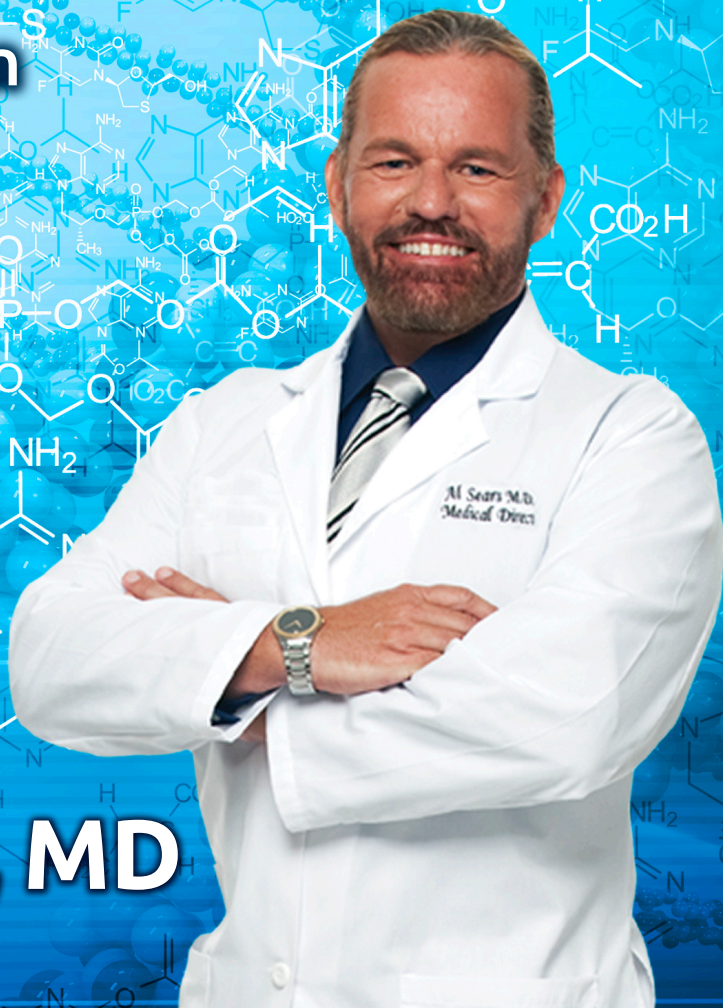
From The Sears Institute for Anti-Aging Medicine

The Youth Factor Protocol

Discover the New "Telo-Technology" That Stimulates Your Cells to Grow Younger

- Ignored by Both Media and Medical Journals
- Genetic Key Unlocks a Secret Inside Us
- Restore Your Aging Brain



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Uniquely Qualified to Keep You Healthier For Life

Dr. Al Sears, M.D. currently owns and operates a successful integrative medicine and anti-aging clinic in Royal Palm Beach, Florida, with over 25,000 patients. His cutting-edge therapies and reputation for solving some of the most difficult-to-diagnose cases attract patients from around the world.

As a graduate of the University of South Florida College of Medicine, Dr. Sears scored in the 99th percentile on his MCAT and graduated with honors in Internal Medicine, Neurology, Psychiatry, and Physical Medicine.

After entering private practice, Dr. Sears was one of the first to be board-certified in anti-aging medicine. As a pioneer in this new field of medicine, he is an avid researcher, published author, and enthusiastic lecturer. He is the first doctor licensed in the U.S. to administer TA-65, the most important breakthrough in anti-aging medicine today.

Dr. Sears is board-certified as a clinical nutrition specialist and a member of the American College of Sports Medicine (ACSM), the American College for the Advancement in Medicine (ACAM), the American Medical Association (AMA), the Southern Medical Association (SMA), the American Academy of Anti-Aging Medicine (A4M), and the Herb Research Foundation, (HRF). Dr. Sears is also an ACE-certified fitness trainer.

Dr. Sears currently writes and publishes the monthly e-Newsletter, *Confidential Cures*, and daily email broadcast, *Doctor's House Call*, and contributes to a host of other publications in the field. He has appeared on over 50 national radio programs, *ABC News, CNN,* and *ESPN*.

Since 1999, Dr. Sears has published 14 books and over 100 reports on health and wellness with a readership of millions spread over 163 countries.

In his first book, ***The T-Factor, King of Hormones***, Dr. Sears perfected the use of natural and bio-identical testosterone boosters to help men restore the drive, ambition, muscle strength, vitality and sexual performance of their youth.

Dr. Sears followed up with ***12 Secrets to Virility***, a full-blown strategy for male performance that includes his own patient-tested protocols for successfully dealing with men's health concerns like fighting excess estrogen, protecting the prostate, eliminating fat gain and keeping a sharp mind and memory.

In 2004, Dr. Sears was one of the first to fight against the conventional belief that cholesterol causes heart disease, proving that cholesterol is not the cause, but the part of the body that heart disease acts upon. In ***The Doctor's Heart Cure***, Dr. Sears offers an easy-to-follow solution that effectively eliminates your risk of heart disease, high blood pressure and stroke.

In 2006, Dr. Sears shocked the fitness world by revealing the dangers of aerobics, "cardio" and long-distance running in his book, ***PACE: The 12-Minute Revolution***. Expanding on the fitness principles in ***The Doctor's Heart Cure***, he developed a fast, simple solution to restore muscle strength, guard against heart attack and burn excess fat. Today, PACE is practiced by thousands of people worldwide.

In 2010, Dr. Sears made history by bringing telomere biology to the general public. As the first U.S. doctor licensed to administer a groundbreaking DNA therapy that activates the gene that regulates telomerase, his breakthrough book ***Reset Your Biological Clock*** shows how anyone can preserve the energy of youth by controlling the length of your telomere, the true marker of aging.

An avid lecturer, Dr. Sears regularly speaks at conferences sponsored by the American Academy of Anti-Aging Medicine (A4M), the American College for the Advancement of Medicine (ACAM), the Age Management Medicine Group (AMMG), and the Society for Anti-Aging, Aesthetic and Regenerative Medicine Malaysia (SAAARMM).

As the founder and director of Wellness Research Foundation, a non-profit research organization, Dr. Sears has made it his life's work to bring his patients the latest breakthroughs in natural therapies. As part of his ongoing research, Dr. Sears travels the world in search of herbs, novel cures and traditional remedies. Meeting with doctors and healers, Dr. Sears has brought back and revitalized much of the traditional knowledge considered endangered in today's modern world.

- **During an expedition to the Peruvian Andes, Dr. Sears brought back a nutrient-dense oil made from the Sacha Inchi nut, containing the highest plant source of heart and brain boosting omega-3 fatty acids.**
- **In India, Dr. Sears studied at the oldest existing school of Ayurvedic medicine, the ancient Indian healing tradition, and was tutored by Ayurvedic doctors on the use of potent Indian herbs used to treat heart disease, cancer and Alzheimer's disease.**
- **While trekking through the Amazon rainforest in Brazil, Dr. Sears lived among the native Ashaninka Indians, incorporating their ancient knowledge of healing herbs into his own nutritional supplement formulas.**
- **In Jamaica, Dr. Sears met with the last living healer from the ancient and forgotten lineage known as the Maroons. Coming from West Africa 500 years ago, their knowledge was on the brink of extinction until Dr. Sears published a book showcasing their unique herbs and healing formulas.**
- **On the island of Bali, Dr. Sears had a meeting with the most famous of the ancient healers known as "Balians," – Ketut Leyir – and also met two of the country's foremost herbalists. Dr. Sears is publishing a book showing how to use Balinese herbs and make unique healing mixtures for the skin and body.**

With a life-long interest in botany, herbology, physiology and anthropology, Dr. Sears has a unique capacity to investigate the evidence behind the stories and claims of traditional medicine from native cultures around the world.

By exposing the flaws of mainstream medicine and pioneering new solutions through innovative approaches to exercise, nutrition and aging, Dr. Sears continues to empower the lives of his patients and readers through his books, newsletters and regular media appearances.

The Youth Factor Protocol

I remember writing the word "telomere" on a piece of scratch paper. Underneath, I added, *"This will change the world as we know it."*

That was back in 1990, just moments after I finished reading an article in the journal *Nature* about a new technology that promised to turn everything we know about aging and disease on its ear.

Today, I want to show you how the revolution is in full swing all around me.

I no longer guess at how and why we age. I know EXACTLY how the mechanism of aging works… and how to influence it so that we maintain the power, strength and enthusiasm of youth for longer than anyone imagined possible.

Finding this "cellular control switch" inside our cells and understanding how I can influence it to extend our "health span" is the greatest discovery of our time.

I now have a true "age-reversing therapy," and with it, the ability to slow the loss of our physical and mental powers. In many cases, I can EXTEND the time we have on this earth to feel young and vibrant.

In this special report, I'll show you what this discovery really means, the story behind the researchers who won the Nobel Prize for its discovery and how YOU can use a handful of simple nutrients to set this "control switch" to "perpetual youth."

I'll also show you the science behind the magic and why researchers from the University of California at San Francisco to Harvard University all agree that this breakthrough will change life as we know it… *forever*.

I Now Understand the True Mechanism of Aging

OUTDATED:
Theories on Why We Age:

- **Disposable Soma Theory** – We just temporarily house our Genes.
- **Oxidative Stress Theory** – Free radicals cause damage to cells.
- **Vital Substance Theory** – A vital substance is limiting.
- **Wear and Tear Theory** – Self explanatory.
- **Reproductive Exhaustion Theory** – After reproduction we die rapidly.
- **Aging by Design Theory** – Aging is programmed.
- **Mitochondrial Dysfunction Theory** – Mitochondria become altered.
- **The Neuroendrocrine Theory** – Changes in hormone regulation.
- **The Rate of Living Theory** – Similar to the Vital Substance Theory.
- **Genetic Mutation Theory** – Accumulation of mutations cause aging.
- **The Immune System Theory** – Decreased immune function.
- **The Waste Product Accumulation Theory** – Self explanatory
- **The Cross-Linking Theory** – Proteins such as collagen crosslink.
- **Errors and Repairs Theory** – Inaccurate repair of damage.
- **The Order to Disorder Theory** – Decreased maintenance of order.
- **Telomere Theory of Aging** – Telomere length controls aging.

Over the past century, dozens of ideas, theories and hypotheses have made their way through the halls of universities and laboratories around the world.

But as captivating as these ideas may have been at the time, I now know that all the factors I used to think of as "causes" of aging are merely the "consequences" of aging.

Most of the so-called "causes" come from *internal* sources. In other words, the hormones, cells and sources of energy inside our bodies start to decline over time and cause the loss of energy, vitality and immunity we associate with aging.

There's "menopause" the hormonal changes that usher women into middle age, "adropause" or the loss of male sex hormones like testosterone in men that cause a loss of sex drive, ambition and muscular physique.

There's "somatopause" the loss of growth hormone that immediately saps your physical performance and adds pounds of fat around your middle, there's "thyropause" the loss of thyroid hormones that throw off your metabolism and energy… and dozens of other "pauses" that rob you of your youth.

There were also the ideas that focused on external causes of aging such as poor diet, stress, lack of exercise or physical challenges, predation, contamination of our air, water and food supply, as well as the new modern threat, the toxic "chemical body burden" that accumulates in your blood from the time we're in the womb.

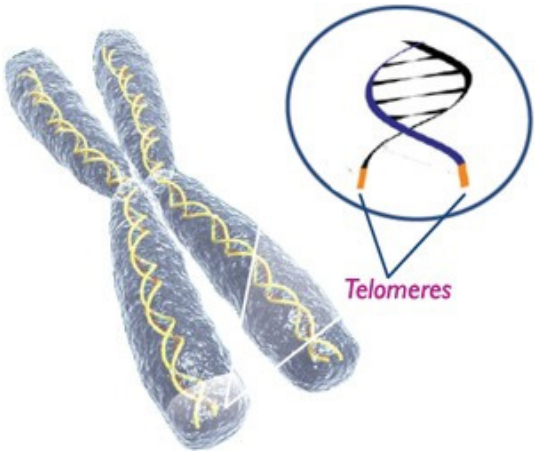
But ALL these influences, whether internal or external all point to one final pathway that determines how and why you age, and that's the ***shortening of the telomere.***

To better understand what this means… let's take a look at what the "telomere," or your "cellular control switch" really is.

Your Telomeres Tell Your Cells How Old They Are

Deep within your DNA, located in the nucleus of each cell, are the building blocks or "blueprint" of every cell in your body.

At the end of each strand of DNA is a little bit of genetic material called the *telomere* (tee-lo-mere).



The telomeres are the "protective tips" or "caps" at the ends of each strand of DNA. As a whole, your DNA contains the blueprint or program for EVERY cell in your body.

The telomere is the part of your chromosome that controls aging. And every time your cells divide, your telomeres get shorter. And when your telomeres finally run out, cell division stops and life comes to an end.

But there's more to it than that. As you age and your telomeres get shorter, your body produces cells that are older, weaker, and more decrepit.

It's programmed old age… complete with all the telltale problems that come with it.

In fact, the shorter your telomeres, the "older" your body is, regardless of your actual age. In this way, your telomeres "tell" or instruct your cells how to behave based on how old they are.

But when you slow the countdown, you may be able to extend your lifespan, and feel younger longer.

In just a moment, I'll explain more about how we came to that conclusion, and the studies that support it.

First, there's something even more remarkable about the telomere you need to know.

The Telomere is the "Director" of Your Life Movie

Because telomere biology is an emerging science, there are researchers who suggest the telomere is merely an "end point" that signals the end of life when the telomere burns down to the end and cell division stops.

I believe the telomere has a more powerful, more commanding role in how we live day-to-day and year-to-year.

Playing the role "control switch" in your cells, the telomere serves as the "director" of the unfolding drama we call life. This control switch determines how old your cells act, what they're capable of, and what their true potential is at EVERY moment of your life.

Like a movie director, the telomere tells the cell what to look like, how to move and what to say. It literally gives your cells a complete set of instructions, like a script or screenplay, based on what act and scene of your "life movie" you're currently acting in.

And those instructions can change quickly if there's a rapid loss of the telomere.

Here's what I mean… Let's imagine there's a man named Tom was born into a wealthy New England family. Because Tom had all the privileges of money, he grew up relatively stress-free, with access to a fresh, varied diet with the right amount of nutrients, antioxidants, plenty of exercise and time outdoors.

Under these conditions, Tom's telomeres would disappear at a slower rate than most people. And with longer telomeres, Tom would be someone who "aged well" and looked younger than his age.

Now let's imagine that Tom grew up to become a university professor with a nice income and lovely home. But that at some point in his life, let's say in his early thirties, Tom finds out that his cousin Joe living in West Virginia suddenly dies, leaving a wife and three children without a father.

So Tom decides to do the right thing and move to West Virginia to look after his cousins family. But when Tom arrives, he can't find a job. There are no openings at the college level so Tom has take a job in the coal mines.

As soon as Tom starts breathing in coal dust, his telomeres start to disappear at a faster rate. Working twelve hours a day, Tom has little time for exercise and starts eating fast food.

With the added stress of taking care of a large family on a small income, his telomeres start burning down two to three times as quickly as they did when he was living the American dream back in New England.

Because the telomere is the master "control switch," the much shorter telomeres demand that Tom starts expressing a much "older" version of himself.

In other words, his short telomeres CREATE cells that are older, weaker and less able to fend off the threats Tom experiences in his new environment.

Tom, once healthy and robust, goes into a tailspin and starts to look and act more and more like an "old man." He develops back pain, he doesn't have the energy to do anything on his day off, his skin wrinkles, his eyesight diminishes and he appears colder and more distant to his family.

At the age of 35, Tom is now "old."

On the surface, you might think it was the change of environment that did him in… and that was a contributing factor, or course.

But the key here is realizing that these stress factors accelerated the loss of his telomeres, which in turn CREATED an "older" more decrepit version of himself.

It's also important to realize that Tom's condition can be fully REVERSED if his telomeres were to be *lengthened*.

In that case, you would see Tom transform into a younger, happier, more energetic version of himself.

It all depends on where you put that control switch.

When telomeres burn quickly, the control switch moves into an older-acting part of your genome. And when you keep longer telomeres, the control switch stays in a younger-acting part of your genome.

This "programmed death" in your cells is part of a larger, ongoing program that started running -- like a movie -- the day you were conceived.

But today we know we can influence the director of this movie… Here's how it all started.

Shining the First Ray of Light into the Mystery of Aging

In 1962, Leonard Hayflick, Ph.D. shattered a long-standing myth of the human cell.

Up to that point, scientists believed the human cell would continue dividing if you gave it the right conditions. Theoretically, they thought that if you cultured human cells in a petri dish they would proliferate forever.

Dr. Hayflick showed that human and animal cells have a limited capacity for replication. In fact, he determined that human and animal cells have a limit, beyond which, cell division stops and life come to an end.

Now known as "Hayflick's limit," the discovery that our cells have a set number of replications triggered the first realization of aging.

If human cells have a finite number of divisions, there MUST be some mechanism in the cell that keeps track of each division and determines when the end point is reached.

At the time, Hayflick had no knowledge of the telomere, but he laid the foundation for what was to come. It's also important to note that Hayflick's discovery created the distinction between "mortal" and "immortal" cell lines.

In Hayflick's time, it was already known that germ cell lines, specifically one-celled organisms, could replicate over and over, and if given the right environment, could live forever. These cells were termed, "immortal" because there was no limit to how many times they could divide.

Hayflick showed that animals and humans were different, and his discovery uncovered the roots of our human mortality. We are, in a very real sense, programmed to die.

Today, we know that the telomeres of one-celled organisms are "static." Their telomeres never shorten.

But as Hayflick discovered, *that's not true for human cells.*

Decide for Yourself Which Genes Get "Turned On" and Which Get "Turned Off"

At the moment of conception, life begins… and as cells start to divide, your telomeres start directing the show.

Conception is also the point where "immortal" cells become "mortal." In other words, once you become human, the hour glass gets turned over and the countdown begins.

You probably remember from high school biology class how a fertilized egg becomes an embryo. And during gestation, your cells become more and more specialized as organs and tissues begin to form.

So how does your tiny, unborn body know how to do all this?

The length of the telomere tells your cells exactly what to do based on what part of the genome is being expressed. Not surprisingly, up to half of your telomeres are burned off while you're still in the womb. This is when your cells are dividing rapidly and you're expressing massive amounts of genetic material in a short space of time.

But that program doesn't stop at birth. It carries on as we grow into adults, through old age and right up to the point of our death.

As your telomeres shorten over time, the proteins inside your DNA shift and change, exposing a new "fold," or new section of your genome.

As the shortened telomeres show "older" parts of your genome, you create cells that act and look older.

Think of it as moving your control switch further into your script or screenplay… and the further you get, the closer you are to the end of the story.

Here's the bottom line: The page of your life script you happen to be on determines which part of your genome is "expressed" or brought into reality. Your telomere or "control switch" lets you know how much youthful energy you have to work with, and based on that, commands your cells to act accordingly.

Imagine being an actor in a play. In act 1 your character is a teenager. The stage hands behind the scenes give you a costume that corresponds to your character's age. In this case, you might wear a pair of jeans and a t-shirt and have the energy and perspective of a teenager that gives you room for a spirited, dynamic performance.

But by act 3, your character is older. The stage hands take your t-shirt and jeans and give you a button-down sweater, a fat pair of sneakers and a walker. Now your dialogue doesn't have any of the spunk it used to… and you're moving more slowly on stage to accommodate your character's age.

Are you beginning to see how this works?

The stage hands behind the scenes are like your body's control switch. They tell you what part of the play you're acting out, what to wear, how to behave and what to say.

They direct the show.

The discovery of the telomere is the most important discovery of your time because for the first time in human history it gives YOU the opportunity to influence the director of your own life's movie.

Now, you can tell the director to stay in the "youthful" section of your life script simply by moving the control switch to that section and leaving it there.

Later I'll show you HOW to move your control switch into a "younger" section of your genome.

First, I want to show you the research behind this discovery and how we arrived at this understanding.

The Discovery that Lead to a Nobel Prize in Medicine

In 1973, the Russian theorist Alexei Olovnikov first recognized that the tips of chromosomes could not completely replicate themselves after each cell division. In other words, he noticed that the ends of the chromosome got shorter with each replication.

Taking Hayflick's observation to the next level, Olovnikov suggested that the end pieces of DNA continued to shorten until a critical level had been reached, at which point cell division stopped.

While Olovnikov was on the right track, his research apparently stalled and it wasn't until Elizabeth Blackburn arrived on the scene that the telomere really came into focus.

Starting in 1975, Dr. Blackburn working as a postdoctoral fellow at Yale University with Joseph Gall, first detailed the unusual nature of telomere by mapping out their simple repeated DNA sequences at the end of chromosomes.

Published in 1978, their work launched Dr. Blackburn's historic career in telomere biology. Obsessed with her new mission, Dr. Blackburn became increasingly marginalized from mainstream science as her research took her in new, but unpopular directions.

Her next breakthrough came in the mid 1980s during her work with the *tetrahymena*, a single-celled organism we know as "pond scum." Suspecting there was an enzyme that kept the telomere from eroding as it does in humans and animals, she caught her first glimpse of the enzyme she co-founded: *telomerase*.

Dr. Elizabeth Blackburn
In 2009, Dr. Blackburn and her co-founders Carol Greider and Jack Szostak won the Nobel Prize in Medicine for discovering the enzyme that rebuilds the telomere.

Photo: Micheline Pelletier 2007

Simply stated, telomerase is enzyme that rebuilds the telomere.

That's why single-celled organisms are able to live forever. With telomerase "turned on," their telomeres never run down.

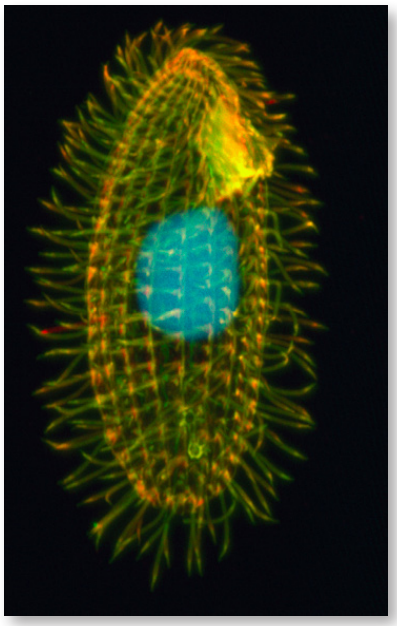
In humans and animals, telomerase is ***turned off.*** And that's why humans are mortal beings.

Without an active telomerase enzyme, our telomeres shorten until they run out and life comes to an end.

At the time of Dr. Blackburn's discovery, no one knew if humans had telomerase, that discovery came later.

But of course, once telomerase was discovered, it opened new doors and posed new questions, namely: If humans have telomerase, and telomerase can be "turned on," does that mean humans can extend their lifespans and live without disease?

As Dr. Blackburn's discovery made its way into peer-reviewed journals, the attention of the scientific world turned more and more towards the question of the telomere. And that in turn, inspired a new wave of research.



Tetrahymena: the one-celled organism Dr. Blackburn was studying when she co-discovered the telomerase enzyme.

In Spite of the Telomere's New Credibility Researchers Fail to Connect All the Puzzle Pieces

By the mid 1990s, the number of research studies on telomeres and telomerase exploded. From just a handful in 1995, the number of published journal articles and studies jumped to over 1,000 by 2005.

But you're lucky to be reading this, because in spite of the additional exposure and credibility, *scientists and researchers failed to connect the dots.*

Even though we have conclusive proof that the telomere is the defining mechanism of aging, and that rebuilding the telomere changes the way we age, the scientific community at large never put it all together to draw this conclusion.

To this day, you still find researchers saying they don't believe the telomere has any implications for avoiding chronic disease… for improving the quality of our lives… or reversing the degenerative effects of aging.

Sure, science is slow to embrace change. ***But let's look at the evidence.***

There's more than enough proof to show that the telomere is THE mechanism by which we age, AND gives us the ability to reverse the signs of aging and restore the power and clarity of youth.

Here's what I mean:

FACT #1: Younger Cells Have Longer Telomeres… Older Cells Have Shorter Telomeres

The first major turning point was Dr. Hayflick's discovery that human cells have a set number of replications before division stops and life comes to an end. Knowing this is true means there MUST be some sort of mechanism inside the cell that "counts" the number of divisions and keeps track of them.

Without this mechanism, there would be no way for cells to know when time has run out. So the fact that human cell lines have a "built-in mortality" means there's an internal "authority" that sets the limit on cell division and shuts down the cell line causing death when the limit is reached.

Today we know that mechanism or "authority" is the telomere.

Once we understood the role of the telomere, the next observation revealed ***younger cells have longer telomeres, and older cells have shorter telomeres.***

Two studies from 1990, published in the journal *Nature* (the same issue I read with such anticipation back in those early days) proved this point.

These studies showed:

There is an age-dependent loss of telomere length, with losses ranging from between 30 and 150 nucleotide pairs per replication, depending on cell type.[1]

Cell division and telomere shortening continues until a critical telomere length is reached, at which point the cell is forced into a "programmed death" and can no longer replicate.[2]

That tells us that long telomeres are associated with ***younger cells***, and that short telomeres are associated with ***older cells***.

So at first, we only knew that telomeres shorten with age. We identified an association between short telomeres and aging and we knew the two happened at the same time.

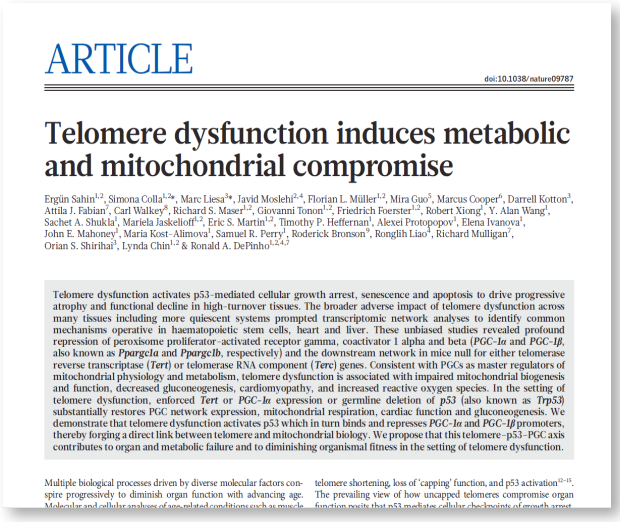
The next step was to see what would happen if you took a young cell with long telomeres and artificially shortened them.

If you could make a cell age faster than normal by shortening its telomeres, that would be the next link in proving the "age" of the cell is dependent on the length of the telomere.

And that's exactly what happened.

FACT #2: Artificially Shortening the Long Telomeres of Young Cells ACCELERATES Aging

In a groundbreaking study, again published in the journal *Nature*, researchers discovered that when they shortened the telomeres of young, health mice, they triggered a host of problems we associated with old age.[3]



ARTICLE

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Telomere dysfunction induces metabolic and mitochondrial compromise

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Telomere dysfunction activates p53-mediated cellular growth arrest, senescence and apoptosis to drive progressive atrophy and functional decline in high-turnover tissues. The broader adverse impact of telomere dysfunction across many tissues including more quiescent systems prompted transcriptomic network analyses to identify common mechanisms operative in haematopoietic stem cells, heart and liver. These unbiased studies revealed profound repression of peroxisome proliferator–activated receptor gamma, coactivator 1 alpha and beta (*PGC-1α* and *PGC-1β*, also known as *Ppargc1a* and *Ppargc1b*, respectively) and the downstream network in mice null for either telomerase reverse transcriptase (*Tert*) or telomerase RNA component (*Terc*) genes. Consistent with PGCs as master regulators of mitochondrial physiology and metabolism, telomere dysfunction is associated with impaired mitochondrial biogenesis and function, decreased gluconeogenesis, cardiomyopathy, and increased reactive oxygen species. In the setting of telomere dysfunction, enforced *Tert* or *PGC-1α* expression or germline deletion of *p53* (also known as *Trp53*) substantially restores PGC network expression, mitochondrial respiration, cardiac function and gluconeogenesis. We demonstrate that telomere dysfunction activates p53 which in turn binds and represses *PGC-1α* and *PGC-1β* promoters, thereby forging a direct link between telomere and mitochondrial biology. We propose that this telomere–p53–PGC axis contributes to organ and metabolic failure and to diminishing organismal fitness in the setting of telomere dysfunction.

Multiple biological processes driven by diverse molecular factors conspire progressively to diminish organ function with advancing age. Molecular and cellular analyses of age-related conditions such as muscle

telomere shortening, loss of 'capping' function, and p53 activation[12–15]. The prevailing view of how uncapped telomeres compromise organ function posits that p53 mediates cellular checkpoints of growth arrest

The article published in the prestigious journal Nature revealed the ability to create the signs of aging by shortening the telomere.

In short, by making their telomeres shorter and therefore "dysfunctional," they were able to artificially create signs of aging. And they made these changes to mice who were otherwise enjoying the vitality of youth.

It's as if the researchers put these mice in a time machine and sent them years into the future. But in reality, all they did was move the "control switch" inside their cells to an "older" part of their genome.

So then we knew there was some causal relationship. There's a cause and effect between short telomeres and aging that we can prove. In addition, we found that we can ***create*** the signs of aging simply by shortening the telomere artificially.

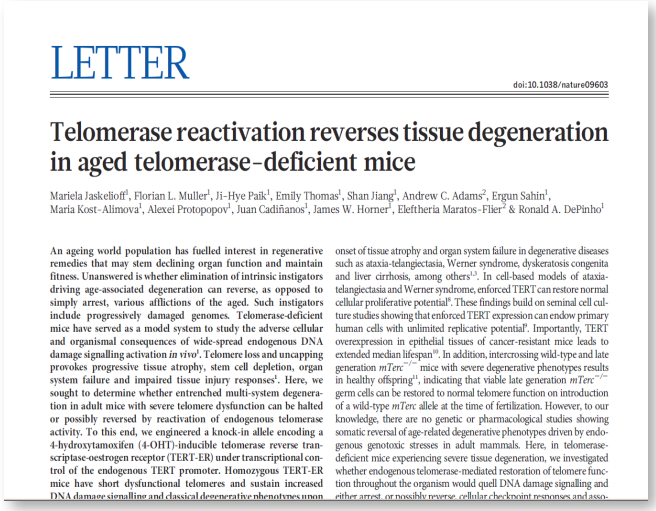
In the study, the researchers discovered that causing the telomeres of mice to become short and dysfunctional trigged a gene that immediately caused a loss of the cell's power plants called mitochondria.

Aside from a loss of energy and signs of heart disease, these shortened telomeres also caused problems with blood sugar and mice's ability to regulate their metabolism.

In other words, they became fat, slow and diseased. Exactly what you would expect from old mice.

The next step was showing that if we turn on the enzyme telomerase, we can slow the shortening of telomeres in a cell.

And in some cases ***make them longer.***



LETTER

doi:10.1038/nature09603

Telomerase reactivation reverses tissue degeneration in aged telomerase-deficient mice

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An ageing world population has fuelled interest in regenerative remedies that may stem declining organ function and maintain fitness. Unanswered is whether elimination of intrinsic instigators driving age-associated degeneration can reverse, as opposed to simply arrest, various afflictions of the aged. Such instigators include progressively damaged genomes. Telomerase-deficient mice have served as a model system to study the adverse cellular and organismal consequences of wide-spread endogenous DNA damage signalling activation *in vivo*[1]. Telomere loss and uncapping provokes progressive tissue atrophy, stem cell depletion, organ system failure and impaired tissue injury responses[2]. Here, we sought to determine whether entrenched multi-system degeneration in adult mice with severe telomere dysfunction can be halted or possibly reversed by reactivation of endogenous telomerase activity. To this end, we engineered a knock-in allele encoding a 4-hydroxytamoxifen (4-OHT)-inducible telomerase reverse transcriptase-oestrogen receptor (TERT-ER) under transcriptional control of the endogenous TERT promoter. Homozygous TERT-ER mice have short dysfunctional telomeres and sustain increased DNA damage signalling and classical degenerative phenotypes upon

onset of tissue atrophy and organ system failure in degenerative diseases such as ataxia-telangiectasia, Werner syndrome, dyskeratosis congenita and liver cirrhosis, among others[1,3]. In cell-based models of ataxia-telangiectasia and Werner syndrome, enforced TERT can restore normal cellular proliferative potential[4]. These findings build on seminal cell culture studies showing that enforced TERT expression can endow primary human cells with unlimited replicative potential[5]. Importantly, TERT overexpression in epithelial tissues of cancer-resistant mice leads to extended median lifespan[10]. In addition, intercrossing wild-type and late generation *mTerc*$^{-/-}$ mice with severe degenerative phenotypes results in healthy offspring[11], indicating that viable late generation *mTerc*$^{-/-}$ germ cells can be restored to normal telomere function on introduction of a wild-type *mTerc* allele at the time of fertilization. However, to our knowledge, there are no genetic or pharmacological studies showing somatic reversal of age-related degenerative phenotypes driven by endogenous genotoxic stresses in adult mammals. Here, in telomerase-deficient mice experiencing severe tissue degeneration, we investigated whether endogenous telomerase-mediated restoration of telomere function throughout the organism would quell DNA damage signalling and either arrest, or possibly reverse, cellular checkpoint responses and asso-

Published in the journal Nature, Dr. DePinho's study proves that activating telomerase REVERSES the losses we associate with aging.

If the theory help up, that would mean you could actually REVERSE the signs of aging by artificially lengthening the telomere.

And that's what happened during a recent Harvard study.

In 2011, Dr. Ronald DePinho, professor of genetics from Harvard Medical School and director of applied cancer science as the Boston-based Dana-Farber Cancer Institute, shocked the world by taking old mice (the equivalent of humans in their 80s) and returning them to youthful form.

FACT #3: Artificially Lengthening the Short Telomeres of Old Cells REVERSES Aging

The mice had lost their intelligence. Every one of them had performed poorly on tests, and they all had shrunken brains.

They had become infertile and lost their desire for sexual activity. Their hair had changed from glossy and youthful to dull and gray. Their vision was dimming, with a loss of peripheral vision.

Then, one by one, each of those signs of aging was reversed.

They became sexually active again and actually fertile. At the equivalent of a very elder age they had healthy offspring.

Not only did their intelligence come back, it reverted back to youthful. And the atrophy of the brain – the shrinkage – reversed. They grew back a normal, youthful brain.

Their hair became shiny and thick again. And their eyesight returned.

All because Dr. DePinho "turned on" the enzyme Dr. Elizabeth Blackburn identified as the "rebuilder" of the telomere.

When the mice had their telomerase turned on, they were rejuvenated ***after only one month.***

Their telomeres lengthened, and their telomerase levels increased.

Brain cells that were dormant came back to life, producing new neurons. Their shrunken organs, like spleens and even testes and brain, grew in size.

Key organs functioned better, and the mice got their sense of smell back. The males also produced new sperm cells, and their mates gave birth to larger litters.

The mice went on to live long healthy lives.[4]

After DePinho and his colleagues had taken mice and made them young again, he said the study produced results that were the equivalent of finding the famed ***fountain of youth.***

Diane Sawyer announcing the results of Dr. DePinho's study on *ABC's World News*.

The results were so remarkable, the story landed on *ABC's World News* with Diane Sawyer. But for those of us who had been following the story for decades, the victory was a watershed event.

On that night, over 40 years of research culminated in the revelation that when you change your telomeres, you change the aging process.

Fortunately, there are a few simple steps you can take that together promote longer telomeres and can slow the aging process. You don't have to make any radical changes, and there are no impossible, insane workouts or dieting that will deprive you of anything.

It's important because maintaining and even lengthening your telomeres can help you live healthier and longer, plus dramatically slash your risk of serious diseases.

And for the first time in human history, we know of specific nutrients that activate telomerase, your "fountain of youth" gene.

The Birth of the First Commercially Available Telomerase Activator

Back in the early 1990s, an entrepreneur named Michael West heard about the amazing breakthroughs in telomere biology at an anti-aging conference. Convinced of its effectiveness and place in history, Michael started the Geron Corporation with the vision of bringing the first commercially available telomerase activator to the public.

Over the last two decades, Geron secured more than 250 patents on their research, including one of the first nutrients proven to turn on your fountain of youth enzyme, *telomerase*.

The first milestone came when **Dr. Bill Andrews**, who was a Geron employee at the time, discovered the telomerase gene in humans. Bolstered by this success, Dr. Andrews dedicated his life to the search for a telomerase activator that would work in humans.

Dr. Andrews literally scoured the world looking for clues and after years of painstaking work, found a solid lead by turning to Traditional Chinese Medicine.

While investigating the ancient Chinese herb *astragalus*, Dr. Andrews uncovered a unique molecule by applying a patented extraction process. The result was the world's first telomerase activator for humans.

While this activator was owned by a Hong Kong subsidiary of Geron, another entrepreneur obtained a license from Geron to sell it commercially.

The new company launched a product using this unique molecule that activates telomerase..

After some initial testing in New York City, I became the first doctor officially licensed to administer this exciting discovery.

But before I tell you about my own experience with the first telomerase stimulator, let me share some of the evidence with you.

This compound is a single molecule which is extracted from the ancient Chinese herb astragalus. This concentrated nutrient helps to keep your telomeres from shortening, and in some cases can lengthen them.

Geron Corporation discovered a process to extract a very rare molecule found in tiny amounts in the Chinese herb astragalus. And they were able to prove that this molecule throws the switch on the gene that makes telomerase.

The problem is you can't just take astragalus. You need a highly concentrated form of it as an extract. It has to be pure, free of toxins and only comes from certain species of the plant.

Through a unique extraction process, this miraculous anti-aging molecule is isolated in its purest form, and tested for heavy metals, pesticides or other toxins, and is then processed in very small batches.

And it's safe. This compound has been used since 2005 and not a single adverse side effect or event has been reported.

Imagine, for a moment, what this means: ***this telomerase activator gave us the ability to slow the progress of aging, and in some cases reverse it, with a natural supplement.***

Clinical analysis backs this up.

Researchers tested a group of people and measured the number of white blood cells that looked old, and the number that looked young. Then the people started taking this exciting discovery.

After three months, they were found to have a ratio of young-looking cells to old-looking cells that someone would have if they were 20 years younger.[5]

Another peer-reviewed study was published in which this therapy reduced the percentage of cells with short telomeres, when taken as part of a supplement protocol.[6]

As you might imagine, Dr. Bill Andrews started taking this unique compound as soon as it was available.

As I mentioned, Dr. Andrews was the lead researcher responsible for the discovery of the telomerase enzyme in humans, and spearheaded the search for the astragalus molecule that activates telomerase, allowing the body to rebuild the telomere.

Stealing Fire from the Gods: My Professional and Personal Experience

As the first physician licensed to administer this discovery, I was privileged to see the results unfold right in front of my eyes.

In my practice, I've treated 53 patients for at least a 12-month period. On average, they have:

- **Reduced their pulmonary age;**
- **Decreased their c-reactive protein or CRP levels (a key indicator of inflammation and heart health); and**
- **Decreased their neurological age.**

These three documented changes are very promising.

"Reduced pulmonary age" means my patients' lungs have a new, younger biological age. And that's good news. Your lungs are your number-one indicator of all-cause mortality. The more lung power you have, the longer you live… and lung power trumps all other causes of death.

Inflammation, as measured by c-reactive protein or CRP, is another breakthrough for this compound. Having a healthy inflammation response is critical to good health. And decrease in CRP is an indication of youth and vitality.

Neurological age is an indication of brainpower, memory and reaction speed. The younger your neurological age, the faster your brain responds to the demands of daily life. This lets you maintain a sharp mind, a responsive memory and fast reaction times.

Many of these changes are best illustrated in one of my patients I'll call, "Michael."

This Revolution in Aging Gave Michael the Lung Power Of Someone Less than HALF His Age

I joke with Michael that he "turned 24" on his 60th birthday.

You see, Michael's 60-year-old body started to "grow younger." Today he has the clinically documented "pulmonary age" of a 24-year old.

In other words, Michael has the lung capacity and lung power of a man less than half his age. And when I measured markers to find the age of his other organ systems, I found similar results.

For example, Michael's "neurological age," the measure of his ability to concentrate, remember and process information is only 44, a sign that he has the brainpower of a much younger man.

Michael had other remarkable changes including better eyesight, lower cholesterol and dramatically higher testosterone.

All this extra energy helped him win at the recent North American Grappling Association Championship. In the space of one hour, Michael won two first place titles against men who were twenty years his junior.

In Michael's own words:

> *"I lost 20 pounds, increased my muscle mass and flexibility, eliminated joint pain I've had for years and miraculously made the inside of my body younger."*

While Michael's story sounds dramatic, it's not uncommon for people tto undergo a similar transformation.

I should know. I'm one of them.

After using this compound for several years, I can tell you there's nothing else like it. I can document from my own blood tests that I have the pulmonary age of a 25-year-old.

I was born in 1956, but my cardiovascular age is only 35. More importantly, the telomere length of my T-lymphocytes (white blood cells) correlates to that of a 35-year-old.

What hit me first was an *overwhelming sense of optimism*. As soon as I started taking it, I felt like a kid who just started summer vacation. I felt like someone who had their whole life ahead of them.

It's no exaggeration to say that you can roll back your aging clock to feel the kind of strength, optimism and exuberance you get from a MUCH younger body.

That means your cells, and therefore your body, get older without showing all the typical signs of aging. It gives you the energy, drive and power of movement younger people take for granted.

Restore the Powers of Youth You Thought Were Gone Forever

When the first telomerase activator first hit the market it was too expensive for most people afford. At $25,000 for the initial treatment protocol, plus weeks of blood tests and in-office exams it was only for the wealthy.

Today, the price has come down but you can still expect to pay several thousand dollars a month to keep the therapy going. There are other telomerase activating formulas available that cost much less.

But I do have more good news.

There are newly discovered telomerase activators you can take RIGHT NOW that don't cost more than a few hundred dollars a month… and that's if you take the best 9 or 10 that we know of.

What's more, you can get started without going through a lot of blood work or physical exams.

Below is a list of the best nutrients that are clinically proven to activate telomerase, your "fountain of youth" enzyme.

Use These Newly Discovered Telomerase Activators To Activate Your "Fountain of Youth" Enzyme

We've covered a lot of material so far, and there are a lot of new terms that may take some getting used to… but here's a quick recap of what you need to know:

Telomere: These are the "caps" at the end of each chromosome. Your chromosomes are the blueprints of life and are packed together in the nucleus, or center, of every one of your cells.

Every time your cells divide, the telomere gets a little bit shorter. When the telomere runs out, cell division stops and life comes to an end.

I like to think of the telomere as your ***cellular control switch***, because the length of your telomeres determines which part of your genome you express. By keeping longer telomeres, your control switch is set in the "younger" part of your genome, which means your body will create younger-looking and younger-acting cells.

Telomerase: This is the enzyme that "rebuilds" your telomeres. In our cells, this enzyme is "turned off." That means there's usually no way to stop the loss of your telomeres, or to rebuild them.

The telomerase enzyme was first discovered by Dr. Elizabeth Blackburn in 1984. Today, we are finding new ways to "turn on" this ***fountain of youth enzyme*** to prevent the shortening of the telomere and in many cases, lengthen it.

And here's the REALLY good news…

Newly Discovered Telomerase Activators: There are a handful of nutrients that are proven to not only prevent the loss of the telomere, but to ***activate telomerase and rebuild the telomere.***

Here are the best of these newly discovered activators:

Resveratrol:

It's probably no surprise this popular anti-aging nutrient can, according to new studies, ***"significantly increase telomerase activity."*** By helping to "turn on" genes that promote longevity, and "turn off" genes that promote disease, this new research confirms resveratrol's role as a leading telomerase activator.[7]

By influencing the way genes are expressed, resveratrol has the ability to activate anti-aging genes called *sirtuins*.

Sirtuins transmit signals to every cell in your body that literally cancel out the effects of aging. They bring the processes that lead cell death to a crawl, buying your body more time to repair the DNA damage that brings life to an end.

Resveratrol is in the skin of grapes. It protects the grape from threats such as cold weather, UV radiation and microbes. The amount of resveratrol in wine differs. White wine is not made with the skins like red is – so white wine has little resveratrol. Red wines from colder regions have the most resveratrol.

Drinking one or two glasses of red wine is one way to benefit from resveratrol. To get the maximum amount choose wines from Burgundy and Argentina's Cafayate Valley. Most red wines from California and Australia will have lower amounts.

If you're not a fan of red wine, resveratrol is also in:

- **Raisins**
- **Purple Grape Juice**
- **Peanuts**
- **Mulberries**
- **Eucalyptus Trees**
- **Japanese knot wood**

The problem lies in getting sufficient amounts of resveratrol. You'd need to drink 1,000 to 3,000 glasses of wine to experience the life extending benefits of resveratrol.

Resveratrol supplements are a better option. They're inexpensive and completely safe. You can take it any time of day, with or without food.You can find them in health food stores or online. ***I recommend taking around 10 mg to 20 mg per day for telomerase activation.***

Green Tea (EGCG):

The extract of green tea, EGCG, has a powerful protective effect on telomeres. In a study published in the *British Journal of Nutrition*, the telomeres of green tea drinkers were about 0.46 kilobases longer. This average difference in the telomere length corresponds to, ***"approximately a difference of five years of life."*** [8]

The active ingredient in green tea is EGCG, which can prevent and repair cell damage. As a scavenger of free radicals, EGCG combats the effects of pollution, sunlight and smoking, which keep skin from wrinkling and aging.

The best way to receive the benefits abundant in green tea – including the EGCG – is to start with whole tea leaves (sold in specialty tea stores) or with a tea bag.

Most of the bottled green tea drinks contain additives like aspartame that counteract brewed green tea's healing properties. I suggest you make your own to maximize the powerful, antioxidant-fighting benefits. You can also find ECGC supplements at your local health food store. ***I suggest taking 50 mg of ECGC daily.***

N-Acetyl-Cysteine (NAC):

This potent amino acid is a building block of your body's primary antioxidant called glutathione (GSH) and ***has the ability to prevent the death of cells by activating the human telomerase gene, your "fountain of youth gene."***

Just one of the many examples of how NAC protects your cells from early death is in your inner ear. Our military now treats soldiers with NAC during training to protect them from blast noise from gunfire and explosions.[9]

In fact, one study looked at military officers after shooting practice. The guns are incredibly loud. A roaring jet engine from a plane taking off a few feet above your head would be about 120 decibels. These officers were hearing gunfire that was up to 160 decibels.

After the noise exposure, one group took NAC and one got no treatment. The NAC group had much better hearing. Not only that, but the unprotected group had damage to the inner ear structure that's responsible for turning sound into nerve impulses so your brain can make sense of it. But the NAC group stayed completely normal and totally protected.[10]

To stimulate the activation of telomerase, I recommend a dose of 1,800 mg to 2,400 mg a day. NAC is available at your local nutrition and/or health food stores.

Alpha Tocopherol:

The most well-known form of vitamin E, alpha tocopherol ***protects against telomere shortening by activating and restoring telomerase.***[11]

That may explain why vitamin E can help prevent heart disease and even cancer. Research from Finland gave us the first massive study proving that vitamin E prevents prostate cancer.

Researchers monitored over 29,000 men for up to 8 years. They took either vitamin E or a placebo daily. The men taking the vitamin E had a 32% lower rate of prostate cancer. Also, these men had 41% fewer deaths from prostate cancer than those men not taking vitamin E.

The researchers believed that vitamin E prevented cancer in a several ways. By:

- **Neutralizing free radicals in your body**
- **Protecting your cells from oxidation**
- **Aiding in cell membrane stability**
- **Stopping damaged cells from multiplying**

Today we know vitamin E's primary protective mechanism comes from preventing the telomere from being shortened, and by activating the enzyme that rebuilds your telomere, telomerase.

The very best forms of vitamin E come straight from mother nature. You can find vitamin E in a wide variety of foods. The best of these includes:

- **Nuts**
- **Seeds**
- **Beef**
- **Avocados**
- **Nut oils**
- **Apples**
- **Seafood**
- **Spinach**

Sadly, the vast majority of Americans don't consume nearly enough vitamin E. And, it would be very difficult to eat enough to get the amounts of vitamin E used in the studies. To get these amounts you'll need to take vitamin E in supplement form.

Fill your diet with foods rich in vitamin E. But in addition, ***I also recommend 400 IU of vitamin E daily.***

Gamma Tocotrienol:

One of the four lesser-known forms of vitamin E, gamma tocotrienol can, ***"modulate the length of the telomere possibly via telomerase."*** During one study, telomere lengths were ***16% longer*** than controls when exposed to gamma tocotrienol.[12]

Most people don't know this, but there are eight forms of vitamin E: four tocopherols and four tocotrienols. While they're all antioxidants, there are big differences.

Tocotrienols help:

- **Reduce cholesterol oxidation**
- **Maintain healthy triglyceride levels**
- **Support normal blood pressure levels**

Tocotrienols are hard to come by. You won't find them in most foods. In fact, it's almost impossible to get enough of them even if you do eat the few foods that contain them.

For instance, palm oil is rich in tocotrienols. But who consumes a lot of palm oil? Even if you did, you'd have to drink a cup a day to get enough of the recommended amount. Annatto is one of the richest sources of tocotrienols in the world, but is also hard to come by.

The problem with most vitamin E supplements is they contain none of the heart healthy tocotrienols and only ONE type of tocopherol. I recommend a supplement of "mixed tocotrienols," as it is just about impossible to get gamma tocotrienol on its own. ***Look for at least 20 mg of mixed tocotrienols per dose.***

L-Carnosine:

L-carnosine can help you live longer, and you can't get it from any other food source. Your body uses L-carnosine to repair tissues and clear away toxins. But here's something else it can do that even I didn't know until recently…

It helps preserve your telomeres. By doing this, it extends the life cycle of your cells.[13]

I first read about L-carnosine's anti-aging talents in a study done in Beijing. Researchers saw that cells grown with carnosine had healthier telomeres than cells grown without it. After a lot of digging and a little math, I discovered that the dose they used was extremely high. It would be about the same as taking 17.1 grams of carnosine.

I don't recommend that you take that much. You can get the benefits for your body at a lower dose.

Carnosine is stored in a few places in your body, and your muscles and brain get the most of it. But when it comes to your blood, carnosine doesn't stick around for very long. I recommend 1000 milligrams of carnosine every day to keep the levels in your blood high enough to make a difference.

Grass-fed, pasture-raised meat is the best way to get carnosine from food. A typical 3.5-ounce serving of beef has about 124 to 220 milligrams of carnosine. When you eat red meat, carnosine can be detected in your blood for about five hours afterward. When you don't eat it, you won't have any carnosine in your blood at all.

Take carnosine as a supplement if you can't get enough by eating red meat, ***I recommend taking 500 milligrams twice a day instead of all at once.*** That way your body always has some on hand to use for protecting your telomeres, supporting your muscles, and encouraging tissue repair.

L-Arginine:

A popular amino acid for improving blood flow, ***l-arginine increases telomerase activity by stimulating the production of nitric oxide (NO)***, the molecule that relaxes your blood vessels.[14]

The real star here is nitric oxide (NO). And the first step to more NO is a simple amino acid called l-arginine. Your body uses this amino acid to trigger the release of NO.

Body builders have been using l-arginine for years. Taken before a workout, it gives them a "muscle pump" by getting more blood and oxygen to their muscles.

Sometimes referred to as the "miracle molecule," NO is a gas produced by a single layer of cells that line your blood vessels. When NO is released, it causes your blood vessels to relax and expand, sending a rush of oxygen through your body.

This expansion of your blood vessels, and the increased flow of blood and oxygen that follows, is essential for life. *You couldn't live without it.*

And with new research showing NO increases telomerase activity, l-arginine is even more important. Fortunately, l-arginine is inexpensive and easy to find at just about any vitamin shop or health food store. ***I recommend 500 mg to 1,000 mg a day.***

Vitamin C:

We knew vitamin C prevented the loss of your telomeres, but ***we now have evidence that it increases telomerase activity in specific stem cells.***[15]

Your telomeres are very sensitive to oxidation. And as you know by now, the shorter your telomeres, the older your cells act and the more susceptible they are to becoming cancerous.

The new, exciting discovery about vitamin C is that it's very effective at slowing down this aging process.

A Japanese study tested vitamin C's effect on telomeres. It was found that raising the level of vitamin C in the cells could slow down the shortening of telomeres up to 62%.

Another study found that skin cells treated with vitamin C kept their young firm shape because it slowed shortening of the cell DNA's telomeres. The telomeres also suffered less damage in the presence of vitamin C.[16]

Vitamin C isn't just "good for you." It protects your DNA. ***And according to this new research, you should take at least 540 mg per day.***

Vitamin D3:

Famous for it's ability to increase immune function and prevent cancer, ***vitamin D also activates telomerase.*** One very recent study showed vitamin D increased telomerase activity by 19.2%.[17]

Vitamin D may be the single most important nutrient in your body.

Vitamin D helps:

- **Boost your mood and mental performance**
- **Prevent prostate, breast, ovarian, and many other cancers**
- **Reduce your risk of skin cancer**
- **Prevent and treat bone diseases**
- **Prevent diabetes**

Vitamin D is used by every cell and keeps them healthy and functioning at their best, and it's critical for your immune system. If you don't have enough, some cells may end up damaged and diseased. To prevent cancer, your levels of vitamin D must be much higher than the 400 IU our government recommends. **Based on this new data, I recommend taking at least 2,000 IU per day.**

You can also get vitamin D from Nature. The best sources include:

- **Cod Liver Oil**
- **Herring**

- **Catfish**
- **Salmon, cooked**
- **Mackerel, cooked**
- **Sardines, canned in oil, drained**
- **Tuna, canned in oil**

Milk Thistle (Silymarin extract):

This ancient, well-known herb is popular for detoxification but was recently discovered to activate telomerase. Researchers concluded, ***"silymarin increased telomerase activity 3-fold."***[18]

Milk thistle, also known as the plant *Silybum marianum*, is one of the best for clearing toxins from your blood and GI tract and helps restore liver function. Many ailments are related to toxin build-up. These toxins amass over time. This further interferes with the function of your liver.

I have been able to document its capacity to heal damaged livers by measuring serum liver enzymes. ***I recommend 200 mg in capsule form twice a day.*** There are no regular food sources for this herb. Look for dried extract with a minimum of 80% silymarin, the active ingredient for liver cleansing, and as we now know, *telomerase activation*.

Ginko Biloba:

Originally known as a brain booster because it helps open up blood vessels to enhance circulation and oxygen delivery, there's evidence that, ***"ginkgo biloba extract significantly increased telomerase activity,"*** and helps prevent the loss of the telomere in sensitive cells that line your blood vessels.[19]

While the research is unclear regarding how much ginko biloba effectively activates telomerase, I recommend keeping your daily dose between 40 mg and 80 mg and cycling every 4 to 6 weeks.

In other words, do not take ginko continuously for the rest of your life. It will lose its effectiveness. Take it for 4 to 6 weeks, then stop. Wait for 4 to 6 weeks, then start the cycle again.

Folic Acid:

This humble B vitamin is important for making the DNA found in your telomeres. A number of studies suggest folic acid ***stimulates the activation of telomerase.***[20]

Folic acid is one of the B vitamins I prescribe to help stop the loss of your telomeres. And it's one of five nutrients used to get rid of excess homocysteine that builds up in your blood stream when you're antioxidant levels start to drop.

Homocysteine is a damaging amino acid that ***triples the amount of telomere length lost during cell division.*** Fortunately, there are supplements you can take to lower your homocysteine in a very short time. This is the formula I recommend to my patients:

- **Vitamin B12 – 500 mcg**
- **Folic Acid – 800 mcg**
- **Vitamin B6 – 25 mg**

- **Riboflavin (B2) – 25 mg**
- **TMG (trimethylglycine) – 500 mg**

But I want you to keep something in mind. ***The new research showing folic acid activates telomerase used a dose of 2 mg to 5 mg daily.***

Acetyl L-Carnitine:

This simple amino acid boosts your brain's level of Nerve Growth Factor by up to 100 times, which explains why this is a favorite brain booster.

But studies suggest that acetyl l-carnitine ***activates the human telomerase gene*** through a chain reaction that starts with the increase of Nerve Growth Factor.[21]

L-carnitine is the utility system for your vital organs. Your heart uses it in bulk to keep blood pumping. Your brain burns through it at lightning speed. Your liver and kidneys require it to work properly. Your sex organs thrive on it for optimum function.

Plus, 95 percent of all cells in your body rely on l-carnitine to melt fat away. That's because l-carnitine shuttles fat into your cells where it's used for energy, instead of being stored as fat.

The problem is your body can't make enough on its own. When scientists looked at levels of this vital nutrient in muscle tissue across a range of age groups, they found a "drastic reduction," in older folks.[22]

Why? Because these days, you can't get enough of it from Nature's richest source: red meat. (The word "carnitine" comes from "carnus," the Latin word for meat.)

Here are good sources of l-carnitine based on a single 3.5 oz serving:

- **Beef Steak, 95 mg**
- **Ground Beef, 94 mg**
- **Pork, 27.7 mg**
- **Bacon, 23.3 mg**

You can also supplement your diet with l-carnitine. While the research on how much you need to activate telomerase is still being determined, ***I recommend a daily amount of 1000 mg.***

I give my patients the liquid form of l-carnitine. It's the most absorbable. The powders tend to clump and the capsules may contain unwanted fillers and binders that may inhibit its absorption.

Also, many l-carnitine capsules use the synthetic "D form" of l-carnitine, which interferes with the natural action of l-carnitine. Make sure you choose a supplement that uses naturally occurring l-carnitine.

Plus, the liquid form is easy to use. The formula I give my patients requires just one tablespoon a day.

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