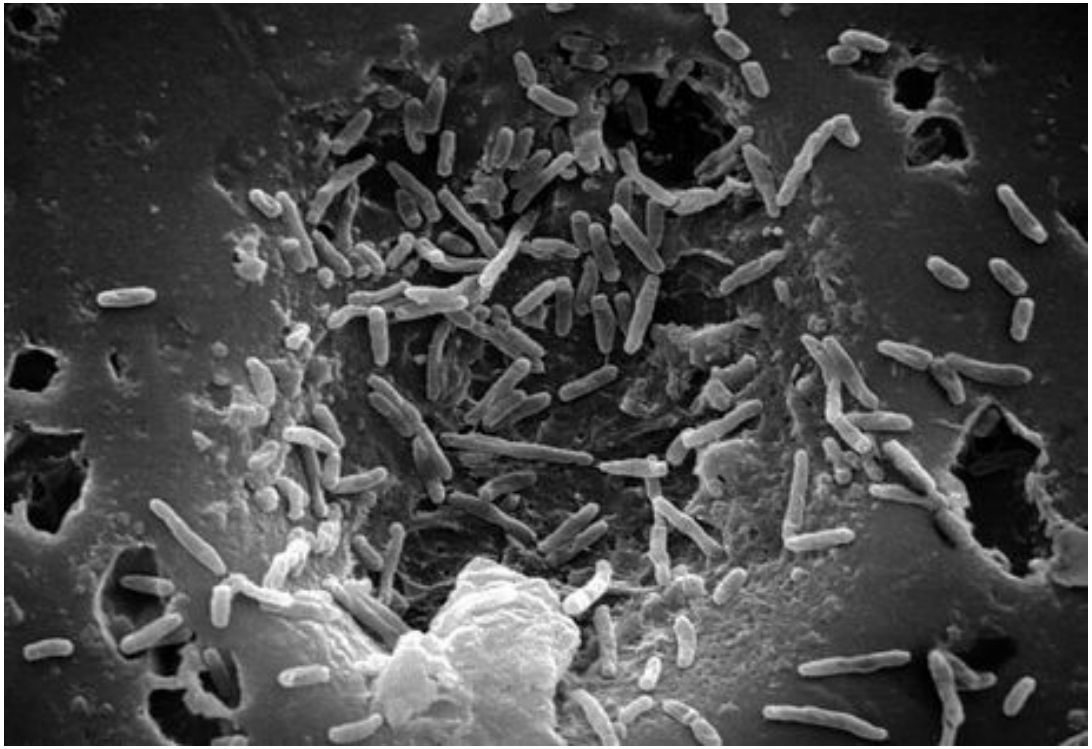
Örök élet – örök fiatalság

Örök élet nincs, lásd statisztika. Az élet veszélyes, végtelen idő alatt biztosan ér bennünket baleset – de azért lehetne hosszabb..

Minek az örök életét keressük?
Önző gén, sejtek, soksejtü organizmus
TUDAT – információ, éntudat
– lehetséges az örök élet – a mesterséges intelligenciáknak

Hosszú életü organizmusok:

'Oldest living thing on earth' discovered Ancient patches of a giant seagrass in the Mediterranean Sea are now considered the oldest living organism on Earth after scientists dated them as up to 200,000 years old



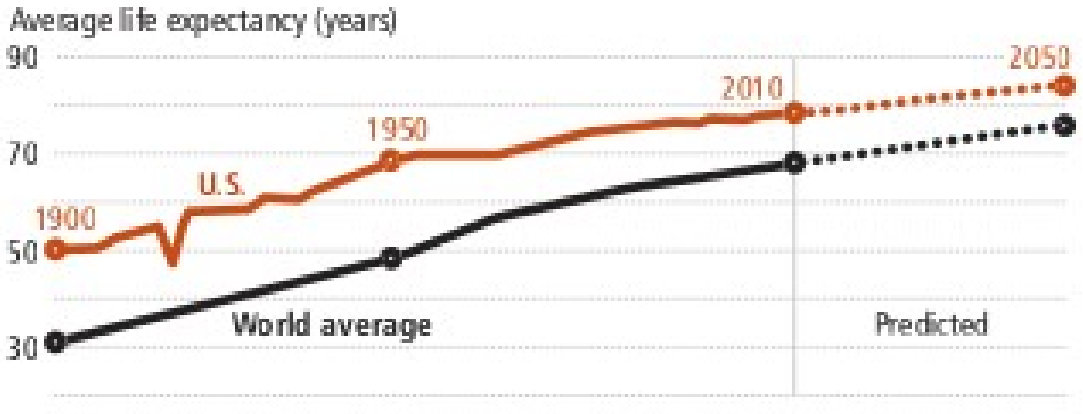
Siberian Actinobacteria - 400,000 to 600,000 years old

The Siberaian Actinobacteria pictured above are one example, because DNA replication in the laboratory proved that these lifeforms, recovered from the permafrost, were indeed still living, up to 600,000 years after they first appeared.

This shrub has shiny green leaves and pink flowers, but produces no fruit or seeds. Only one colony of King's Lomatia is known to exist in the wild. It is sometimes called "King's Holly, and is unusual because all remaining examples are genetically identical. With only three sets of chromosomes and subsequent sterility, reproduction can only happen when a branch falls. The fallen part grows new roots, resulting in a new plant genetically identical to its parent. Although technically separate plants, because each has its own root system, they are regarded as one of the oldest living plants on earth, having been cloning itself successfully for at least 43,600 years and quite possibly up to 135,000 years.

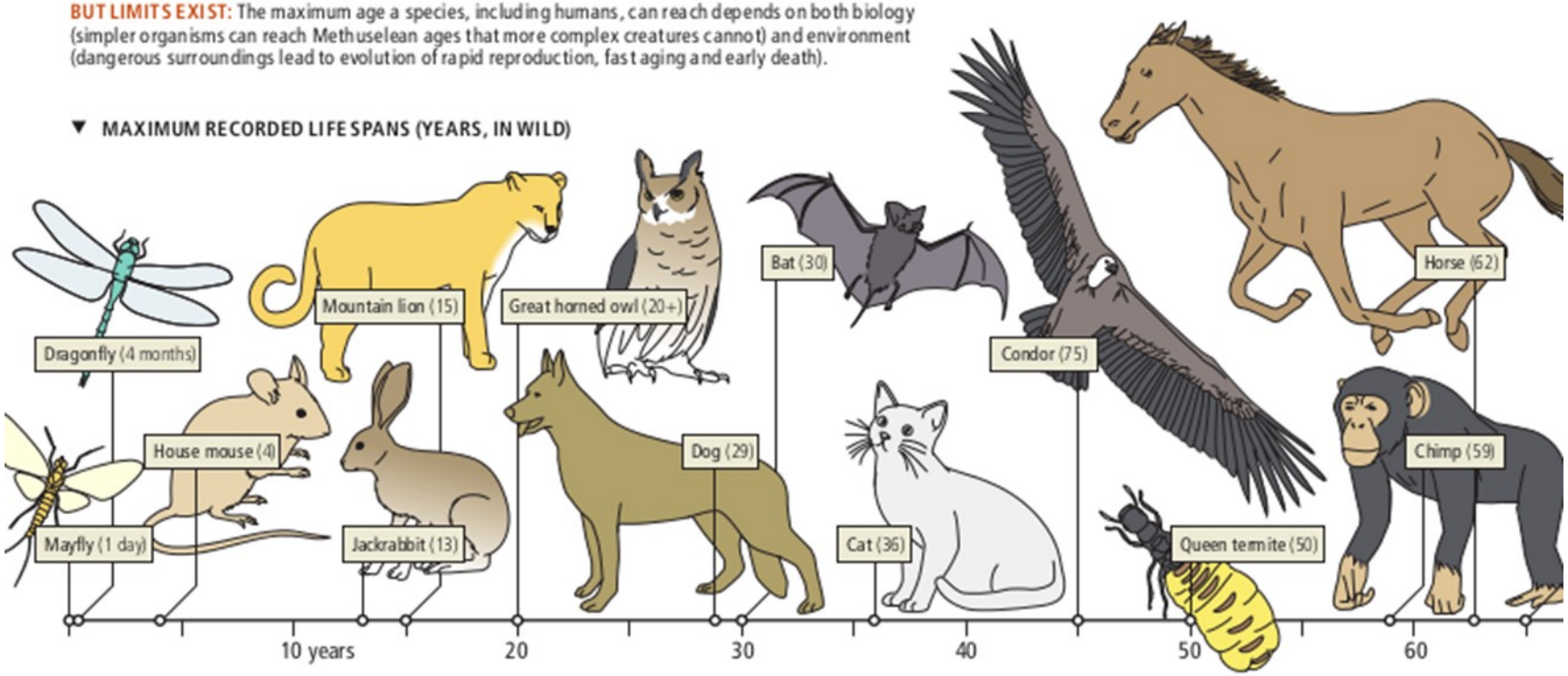
Older than your grandma

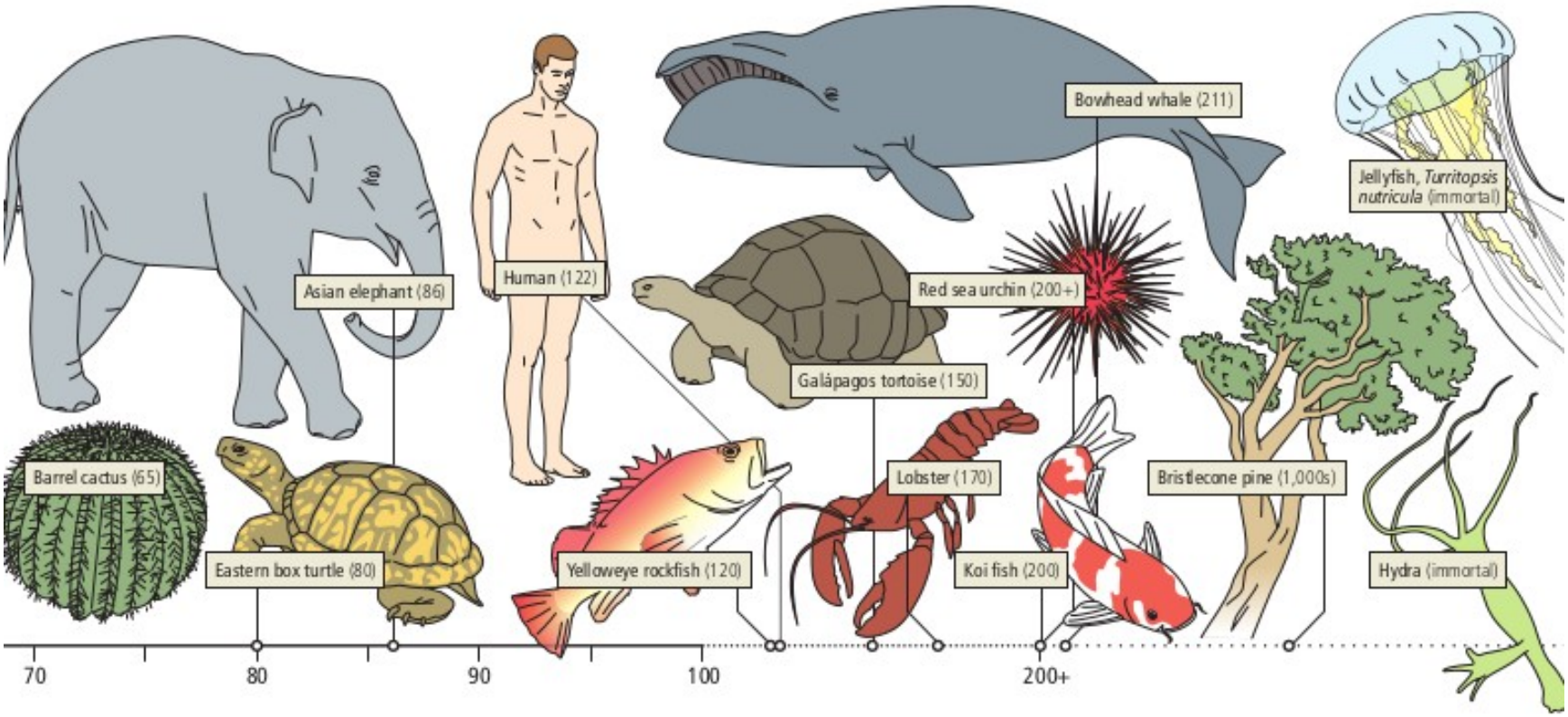
There are tortoises alive today that were 25 to 50 years old when Charles Darwin was born. There are whales swimming the oceans with 200-year-old ivory spear points embedded in their flesh. There are cold-water sponges that were filter-feeding during the days of the Roman Empire. In fact, there are a number of creatures with life spans that make the oldest living human seem like a spring chicken in comparison.



BUT LIMITS EXIST: The maximum age a species, including humans, can reach depends on both biology (simpler organisms can reach Methuselean ages that more complex creatures cannot) and environment (dangerous surroundings lead to evolution of rapid reproduction, fast aging and early death).

▼ **MAXIMUM RECORDED LIFE SPANS (YEARS, IN WILD)**




Bowhead whale (211)
Jellyfish, *Turritopsis nutricula* (immortal)
Asian elephant (86)
Human (122)
Red sea urchin (200+)
Galápagos tortoise (150)
Barrel cactus (65)
Lobster (170)
Bristlecone pine (1,000s)
Eastern box turtle (80)
Yelloweye rockfish (120)
Koi fish (200)
Hydra (immortal)
70
80
90
100
200+

If the mortality rate of a species does not increase after maturity, the species does not age and is said to be biologically immortal. There are many examples of plants and animals for which the mortality rate actually decreases with age, for all or part of the life cycle. Coral colonies and aspen trees are the clearest examples. Some large trees may routinely grow in size for decades, while their mortality rates decrease. Some sources say that sharks, too, grow larger in size while their mortality rate decreases, for long periods of their lives.

If the mortality rate remains constant, the rate determines the mean lifespan. The lifespan can be long or short, even though the species technically "does not age".

AGING IS AN ARTIFACT OF HUMAN CIVILIZATION

Engineers have a term to describe the average period of time that they expect a mechanical device to survive. It is called the “mean time to failure.” The mean time to failure of a cheap car might be two years before some major repair might be needed. A more expensive car might have a mean time to failure of five years. “Mean time to failure” refers to a future time when half of a group of identical objects will stop functioning. It is identical to life expectation in humans where the “mean time to failure” of today’s babies is about 75 years.

If longevity is determined by our genes, albeit indirectly, and aging is not, then why do we age?

It is difficult to see how evolution could select for a process like aging when few, if any, animals ever lived long enough to participate in the selection process.

Humans are the only species in which a large number of members usually experience aging. Aging in numbers proportional to those seen in humans simply does not occur in feral animals.

Scientists prove ‘immortal worms’ can regenerate indefinitely and stay forever young

University of Nottingham scientists spurred a slew of debate in 2008 when they claimed their object of study, the planaria or “flatworm”, might actually be immortal, possessing an indefinite ability to regenerate its cells and thus practically never grow old. In fact, an important distinction must be made, it’s not that the flatworm never grows old that’s interesting, it’s the fact that it stays forever young!

The researchers identified a number of genetic criteria which need to be filled in order for an animal to be considered immortal. First of all, it needs to retain the ability of replacing old cells with new cells indefinitely, and this is what stem cells are for.

This paper argues that the goal the proponents of radical life extension wish to attain is in fact unattainable, and that with regard to this goal, the whole project of conquering ageing and death is therefore likely to fail. What we seek to achieve is not the prolongation of life as such, but rather the prolongation (or restoration) of a healthy and youthful life. Yet even though it may one day be possible to prevent the body from ageing beyond a certain stage (or to bring it back to that stage), it may never be possible to arrest the ageing of the mind, which is what we desire most of all.

Az előző példa magyarázhatóvá válik, ha arra gondolunk, hogy a hím nagyobb hatékonysággal szaporíthatja saját génjeit, ha életét feláldozva testét értékes tápanyagként a nősténynek adja, mint ha abban reménykedik, hogy újabb nősténnyel találkozik. A "cél" tehát nem a túlélés, hanem az, hogy az egyed saját génjei minél több példányban jelenjenek meg a következő generációban. Ez az ún. önző gén elmélet, melyet Richard Dawkins 1976-ban írt le a "Selfish Gene" c. könyvében.

Következmények

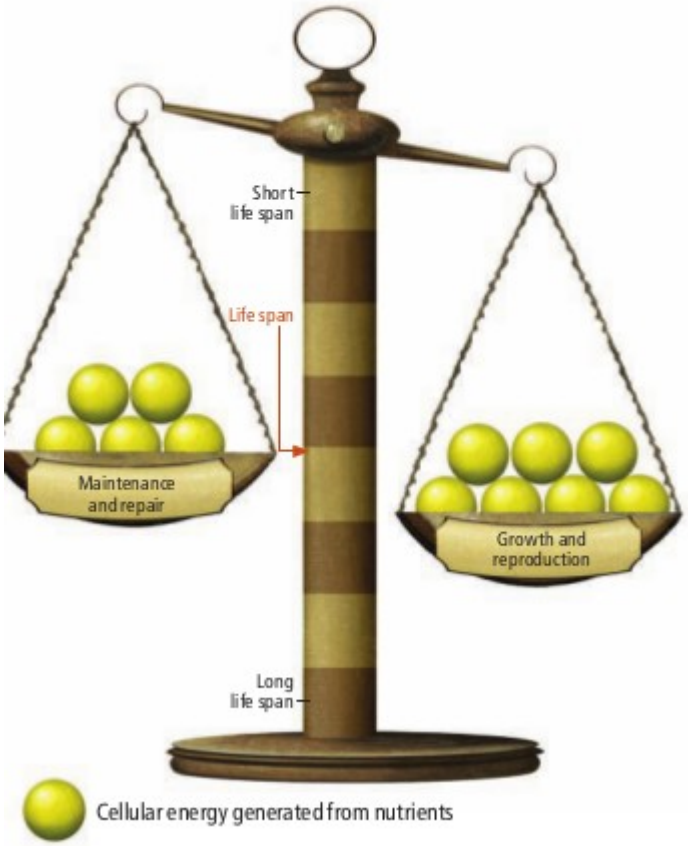
Nem a gének vannak miértünk, hanem fordítva, az életünk csak egy furcsa, bonyolult kacskaringó annak érdekében, hogy génjeink a lehető legtöbb példányban másolódjanak le. Dawkins "túlélő gépeknek" nevezi az élőlényeket, melyeket a gének azért fejlesztettek ki, hogy jól védve legyenek, és optimális körülmények között másolódjanak. A morális következmények nagyon komornak tűnnek első pillanatra.

[A THEORY OF AGING]

HOW AGING STEMS FROM TRADE-OFFS

Aging occurs because our body must make a trade-off between reproducing and staying in good repair, according to the author's "disposable soma" theory. Given a limited supply of energy, the amount that goes to making and protecting sperm and eggs tips the scale away from ensuring that "somatic" cells—skin, bone, muscle, and so on—remain in good condition. As a result, cells accumulate damage over time, which ultimately causes some organ or another to become diseased. If bodily functioning is sufficiently compromised, death ensues.

▼ HOW ENERGY IS ALLOCATED IN THE BODY



tition. Sperm are produced in vast excess; usually only a good one

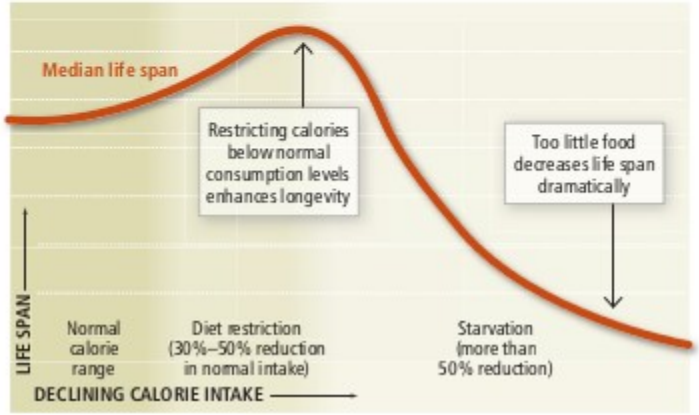
[HINTS FOR NEW DRUGS]

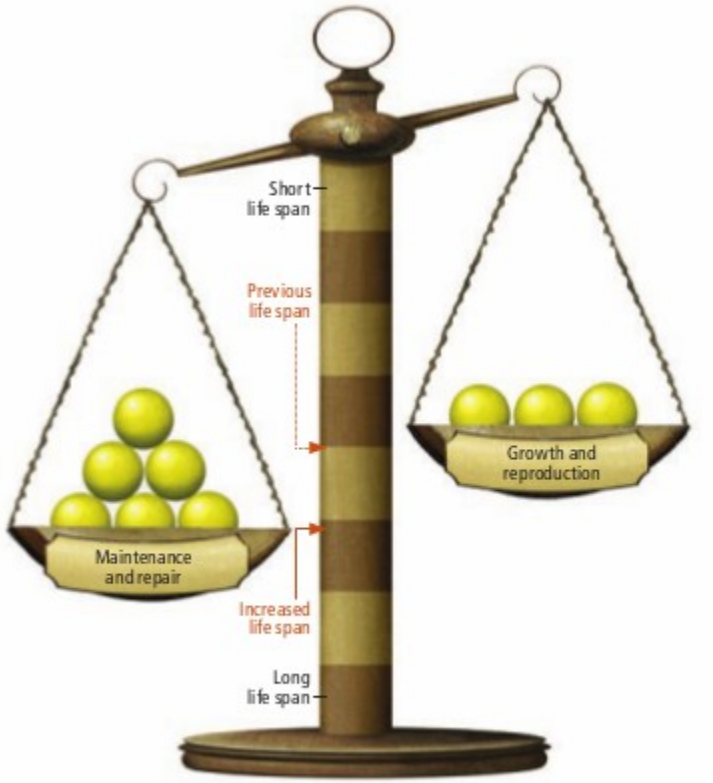
CAN WE SLOW AGING?

No one yet knows how to slow human aging. But basic research into the process might eventually yield longevity drugs. Some compounds might tinker with cell metabolism (energy use) to mimic benefits seen in animals (*below*); others might change the way damaged cells behave (*opposite page*).

LEAN AND LONG-LIVED: Certain therapies might redirect cell metabolism, tilting the scale toward maintenance and repair functions and away from reproduction, thereby keeping bodily organs healthy longer. Calorie restriction lengthens the median life span of flies, worms and mice over that of animals eating a normal diet (*graph*). It is unclear yet whether caloric restriction can work in humans.

▼ RESTRICTING CALORIES ENHANCES LIFE SPAN IN ANIMALS





▲ RESTRICTING CALORIES AFFECTS ENERGY ALLOCATION

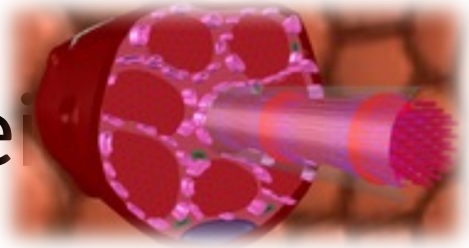
AZ ÖREGEDÉS

Balsay Judit
Biológia MA
YGIB8Q

Melyik lehet az az életkor, amikor beköszönt az öregedés?

- kronológiai kor, azaz a naptári, anyakönyvi életkort
- biológiai életkor, azaz a szervezet tényleges, fiziológiás állapota

Az öregedés szintjei



1,. Molekuláris szint

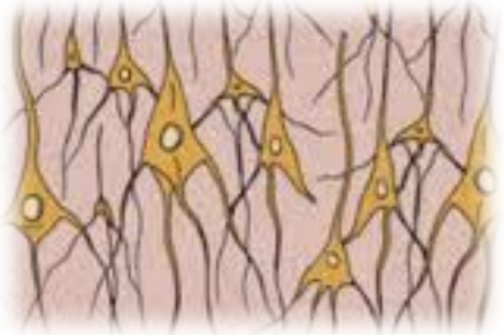
2,. Sejtorganellum szint

3,. Sejtszintű

4,. Szövetszintű

5,. Szervszintű

6,. Szervezetszintű



Öregedés okai:

A. belső, genetikai okok

B. külső károsító tényezők hatása

ELMÉLETEK

1.
A melléktermék felhalmozódási elmélet

- Lipofuszcin (öregedési pigment) felhalmozódása
- Elsősorban izom (szív)- és idegsejtekben
- Zsír a fehérjékhez kötődik
- Mérete az életkorral nő
- Akadályozza a normális működést???

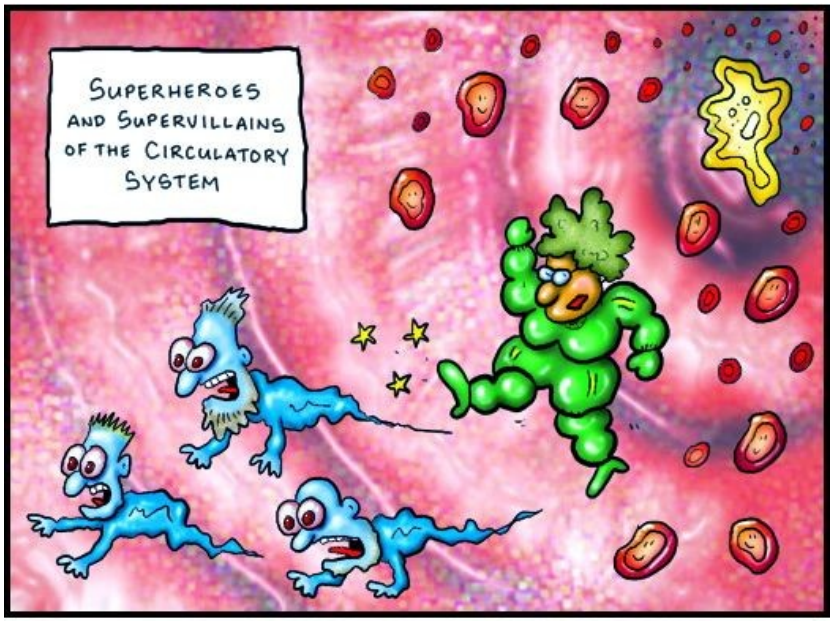
2.
Keresztkötési elmélet

- Kollagén fehérjék fiatalkorban hajlékonyak
- Nő a keresztkötések száma
- Vízvesztés
- Rugalmasságuk csökken
- Pl.: bőr esetében

3. Szabad gyökök elmélet

Jellemzői:

- Denham Harman
- Szerves molekulák és oxigén reakciója
- Oxidatív hatásúak
- DNS-sel !!!
- Léteznek megsemmisíthető enzimek (szuperoxid-disztumáz, peroxidáz, kataláz)
- Antioxidánsok (A-, C-, E-vitamin, glutation)
- Kísérlet



Auntie Oxidant kicks out the Free Radicals.

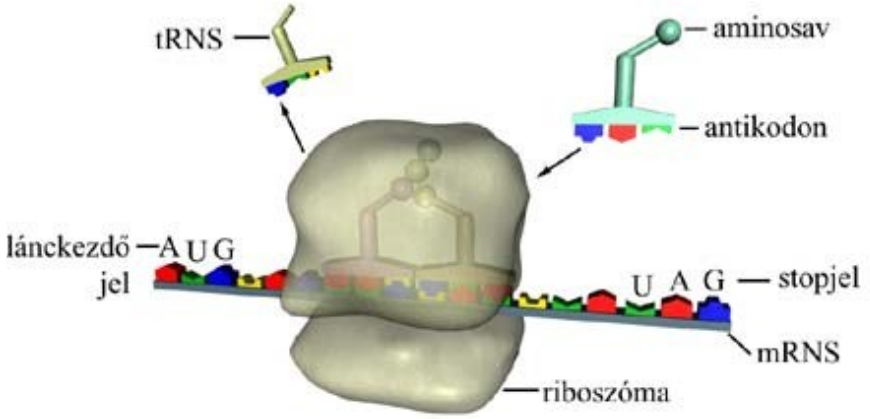
MUTÁCIÓK

- spontán mutációk → repair rendszer korrigálhat
- !!! Mitokondrium DNS mutáció

ENZIMEK

- hibakatasztrófa (Orgel)
- Fehérjék-Proteaszómák
- betegségek kialakulása

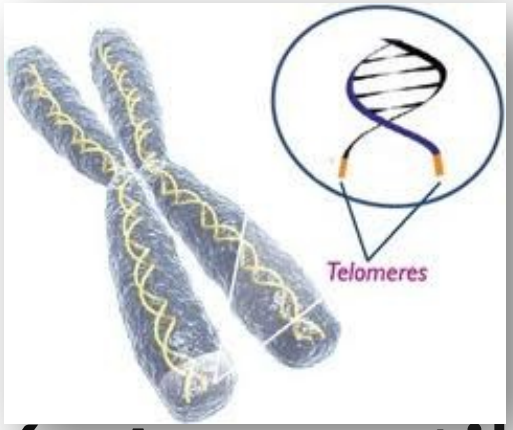
Parkinson-, Alzheimer-kór

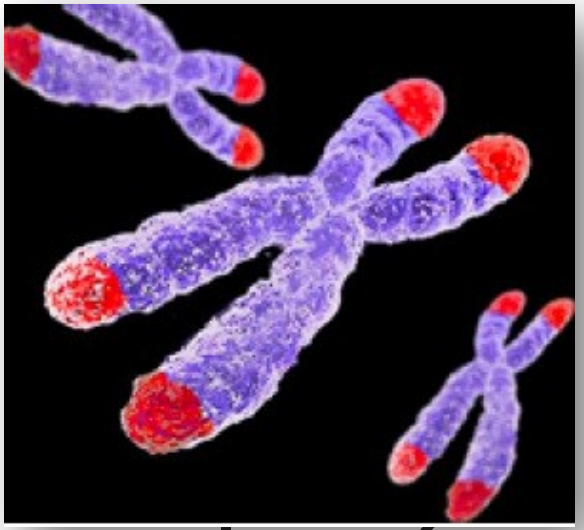


5. A hiba- és javítási elméletek

„örökké nem működik semmi tökéletesen”

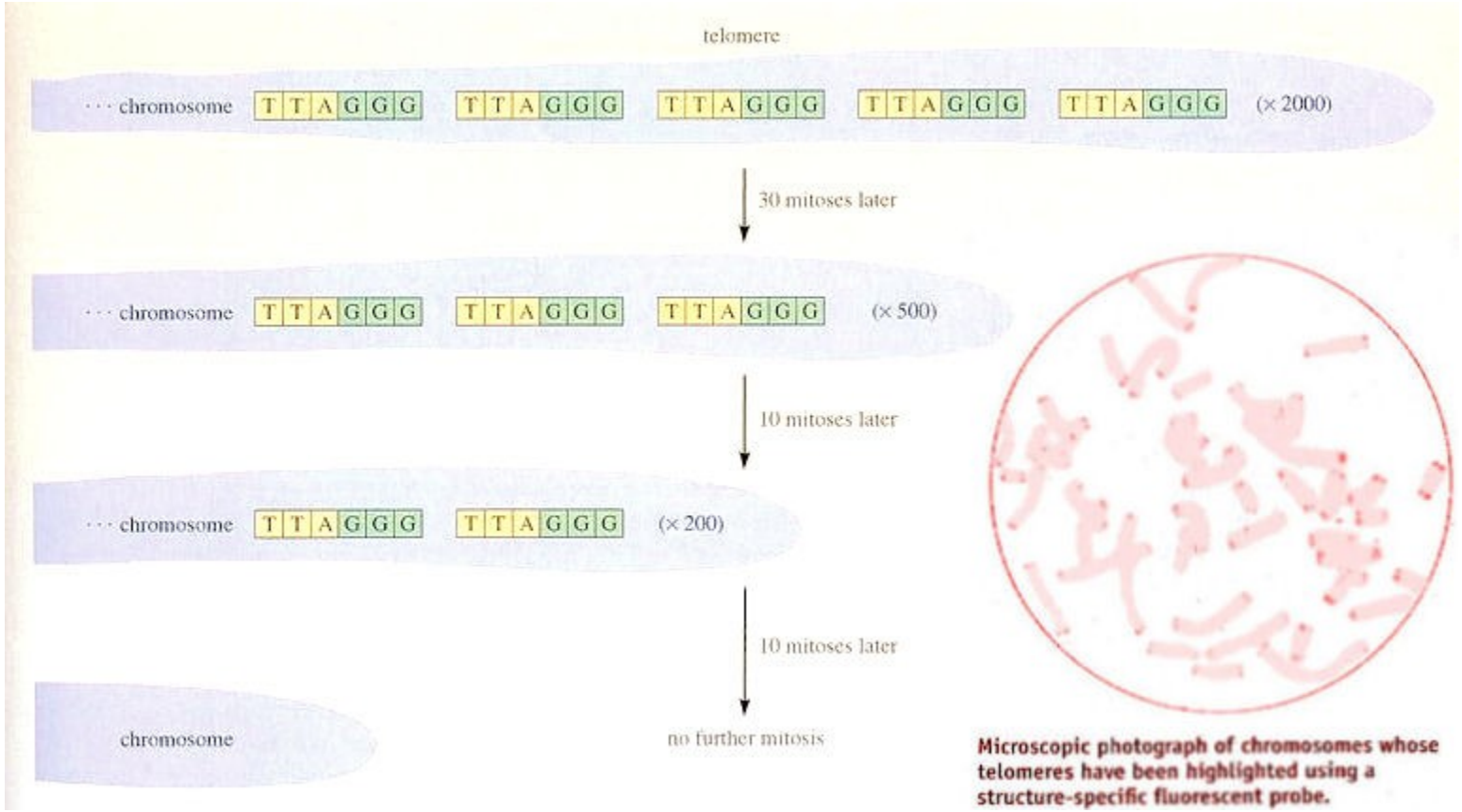
- Teloméra: kromoszómák végén található régiók
- Néhány kb T és G szekvencia, hossza eltérő (ember TTAGGG)
- DNS polimeráz 5’-3’ irányban szintetizál, szükséges egy primer RNS darab (leválik)
- Replikációs öregedés





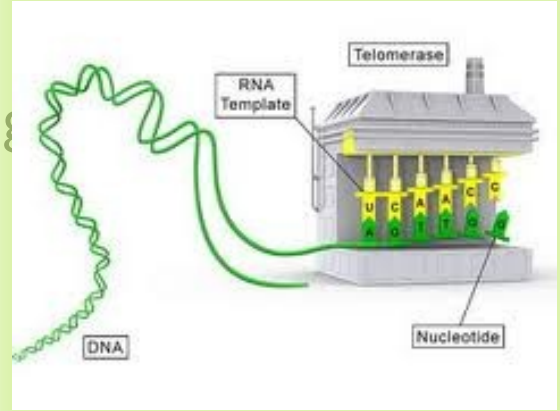
6. A genetikai óra – teloméra elmélet

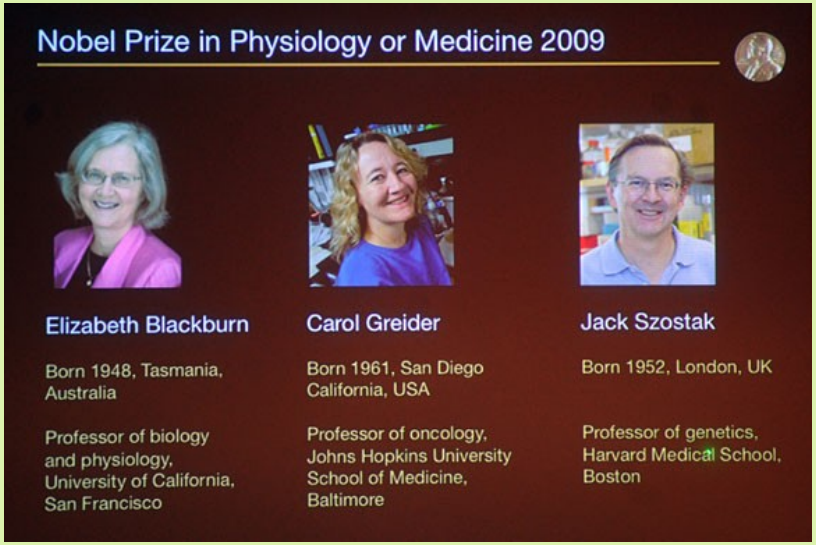
Teleomere elmélet – nem ok, csak mechanizmus!



Öregedés = tumor gátló mechanizmus

- telomérák rövidülése→tumor szupresszor g
expressziója
- DE! telomeráz
- Bizonyíték (in vivo): Dolly





Az örök élet titka a telomeráz???