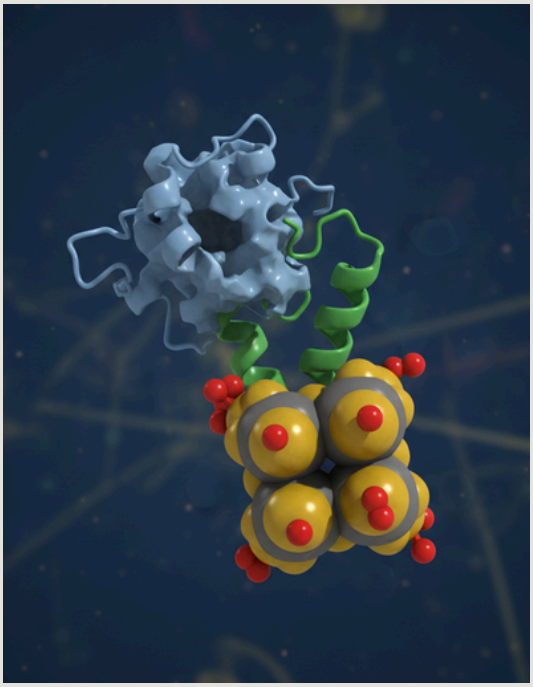
Resilient

"Eat Less, Live Longer ?"

" Calorie Restrictive lengthen lifespan by 15% - 45% but.... "

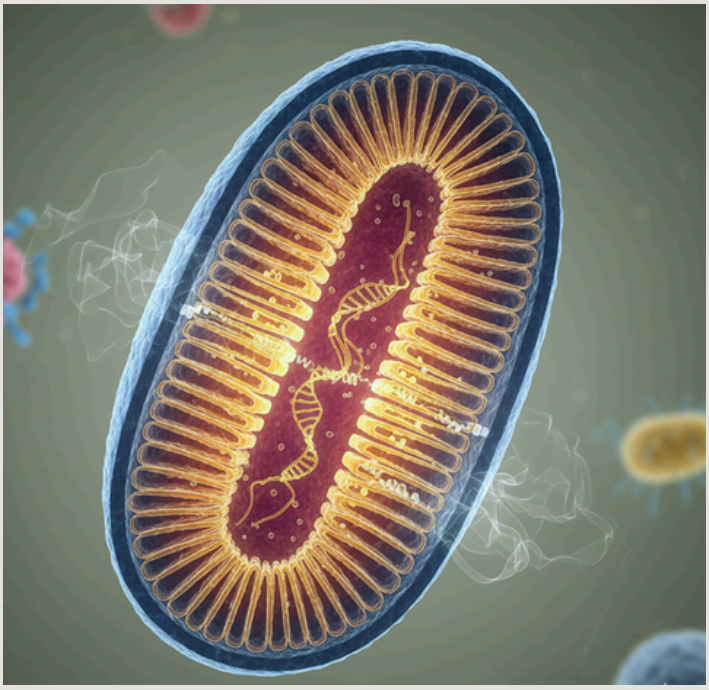
A group of rats that can eat as much as they want vs another group of rats that are given a similar diet containing all necessary nutrients but 25% fewer total calories. These sorts of studies were done repeatedly for many times with other types of animals (yeast, worms, fish, hamsters, dogs, etc.) and the result has been remarkably consistent. Lifespan of the group with less calory intake is longer by 15% - 45% depending on the age and degree of restriction.

However, caloric restriction is kind of radical when it comes to human and is quite impossible for most of us to sustain. Furthermore, there is no evidence that extreme caloric restriction could increase longevity of complex organism like us, humans.



AMPK

These caloric restriction studies uncover critical cellular mechanisms related to nutrients and longevity. When a cell is restricted from nutrients, it triggers a group of innate pathways to increase the cell's stress resistance and metabolic efficiency. AMP-activated protein kinase (AMPK) is an enzyme that activates a series of actions when our body lacks nutrients. This enzyme is also activated when we exercise because of the drop in nutrient levels. APMK prompts cells to conserve and look for alternative energy source.



Mitochondria

AMPK stimulate the production of new mitochondria. These are tiny organelles that produce energy in our cell. After being used, the mitochondria become vulnerable to oxidative stress and genome damage. When a body is restricting nutrients, via diet or exercise, it will trigger the body to make new, efficient mitochondria that replaces the old and damaged ones.

AMPK inhibits the activity of cellular growth regulator. Instead of undergoing cell division, our cell goes into a more fuel-efficient and stress-resistance mode. A cellular recycling process called autophagy is activated.

Autophagy

Autophagy is the process when a cell instead of producing new proteins, it breaks down old proteins and other cellular structures into amino acids components. It then uses these materials to build and repair cells or burning it down to produce energy.

It is a very important process to life. It is like you stopped removing garbage from your house. Your house will soon pilled up with garbage and became uninhabitable. The process cleans up something called aggregates; clumps of damaged proteins that build up over time. These aggregates are linked to Parkinson's and Alzheimer's disease. Breaking down and destroying these protein aggregates lowers the risk of these diseases. Researches had also shown that impaired autophagy is linked to Alzheimer's and Parkinson's disease.

Autophagy allows cells to become more efficient and helps them to be more resistant to stress. However, autophagy declines when we grow older. It seems that autophagy is an important driver of aging-related sickness such as neurodegeneration and osteoarthritis. Keeping in mind that we can still trigger this declining cellular mechanism by reducing nutrients, exercise and perhaps a drug called **rapamycin.**

The Magic of Rapamycin
Rapamycin was first famous because it calms down immune system, which is very helpful to organ transplant patients. It helps them to reduce the risk of new organs rejection.

Rapamycin is also used as coating for a wire mesh device called arterial stents that is used to keep blood vessels from getting blocked again.

The most exciting discovery of Rapamycin has been demonstrated to extend maximum lifespan in mammals such as mice. Studies show that it increases the maximum lifespan of female life up to 13 percent longer. The autophagy-promoting effect of Rapamycin makes it a potential drug for longevity in the future.

Where are we now on Rapamycin

It seems that clinical trial is standing in the way between Rapamycin and preventive therapy in healthy people. Rapamycin has immunosuppressive effect which makes it unpractical when it comes into longevity. Or is it? According to a study by the scientists Joan Mannick and Lloyd Klickstein, a moderate weekly dose seemed to have the best response to the flu vaccine and with the fewest side effects. Rapamycin might be an immune modulator than an immunosuppressor. Under certain dosing regimens, it enhances immunity. Under completely different dosing, it may inhibit immunity.

Resources: Outlive | The Science & Art of Longevity, Petter Attia.

The Cell's On/Off Switch

Think of every cell in your body having a switch (Mechanic Target of Rapamycin, mTOR). Its job is to balances your need to grow against the amount of food you have. After a meal, mTOR switch in ON. It tells the cell to grow, divide and build. When you are fasting, mTOR switch is OFF. It tells the cells to stop growing, conserve energy, and recycle old parts.

Rapamycin works like a mechanical switch that turns off mTOR. It tricks the cell so that cells go into the 'recycling' mode.