THE HEARTSUMMET 2018

ARKANSAS HEART HOSPITAL®

Longevity

Arkansas Heart Hospital CEO Bruce Murphy, M.D., Ph.D.





The four letters of the genetic code—A, C, G, and T—are projected onto Ryan Lingarmillar, a Ugandan. DNA reveals what skin color obscures: We all have African ancestors.

Skin Deep

What is race, exactly? Science tells us there is no genetic or scientific basis for it. Instead it's largely a made-up label, used to define and separate us.

> By ELIZABETH KOLBERT Photographs by ROBIN HAMMOND



In the first half of the 19th century, one of America's most prominent scientists was a doctor named Samuel Morton. Morton lived in Philadelphia, and he collected skulls.

accepted skulls scavenged from battlefields and snatched from catacombs. One of his most famous craniums belonged to an Irishman who'd been sent as a convict to Tasmania (and ultimately hanged for killing and eating other convicts). duro. Up stuffed it with popper goods later be

He wasn't choosy about his suppliers. He acts of creation. The races had distinct characters, which corresponded to their place in a divinely determined hierarchy. Morton's "craniometry" showed, he claimed, that whites, or "Caucasians," were the most intelligent of the races. East Asians-Morton used the term "Mongolian"-With each skull Morton performed the same pro- though "ingenious" and "susceptible of cultiva-

"He had a lot of influence, particularly in the South," says Paul Wolff Mitchell, an anthropologist at the University of Pennsylvania who is showing me the skull collection, now housed at the Penn Museum. We're standing over the braincase of a particularly large-headed Dutchman who helped inflate Morton's estimate of Caucasian capacities. When Morton died, in 1851, the Charleston Medical Journal in South Carolina praised him for "giving to the negro his true position as an inferior race."

Today Morton is known as the father of scientific racism. So many of the horrors of the past few centuries can be traced to the idea that one race is inferior to another that a tour of his collection is a haunting experience. To an uncomfortable degree we still live with Morton's legacy: Racial distinctions continue to shape our politics, our neighborhoods, and our sense of self.

Skulls from the collection of Samuel Morton, the father of scientific racism, illustrate his classification of people into five races—which arose, he claimed, from separate acts of creation. From left to right: a black woman and a white man, both American; an indigenous man from Mexico; a Chinese woman; and a Malaysian man.

the time he was working-shortly before Charles Darwin put forth his theory of evolution and long before the discovery of DNA-scientists had no idea how traits were passed on. Researchers who have since looked at people at the genetic level now say that the whole category of race is misconceived. Indeed, when scientists set out to assemble the first complete human genome, which was a composite of several individuals. they deliberately gathered samples from people

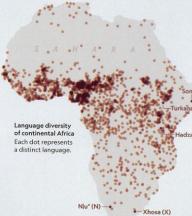
The DNA profiles of these two profiles of these two are nearly 99 percent the same. The genes of any two humans, of course, are even more alike. But after our prehuman ancestors shed most of their body hair, we evolved highly visible differences in skin color. Tiny tweaks to our DNA account for them. Dark pigmentation would have helped our ancestor scope with the intense African sun; when humans migrated out of Africa into low-sunlight regions, lighter skin became advantageous.





There's more diversity in Africa than on all the other continents combined.

That's because modern humans originated in Africa and have lived there the longest. They've had time to evolve enormous genetic diversity—which extends to skin color. Researchers who study it sometimes use Africa's linguistic diversity—it has more than 2,000 languages (see map)—as a guide. Photographer Robin Hammond followed their lead, visiting five representative language communities. His portraits span the color spectrum from Neilton Vaalbooi (top left), a Khoe-San boy from South Africa, to Akatorot Velle (bottom right), a Turkana girl from Kenya, "There is no homogeneous African race," says geneticist Sarah Tishkoff of the University of Pennsylvania. "It doesn't exist." The prehistoric humans who left Africa some 60,000 years ago—giving rise over time to the other peoples of the world—reflected only a fraction of Africa's diversity.

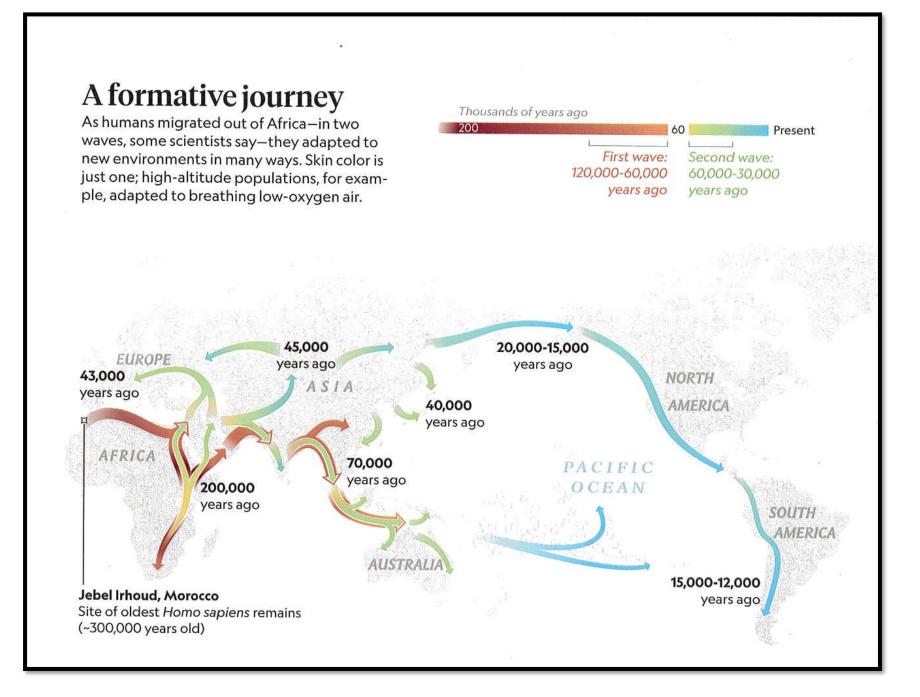


Neilton Vaalbooi (N), 2. Petrus Vaalbooi (N), 3. Khadar Abdullahi (S),
 4. Sadam Abdirisak (S), 5. Askania Saidi (H), 6. Mohamed Ali (S),
 7. Helena Hamis (H), 8. Kooli Maperit (T), P. Sovid Vaalbooi (N),
 10. Sisipho Menze (X), 11. Ayub Abdullahi (S), 12. Bianca Springbok (N),
 13. Xolani Manty (K), 14. Makaranga Pandisha (H), 15. Erinyok (Syen (T),
 16. Isaac Adams (N), 7. Chahida van Neel (N), 18. Griet Seekoel (N),
 19. Siphelo Morodo (X), 20. Piega Mukoa (H), 21. Zacharai Sanga (H),
 12. Tulias Ngxukuma (X), 23. Johanna Koper (N), 24. Abdhilahi Mohamed (S),
 25. Monwabisi Makoma (X), 25. Gelmesa Robe (S), 27. Palanjo, Kaunda (H),
 28. Abdhilahi Said (S), 29. Ejore Elipan Abong (T), 30. Akatorot Yelle (T)

* Nlu is one of many Khoe-San languages.

NGM MAPS. SOURCES: GLOTTOLOG 31. MAX PLANCK INSTITUTE FOR THE SCIENCE OF HUMAN HISTORY: SARAH TISHKOFF, UNIVERSITY OF PENNSYLVANIA; BRENNA HENN, STORY BROOK UNIVERSITY, NEW YORK; RICHARD EW, BERL, COLORADO STATE UNIVERSITY.





DNA TESTING Forget race. Ancestry is the real story—and it's much more interesting. 32% 28% 21% 14% Northern European Southern European African Southwest African

An interest in who begat us goes back at least to the Bible. These days the genealogical impulse is buttressed by modern genetics, which weaves individual stories into the grand migration of humankind. These six people had their DNA tested with National Geographic's kit (see below). The results indicate essentially the same "racial" heritage, in the percentages shown above. But their experiences are unique. Brenda Yurkoski (lower left) knew before the test-which names ancestral populations, not individuals-that her list of ancestors includes Thomas Jefferson and Sally Hemings, Jefferson's slave and mistress. "It was my fourth great-grandfather who came up with the formula to determine whether you were black or whether you were white in America," she says. "I'm what you would have called a quadroon."

WHAT'S YOUR ANCESTRY?

The Geno 2.0 DNA Ancestry Kit breaks down a person's ancestry by region, going back to the time when all our ancestors were in Africa. More than 830,000 people have

Landreau Carocatemac



sent in saliva samples. Learn more at natgeo.com/GenoDNA.



BRENDA YURKOSKI So, Mineral, Virginia "We still identify as African American. By law, in early America, Iwould have had to 5 could have tri to pass as white. But if anybody knew any different



TY WILHELMSEN 18, Milton, Massachusetts "My friend group, they're mostly white, but I'm in the middle. So they usually reference me for ideas that I could tell them about race."

MILO RONALD DEHI JOHNSON 44 6

"Growing up, I was surrounded by family who were black. white, other...Looking at the other people who have the same DNA background...[they] look like five of my cousins."

JASON CARTER

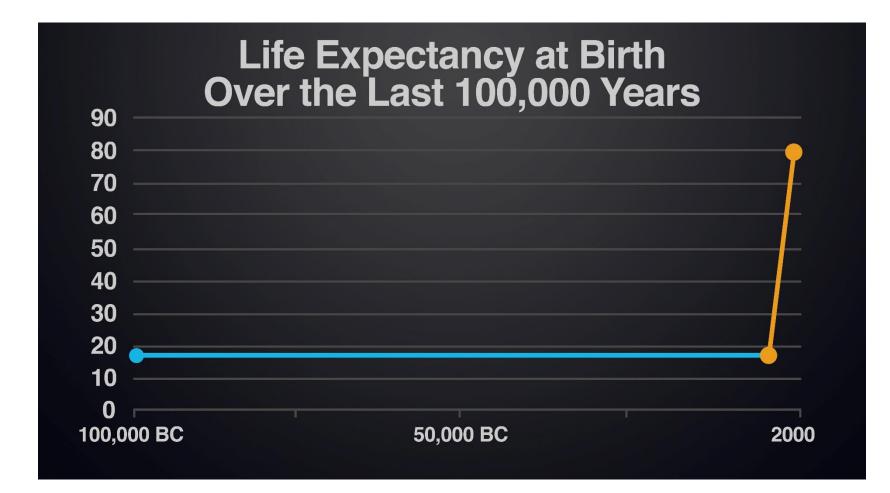
50, Arlington, Virginia

"Now that I know about my deep ancestry, I do see

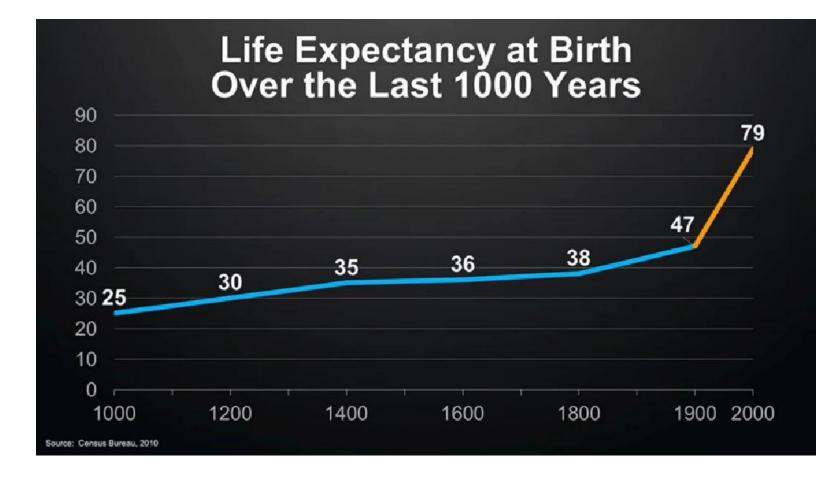
We are in the middle of the single most transformative time in human history.



Longevity and Human Performance



Longevity and Human Performance



Penicillin Aspirin Hygiene 200 years ago, 40% of children in every country in the world died before the age of 1.



How we can win the fight against aging.

Age-related vs. infectious diseases

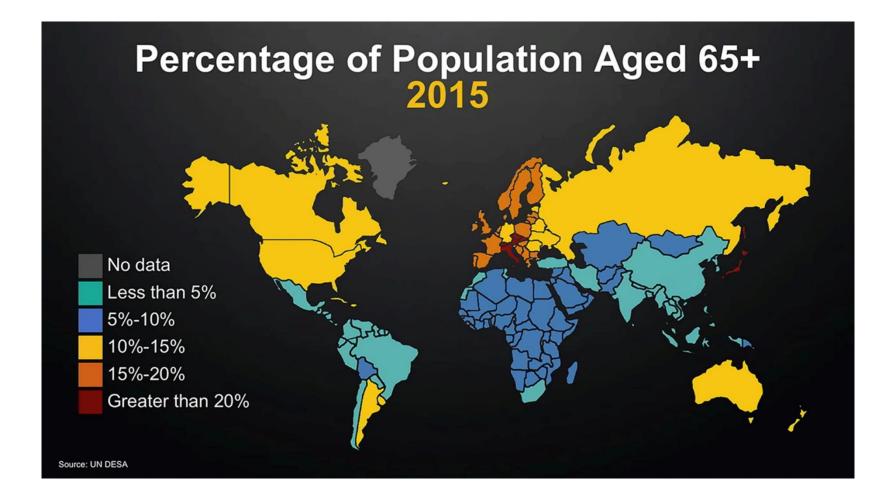
Most infectious diseases have been easily prevented

- Sanitation
- Vaccines
- Antibiotics
- Carrier control

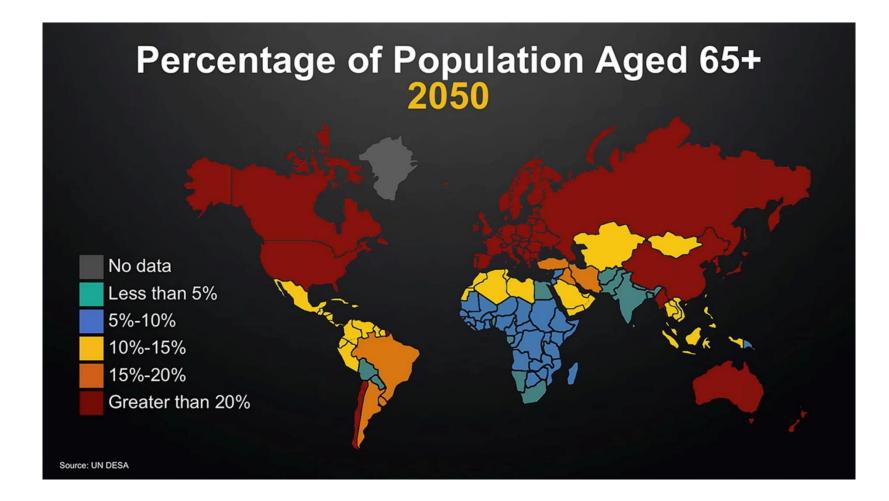
Age-related diseases have not. Why not?

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Percentage of Population Aged 65+



Percentage of Population Aged 65+



Simple, right? Important but unsolvable?

- There's aging, and there's diseases of old age
- Aging is "natural" and universal
- Diseases of old age are "curable" and non-

sens research

toundation

- universal
- Right? ...



What is 'aging', exactly?

Aging is the life-long accumulation of "damage" to the body that occurs as intrinsic side-effects of the body's normal operation.

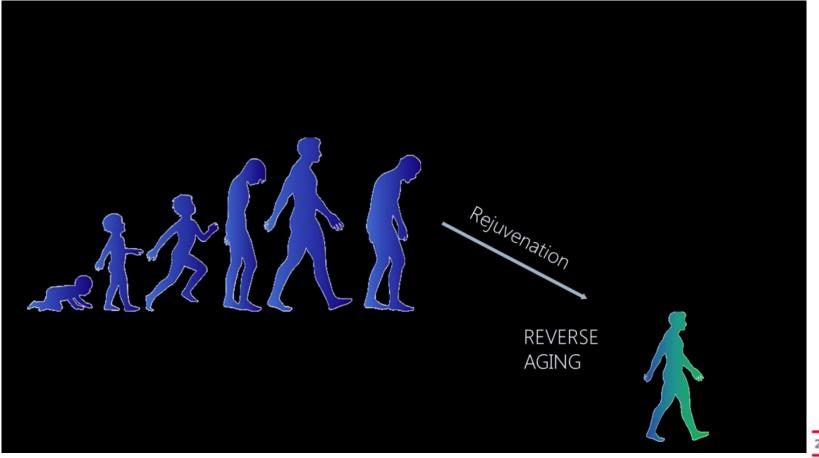
Damage: changes in structure & composition that the body cannot automatically reverse.

The body can tolerate some damage, but too much of it causes disease and disability.

sens research foundation



Reverse Aging



2018 HEART SUMMIT ARKANSAS HEART HOSPITAL It is believed by scientist that the first person to live to be 1,000 years old has already been born.



 Older than Methuselah. Thought to be the oldest person to live at age 969. Methuselah son of Enoch, father of Lamech and grandfather of Noah.

Date of Birth 3074 BC Date of Death 2105 BC



There are people alive today that fought in WWII. There were people alive during WWII that fought in Civil War. There were people alive during Civil War that fought in American Revolution. The US is only 3 lifetimes old.



Longevity and Immortality

- Jellyfish Immortal
- Sea Anemone Immortal
- Ancient Trees >50,000 years old
- Tortoises 200-300 years old

What is it that they have that humans don't?









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Longevity

Health Spanners

Interested in prolonging human life by finding a cure for aging. Consider aging a disease.



• Immortalist

Are planning to upload consciousness to Avatars into a virtually simulated world. "Cyborgs"

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7 Life extension technologies that could help you live to 150

TYPE OF DAMAGE

Cell loss, tissue atrophy

Cancerous cells

Mitochondrial mutations

Death-resistant cells

Extracellular matrix stiffening and

Extracellular aggregates

Intracellular aggregates

TREATMENT

Stem cells and tissue engineering: RepleniSENS

Removal of telomere-lengthening machinery: OncoSENS

Allotopic expression of 13 proteins: MitoSENS

Targeted ablation: ApoptoSENS

AGE-breaking molecules; tissue engineering: GlycoSENS

Immunotherapeutic clearance: AmyloSENS

Novel lysosomal hydrolases: LysoSENS



Therapies for aging that promote longevity The Health Spanners approach

- 1) Caloric Restriction
- 2) Antioxidants
- 3) Telomerase
- 4) Metformin
- 5) Crispr Cas9
- 6) Stem Cells
- 7) Nanobots



Caloric Restriction

- Lowering calories by 30-40% leads to over 50% life span prolongation in mammals.
- Fasting or intermittent fasting puts bodies into extreme tissue repair
- Become ketotic
- Ingest fewer Carbon bonds and generate fewer Oxygen free radicals



Antioxidants

- Oxygen use allowed organism to become multicellular
- Oxygen generates free radials and roughly 2% of the oxygen you free per hour end up as cellular stress



Caloric restrictions and Carbon bonds

So just eat enough, exercise, and keep in mind that the food or carbon bonds that you take in must be excreted out of your lungs as carbon dioxide. These carbon bonds are at a cost, leaving behind oxygen radicals causing cell stress and destroying the cell.

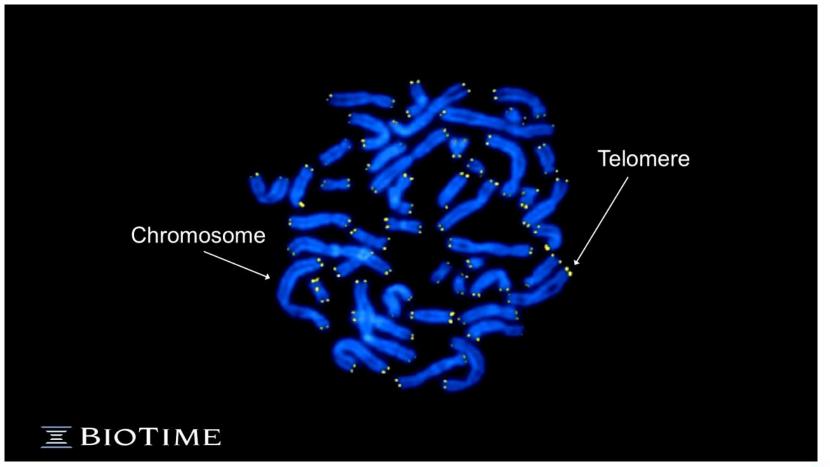




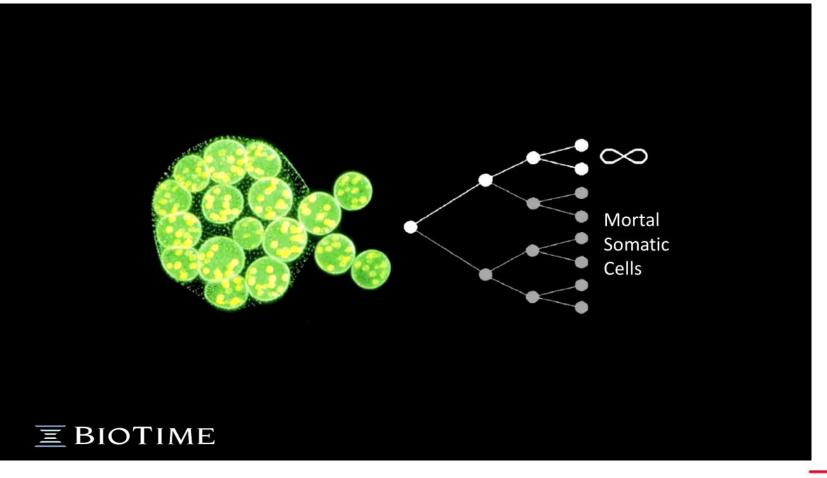
- Keep DNA from unwinding by get shorter every time cells divide. The cell stop reproducing.
- Telomerase allows telomeres to elongate and help cause cellular immortality.



Telomere

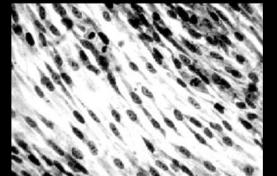








Human Somatic Cells Display a Finite Lifespan



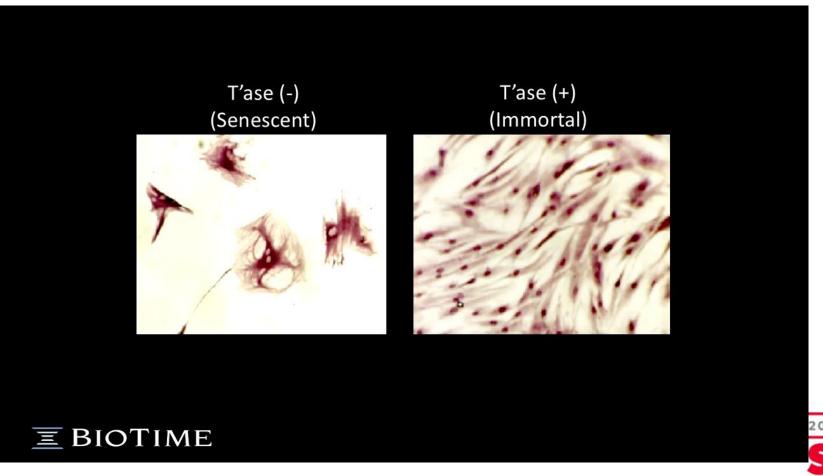


Young Fibroblasts Senescent Fibroblasts

EBIOTIME

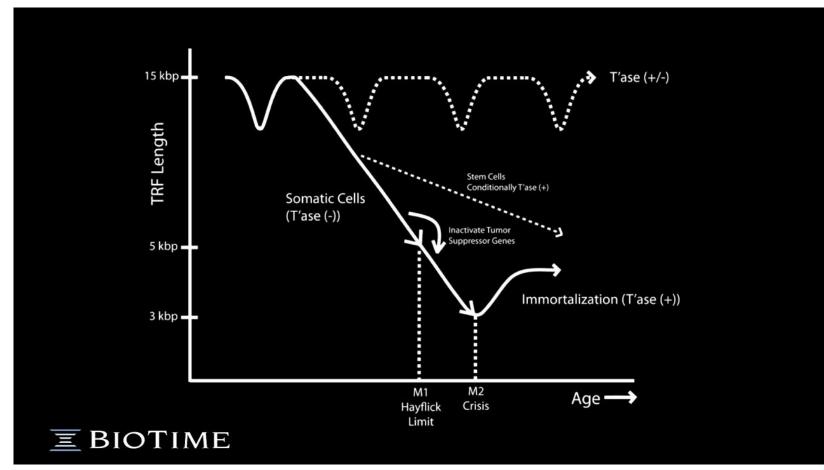


Telomerase immortalized cells in culture w/o transform cancer





Cancer cells escape & become immortal absence of Telomerase



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Metformin

- Most widely prescribed drug for Diabetes type 2
- Patients who take it live longer than those without diabetes
- Tells pancreas to stop making insulin
- Mimics a caloric restrictive diet
- It kills cancer stem cells



Metformin

- Approved for Diabetes in US in 1995 and in Europe in 1958
- Reduces serum insulin levels
- Inhibits lipogenesis, mitigates hyperlipidemia, reduces cellular reactive oxygen
- Reduces risk of cancer in patients with type 2 diabetes and improves survival in cancer patients



Metformin and Nicotinamide

- Combination therapy may act as both an exercise mimetic and caloric restriction mimetic
- Metformin weight loss is confined to reduction in adipose with no change in muscle mass
- Metformin effects of energy production parallels physical activity

Diabetes Care, 2012

J Clin Endo Meta, 2016



Before and Now

Dec 2015



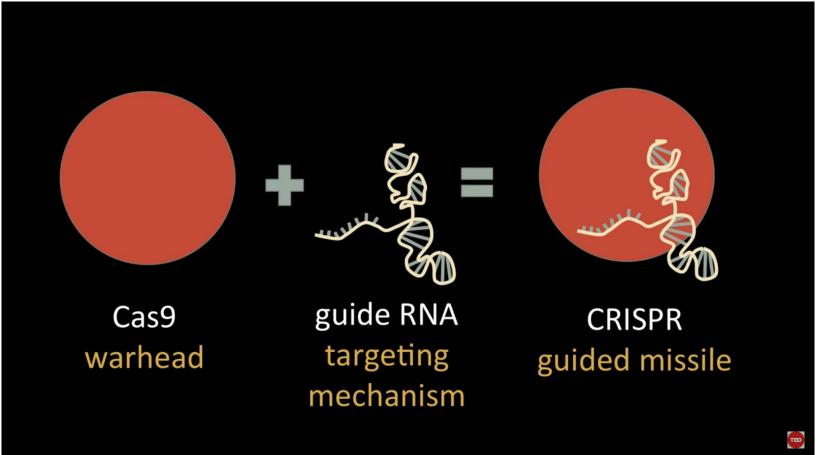
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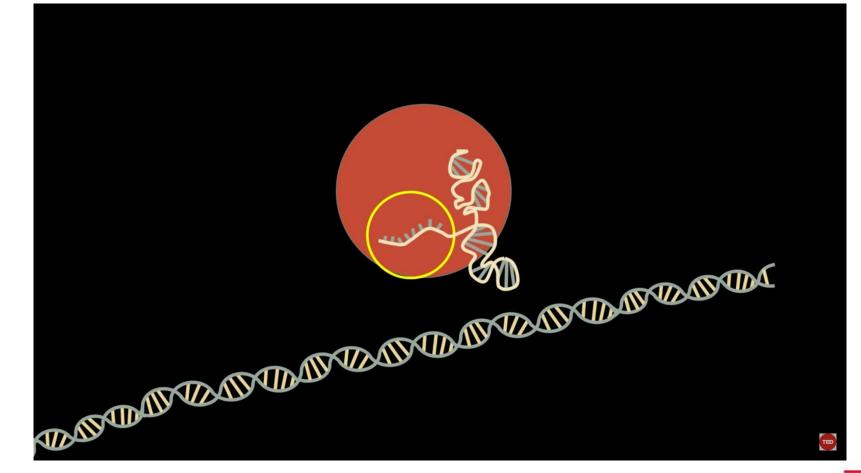


- Gene editing technique that allows insertion of new genes and rejuvenation of older mutant genes
- Easily and cheaply used in animals to transfer desirable traits to their stem cells and subsequently their offspring
- Applications in cancer, inflammation, targeting our own stem cells for rejuvenation





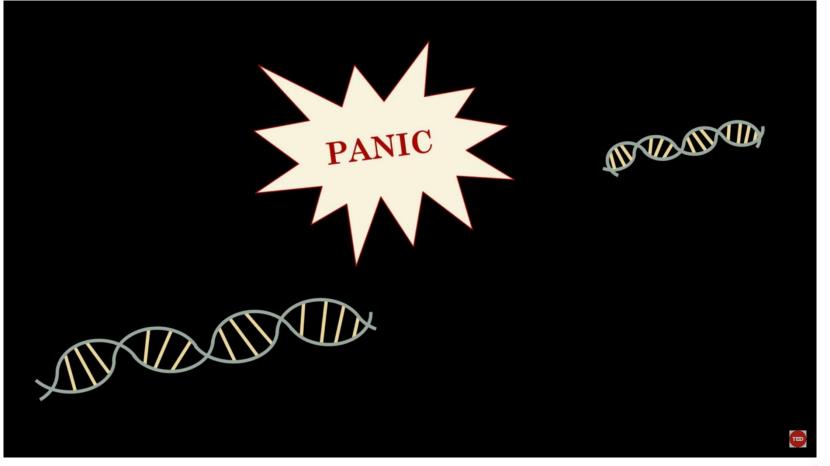






















Stem Cell Therapies

- Pluripotential stem cells infused into damaged organs that revitalize.
- Proposed use of cord stem cells that are low immune reactivity and pluripotent.
- Build new organs on a framework provided or printed.
- Chase after inflammation through out the body many in silent areas.





Pluripotent Stem Cell

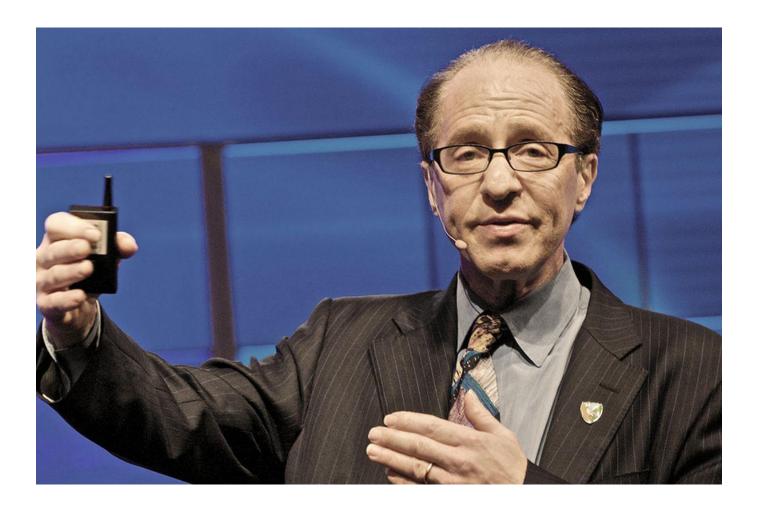


Nanobots

- Micro machines programmed to repair tissue, clean out arteries, kill cancer cells, connect neurons
- Connect our neocortex of the brain to the cloud
- Using successfully in fish cancer model now



Ray Kurweils : Craziest Predictions





RAY KURZWEIL PREDICTIONS

- Collapse of the Soviet Union
- A computer would beat a world champion chess player by the year 2000
- The rise of internet use
- Wireless internet
- Text-to speech converters for the blind by 2009
- Wearable computer technology



RAY KURZWEIL PREDICTIONS 2029

 \$1k computer more powerful than the human mind

• Human driven cars illegal



RAY KURZWEIL PREDICTIONS 2030S

 Uploading consciousness becomes possible

• People more involved in virtual worlds than real ones



RAY KURZWEIL PREDICTIONS 2045

THE SINGULARITY



JOE

The Singularity

- When computers become more intelligent that humans.
- Many believe this is not only inevitable but imminent.
- The rate of development of artificial intelligence will be increasing even faster.
- Will we:
 - 1) Merge to become super intelligent cyborgs using computers to extend our Intellectual abilities just as cars and planes presently expand our physical abilities.
 - 2) Scan our consciousness into computers and become software.
 - 3) Have the AI turn on humanity and destroy it.

RAY KURZWEIL PREDICTIONS THE SINGULARITY

 Machines becoming conscious and self-aware

Nanotechnology creating "foglets"



RAY KURZWEIL PREDICTIONS 2099

Machines given legal status
Organic humans small minority
Planet-sized computers
Dead material made conscious
The universe comes alive



The Cyborg transformation of infinite longevity

Our brains neocortex is what differentiates us and our frontal lobes are where abstract thought and reasoning occurs.

The connection of our neurons in our neocortex to the cloud through nanobots will expand our intelligence at least 1 billion fold.

Since the cloud is pure informational technology and expanding exponentially so we will be a hybrid of biological thinking and nonbiological thinking.

This has already started with devices outside our body that connect us to the cloud.



4 steps to immortality

STEP 1:

Create a Brain-Computer Interface



STEP 2:

Replacing Neurons With Synthetic Circuitry



STEP 3:

Build Simulated Worlds



STEP 4:

Permanent Residence in the Simulation



JOE

Therapies for Longevity The Immortalists Approach

• 2045 Initiative



Dimitri Itskov – 2045 Initiative





 \$3million but you can sell body parts you will not need them. A robotic copy of a human body remotely controlled by brain mapping. 85% of technology already available.

• Possible by year 2020





• Full body prosthesis into which your head will be transplanted.

• Possible by 2030





 Consciousness transferred into non biological brain and body mechanical, custom made, non aging. Grater than human capabilities.

• Possible by year 2040



Avatar D

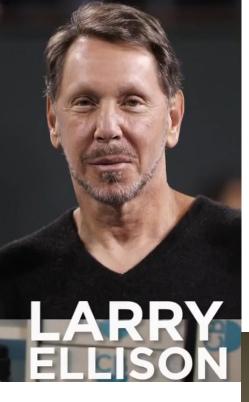
- Non physical hologram
- No moving Parts

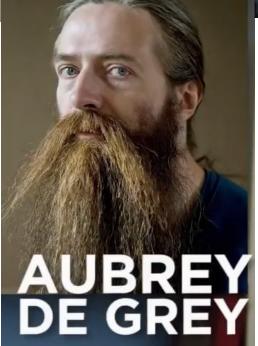
• Possible by year 2045



PETER

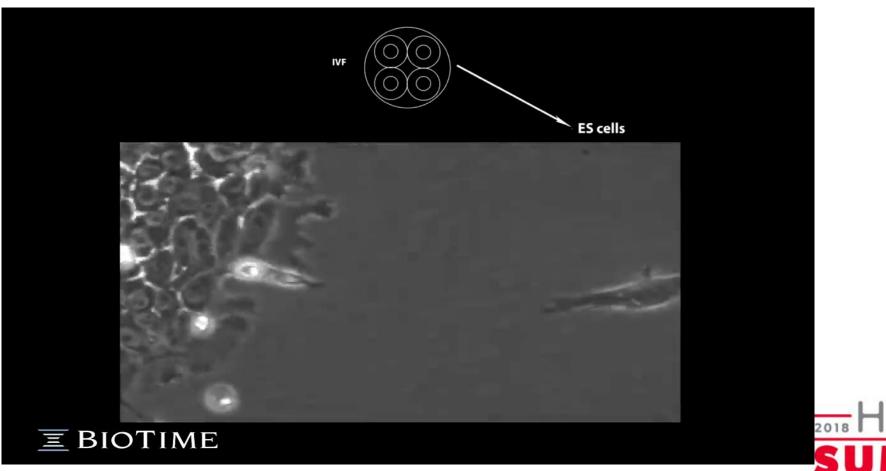












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RT

The dark side of the Singularity





New York City 1913



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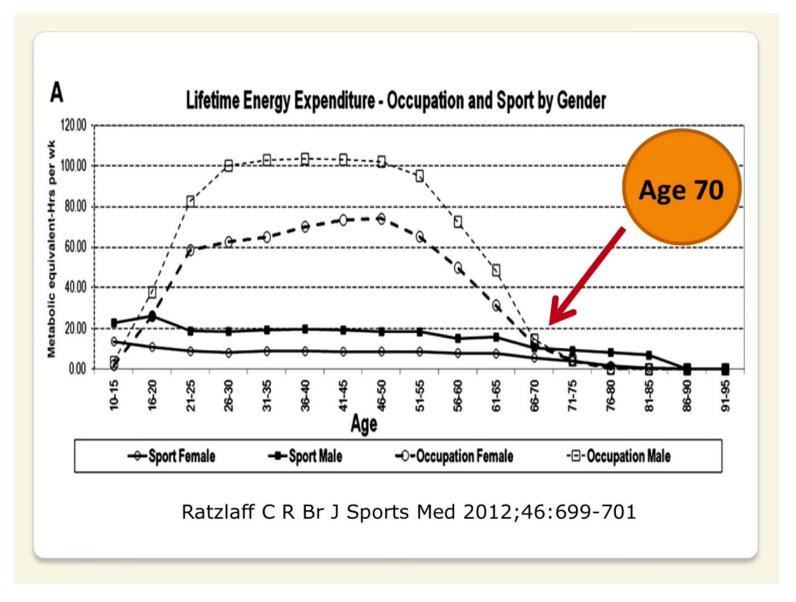
Longevity-How do we do it?

The "seven deadly things" & their fixes

	Damage type	The maintenance approach	
	Cell loss, cell atrophy	Replace, using stem cells	
	Division-obsessed cells	Reinforce, using telomere control	
	Death-resistant cells	Remove, using suicide genes etc	
	Mitochondrial mutations	Reinforce, using backup copies	
	Intracellular waste products	Remove, using foreign enzymes	
	Extracellular waste products	Remove, using immune system	
	Extracellular matrix stiffening	Repair, using crosslink-breakers	
Existence of any 8 th is looking increasingly unlikely			
	sens research foundation		

🔨 reimagine aging





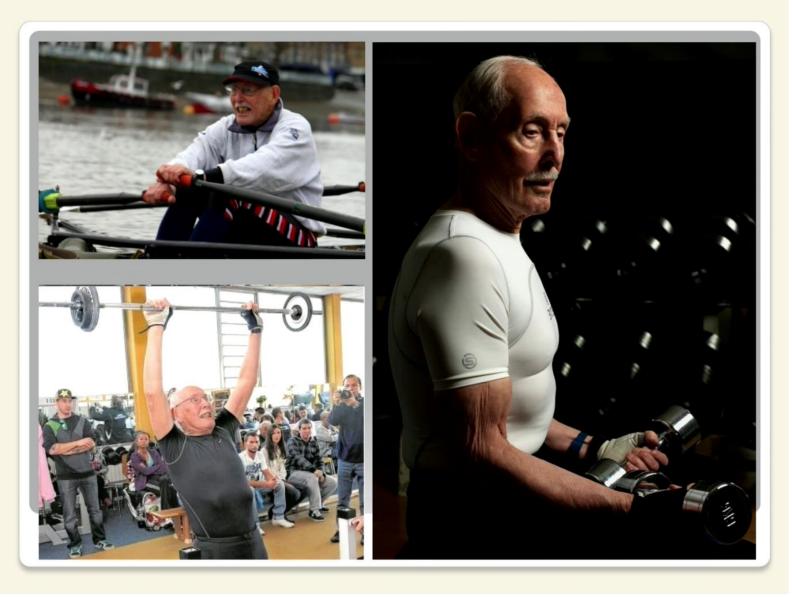


Why bodybuilding at age 93 is a great idea



Successful Aging needs:- Work, Diet and Exercise







Comparison: Car Maintenance



SUMATIONS FEAT OF THE STATE OF