her secret to longevity boiled down to a handful of key points. She ate a plant based diet, did light exercise regularly, stayed connected with friends and family, had a low stress life and a purpose to get up in the morning. This is called 'Ikigai' in Japanese and literally translates as 'meaning to life'.

It is also not a case of one size fits all. A quick review of the average life expectancy across the globe reveals huge differences. In certain central African countries, some people rarely live to see their 50th birthday, while many living in Organization for Economic Co-operation and Development (OECD) countries can live up to an average of 84 years old. The surprising point is that the average global life expectancy is rising by up to four months every year. That equates to an additional six hours for every day that passes.

Simple math shows us that a century from now, we could expect the average lifespan to be close to 110 years.

**NATURE**, a prestigious journal from respectable scientists, suggested in October that the maximum lifespan of humans was set at around 115 years old, though it acknowledges that this does not take advances in human engineering into account.

Modern medicine has traditionally looked at treating the effects of aging, but we have gained great insights into our genetics and the possible causes of ageing since the completion of the human genome project in 2003. In the last few years alone, there have been significant investments into the science of longevity, with companies like AbbVie and Google pledging \$1.5 billion. The investments will support a wide range of research, including research into gene editing and stem cells. We can already increase the maximum lifespan of fruit flies, mice and rhesus monkeys from 40% to 100% more than the maximum of their control groups. If we have been successful in such animal research, then surely humans cannot be much different?

We have already been able to identify potential genes responsible for longevity and we have the technology to either delete these genes, or use them to create a new species. Scientists at the University of Istanbul have taken a gene from a jellyfish and spliced it into a rabbit's DNA to create glow-in-the-dark-bunnies, for example. We should take such advancements very slowly and consider what we may accidentally unleash. But, there is no denying that the science exists.

**Another point** to consider very seriously is the economics. Instead of asking whether science will allow us to live to 150 years old, perhaps we should be asking if we can afford to? What must the new retirement age be to ensure that we have sufficient funds to live healthily and happily into the triple digits? How can the insurance industry switch the focus from the financial consequences of death to that of longevity? When my daughter's children ask her in a few decades to share her secrets to longevity, I suspect she will tell them to save for the future because living longer will be for those who can afford it. ♣

# AGAINST THE MOTION

## Quan Ho Vuong



**"IF THIS OBSESSION TO LIVE LONGER AND LONGER BECOMES THE OVERRIDING MOTIVE BEHIND BEING ALIVE, THEN LONGEVITY BECOMES THE FOCUS POINT INSTEAD OF LIVING."**

**What is the value of life? This is the best starting point to any discussion on longevity.** Death is a fundamental part of who we are and our acceptance of death is an essential part of what it means to be human. Death teaches us to value our time and to strive to meet our goals quickly. This enables people, like an autumn flower, to bloom intellectually and emotionally in life and the evolution of civilizations. New blood and new ideas.

Our obsession with trying to extend life into triple digits erodes our ability to cope emotionally with death. Death knocks the wind out of our sails at the best of times, but living in a society where it becomes more of a taboo topic is not healthy. Switching the conversation to us living to 150 years old does not mean we escape death – we are only pressing the pause button on the inevitable. If this obsession to live longer and longer becomes the overriding motive behind being alive, then longevity becomes the focus point instead of living.

**Society will suffer** if we extend the maximum lifespan into triple digits. When you live for much

longer – we are talking decades – you have less to contribute to the community. Such contributions are vital to flourishing and evolving societies. A team was sent to stabilize the nuclear plants after the tsunami swept through Japan in 2011. Older members of Japan's society made up the team, as authorities said young Japanese engineers had more of their lives to live. The older individuals said they should sacrifice themselves for the good of the wider society. If we live for longer, this natural sense of chronology will suffer.

**It is also important** to consider how societies will be able to support a growing and aging population, especially as the imbalance between working and non-working communities increase. Living longer could also dampen the sense of inspiration amongst today's youth, as millennials will not have the theoretical space to create their own generational image if the old guard lives well into triple digits.

Studies show that 75% of survey respondents would extend their life if it meant they would continue to live healthy lives. But again, this would make it

considerably harder for the younger generation to rise to a position of influence and authority in society. Linked to that is that the younger generation – including those not yet born who some argue could live to 500 years old – will simply procrastinate. They will be raised in an environment where longevity is normal, so they may think they can achieve their goals later. What is the rush, they may ask?

**At the heart of** the argument against making 150th birthdays commonplace is that it goes against our natural rate of evolution. Death is the greatest source for innovation and change. If we look at life in recent centuries and millennia, the old get s replaced by the new and the new are not encumbered by past mistakes. Instead, they try something new. Therein lies the birth of change and evolution. If we try to rewrite the rulebook on this natural mechanism, then what are we putting at risk? If we try to extend life so that many of us end up living to 300 years old, are we giving a dismissive wave goodbye to the natural forces that have enabled us to achieve the great civilization that we currently enjoy? ♣

## Dr. E. Murat Tuzcu



**"THERE APPEARS TO BE A LIMIT TO THE MAXIMUM LIFESPAN OF HUMANS. SCIENTIST THINK THAT THE CEILING IS AROUND 115 YEARS."**

**Nobody is going to live 150 years in the 22nd century.** Treating diseases and making improvements to global healthcare is not going to prolong the maximum lifespan of our species. I have been a physician for 40 years and I have seen many people in their final hours. Aside from accidents, humans inevitably die from illness, or old age.

We have all heard, or read of people who have run half marathons at 80 years old, or go ballroom dancing with their new date when they are in their 10th decade. Such people are undeniably in excellent health and have rarely been ill, or hospitalized. They will live robust lives until they have a bad day that triggers a rapid decline and leads to death relatively quickly. We ask, why did that person die? He did not have diabetes, or high blood pressure, or any other chronic disease. The answer is simple – they died of old age.

We must remember that there is a difference between adding a few more years to the life expectancy and increasing the maximum lifespan of humans. The latter is difficult to achieve. This very issue was studied by scientist. In an article published in *NATURE*, a prestigious journal, sought to answer whether the

maximum lifespan of humans is flexible. It was rare for someone to live to 80 years old, or beyond in the 1800s. Our average lifespan has increased over the last century thanks to the advancement of medicine, technology and vaccines. The maximum age was also increasing gradually. Up until 1990, the global maximum age increased to 115 years old. Since then, almost nobody has lived past that. This appears to be a natural ceiling.

There is more evidence supporting the presence of the ceiling. Scientists reviewed the fastest growing segment of a population in France in the 1920s and found it to be the 85 year olds. The fastest growing population segment got older over time. In 1990, it was those who were 102 years old. These findings were validated in much larger data sets from 40 countries. Scientists were very excited by the clear trajectory, which suggested that humans' maximum lifespan will continue to grow. Yet, after the 1990s this trend reached a plateau.

Some say that we will achieve longevity with genetic engineering resulting in doubling, or even tripling the maximum lifespan. I am a physician scientist, as well as a clinician. I have never forgotten a vital lesson

that I learned from drug development trials. That is unintended consequences. It is not very rare to see a drug that performs well in clinical trials and have an acceptable side-effect profile later on emerge as a dangerous agent as hitherto unknown side effects are discovered. Can you imagine what would be the unintended consequences of a genetic intervention?

**Aging happens in** every cell it gradually weakens the cell and then ultimately it collapses. To prevent this process we have to affect trillions of cells. I don't think we can alter the genes of all of our cells.

If not genetic engineering perhaps printing new organs will be the solution for a lifespan of 150 years. Doctors have already made some advances in this area. I think we will have artificial organs in the future. There are people who think that we will have the content of our brains downloaded, so that our thoughts can be uploaded when our minds deteriorate with Alzheimer's. But, if such a bionic person with many artificial organs and uploaded brain contents lives to 150 years old, would that person be the same human being that we know and love today? ♣

# THE FUTURE OF HEALTH: THE FIRST PERSON WHO WILL LIVE TO 150 HAS ALREADY BEEN BORN

The audience voted their opinion using an electronic voting system before the debate began, with the results displayed at the end of the debate. The audience were then asked to vote a second time following the debaters' closing statements. The winning team is the one that swayed more audience members between the two votes.

14

**40%**  
**DISAGREE**

**PRE-DEBATE**  
**RESULTS**

**60%**  
**AGREE**

**61%**  
**DISAGREE**

**POST-DEBATE**  
**RESULTS**

**39%**  
**AGREE**

15



Join Us at the Next Debate  
on Wednesday March 8<sup>th</sup>, 2017  
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