



SURVIVAL CIRCUITS

Norse Foundation

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POND SCUM



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4 Billion years ago – there was only pond scum. One of these types of pond scum had a superpower.

The earliest living cells developed a very particular survival mechanism: stop cell reproduction when DNA damage occurs and focus all energy on repair until the damage is fixed.



SURVIVAL CIRCUITS

THERE ARE THREE

1. SIRTUINS
2. mTOR
3. AMPK

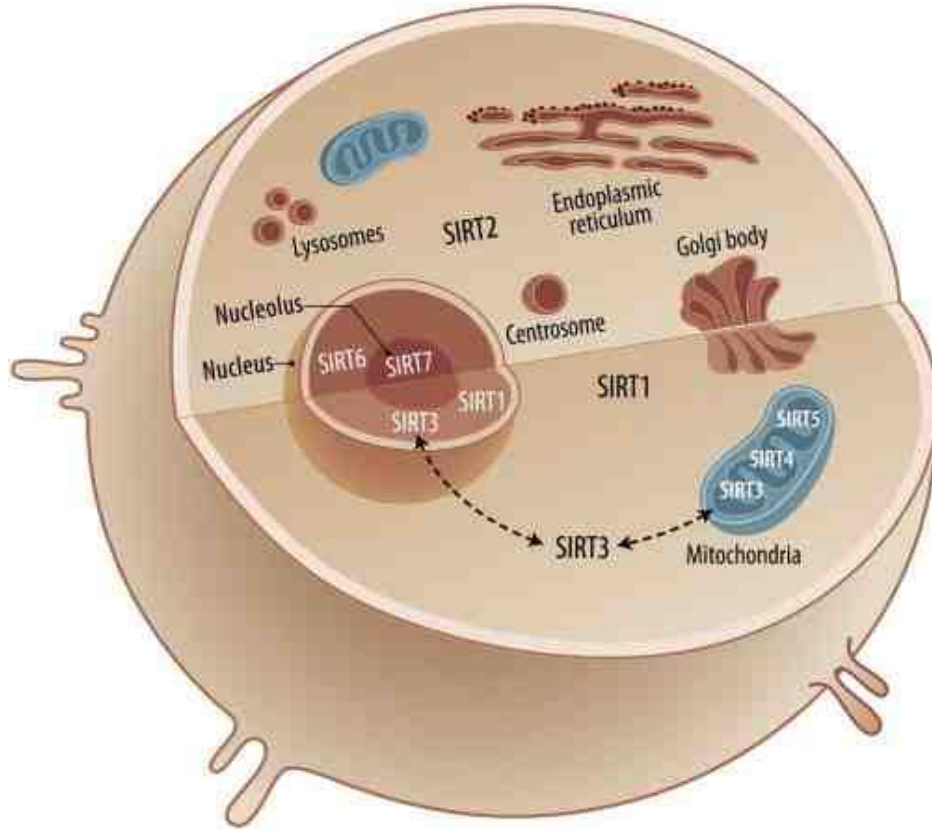


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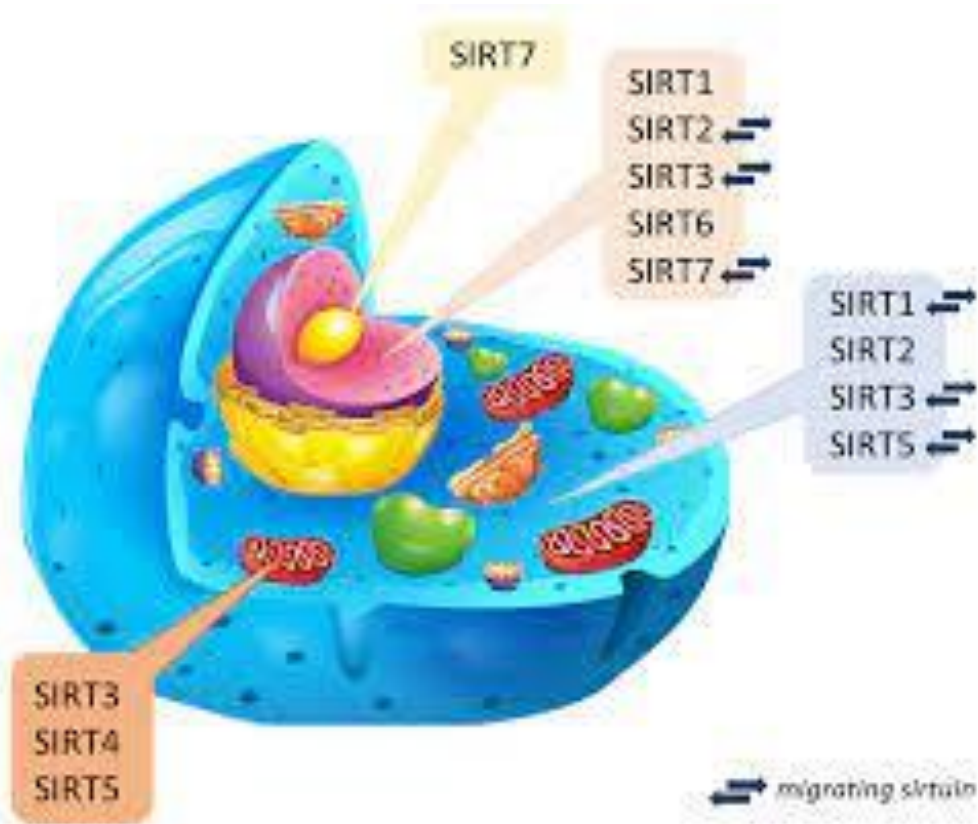
1) SIRTUIN



- Sirtuins are a class of enzymes that are implicated in numerous biological pathways and are considered a promising target for treating human diseases. There are 7 types of sirtuins.
- Sirtuins are enzymes that remove acetyl tags from proteins and change the packaging of DNA, thus turning genes off and on when needed.
- They are critical epigenetic regulators that sit at the top of the cellular control system, managing our DNA repair and reproduction. They control our fitness, health and our very survival.
- In order to work they require a molecule called Nicotinamide adenine dinucleotide (NAD).



1) SIRTUIN



- Sirtuins are implicated in cellular processes like;
- **Aging**
- **Transcription**
- **Inflammation**
- **Stress resistance**
- **Energy efficiency and alertness during low calorie situations.**
- **They are involved in DNA repair.**
- **SIRT6 deficiency in mice leads to premature degenerative aging.**
- **If you remove SIRT7 from mice they display features of premature aging.**
- It is worth noting that sirtuins are dependent on NAD +.
- (Nicotinamide adenine dinucleotide).



SIRTUIN – THE EMERGENCY SERVICE OF THE CELL

- The sirtuins genes are there to repair damage that might cause further noise, but they can get overwhelmed.
- "Think of sirtuins as the directors of a multifaceted disaster response corps, sending out a variety of specialized emergency teams to address DNA stability, DNA repair, cell survivability, metabolism, and cell-to-cell communication."





SIRTUIN – OVERWHELMED

However, if there **are too many emergencies and too much constant DNA repair required, the sirtuins are too busy** with that to focus on their other duties of controlling the genes and ensuring optimal cell function. **That's when problems start.**

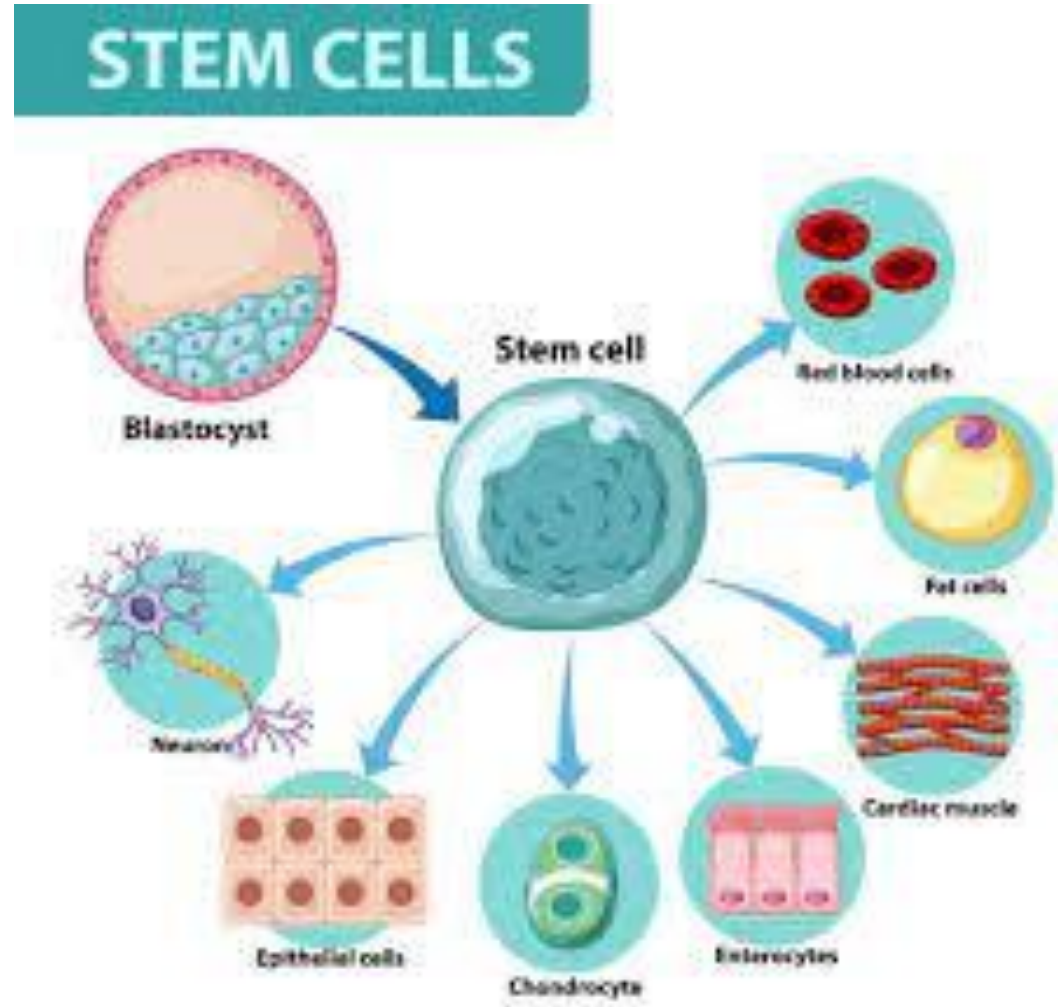




EPIGENETICS

Epigenetics also control the development of stem cells into the different cell types. Their stability is extremely important, but a changed epigenome can disrupt this. That's essentially the process of aging.

Stabilizing the cells, and the epigenome, is the biggest key to slow, or even reverse, aging.





SUPPLIMENTS TO IMPROVE FUNCTION OF SIRTUINS

NAD – Nicotinamide adenine nucleotide – is a chemical used for many processes but also fuels the function of sirtuins, thus allowing their function of DNA and cell repair.

We lose NAD as we age, and this results in a decline in sirtuin activity.

NAD+ carries electron and protons that can be used in the mitochondria to produce ATP.

NMN if you take NMN orally it gets converted NAD in the cells.





SUPPLIMENTS TO IMPROVE FUNCTION OF SIRTUINS

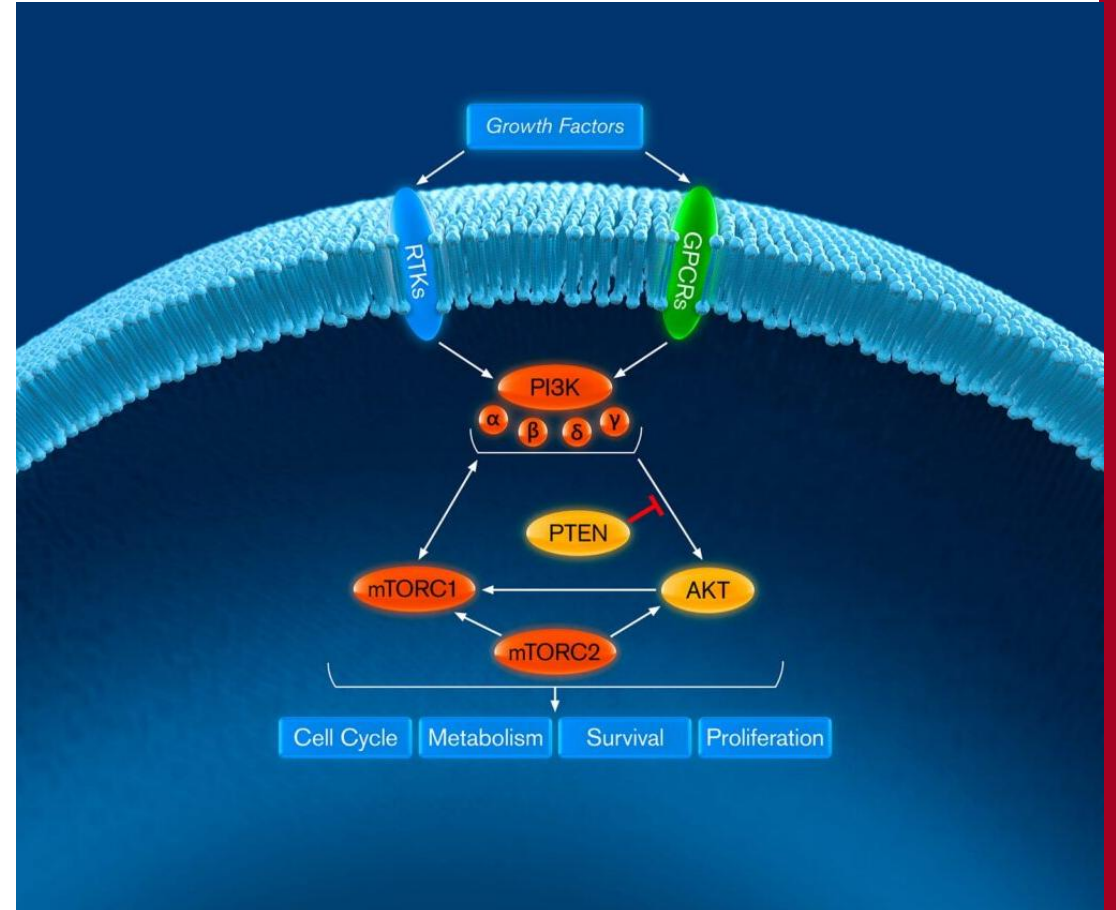
Resveratrol has been shown to increase expression of SIRT 1 which could increase longevity.





2) mTOR

- Target of rapamycin (TOR) known as mTOR in mammals, is a complex of proteins that regulates growth and metabolism.
- Found in every organism.
- mTOR can signal cells in stress to boost DNA repair, reducing inflammation caused by senescent cells, and digests old proteins.
- mTOR is also the master driver of cell growth.
- When mTOR is inhibited, it causes cell repair – autophagy.
- When we are short of food mTOR is inhibited and causes us to make the best of things by repairing the current cells.
- When you fast causes mTOR to repair cells and DNA.





3) AMPK

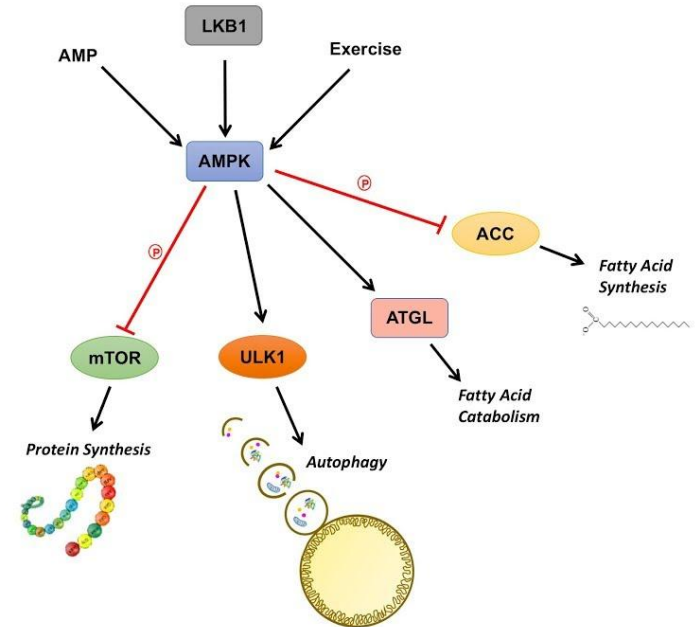
AMPK is a metabolic control enzyme which helps the cells survive in response to a low energy level.

Adenosine 5' monophosphate-activated protein kinase (AMPK) is an enzyme that is known as the body's "master regulator of energy metabolism." Why? It works as an energy sensor within our cells. Researchers believe that as we age, AMPK activity significantly decreases. This is one reason why we experience changes in appetite, body weight, energy levels, etc.

Energy depletion (or a lack of cellular energy) is really what stimulates AMPK activity. This causes more of the protein activated protein kinase (AMP) to be produced. That means some of the best AMPK activators are things we think of as beneficial "stressors." These include calorie restriction, fasting and intense exercise.

We do know, however, that natural AMPK activators can offer many benefits. These benefits include reducing inflammation, improving metabolic pathways and supporting healthy aging.

AMPK Signaling Pathway





3) AMPK

Health Benefits

1. **Regulates Energy Usage and Maintains Homeostasis**
2. **Supports Weight Loss**
3. **Decreases Inflammation**
4. **Improves Metabolic Pathways and Insulin Sensitivity**
5. **Can Improve Physical Performance**
6. **Supports Autophagy and Healthy Aging**
7. **Helps with Hormone Production and Fertility**

Certain studies found evidence that AMPK signalling can support cellular renewal and activate autophagy.

Autophagy is a physiological process in the body that deals with destruction of cells.

“When energy supply is low, organisms respond by slowing aging and increasing resistance to diverse age-related pathologies.”

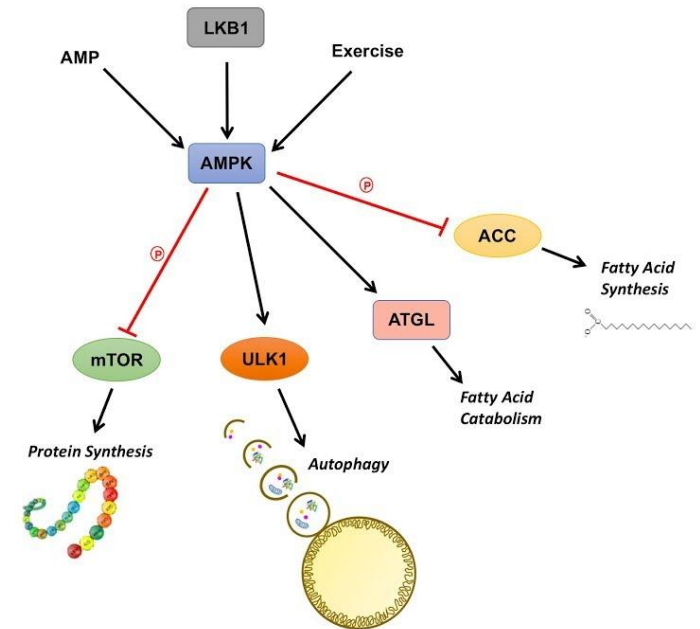
AMPK helps regulate processes that turn over destroyed cell organelles, damaged mitochondria and other degraded material into new cells.

AMPK helps the body age and deal with stress in a healthier way.

[AMPK: Benefits, Activators, Side Effects and More - Dr. Axe \(draxe.com\)](#)

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AMPK Signaling Pathway



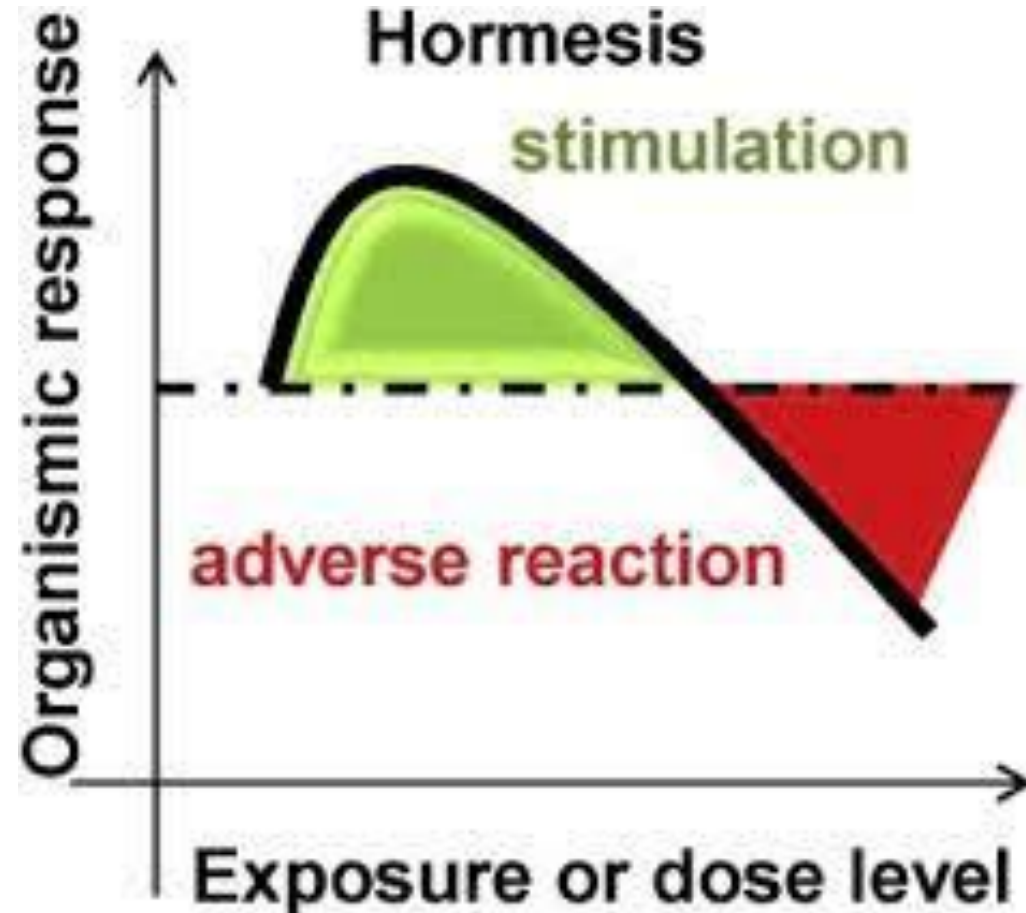
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THE RIGHT LEVEL OF STRESS & HORMESIS

- Too much stress, disease or damage to DNA will kill the cell, the organ and possibly the creature.
- The right amount of stress is good for you, it activates your longevity genes and survival circuits and effectively repairs your DNA and improves your longevity.
- Hormesis – whatever doesn't kill you makes you stronger. A level of biological damage or adversity that stimulates repair process that provide cell survival and health benefits.
- The right kind of stressors, triggers these mechanisms, activating the longevity genes without damaging cells.





SURVIVAL CIRCUITS PROTECT US FROM AGING.

These survival circuits trade reproduction of DNA for repair.

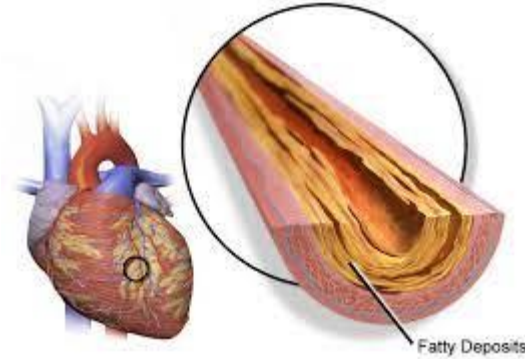
In times of stress, they cause our body to protect us against major diseases of aging ;

- Diabetes
- Heart disease
- Alzheimer's
- Osteoporosis
- And cancer.

They also mute the chronic, overactive inflammation that causes disease like;

- Atherosclerosis
- Ulcerative colitis
- Arthritis
- Asthma

They prevent cell death and boost mitochondria.



| | |
|---|---|
| a | b |
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A GOOD EPIGENOME RESULTS IN HORMESIS

We are trying to live, eat and exercise optimally so that we can keep the body in a state of alert, this triggers the sirtuins / epigenome to be in defence / repair mode.

By putting our bodies under a healthy amount of stress we trigger hormesis, and our bodies start repairing themselves.

