Power of 1 Wellness News

Newsletter 10 Δ October 01, 2020

Wellness Word —

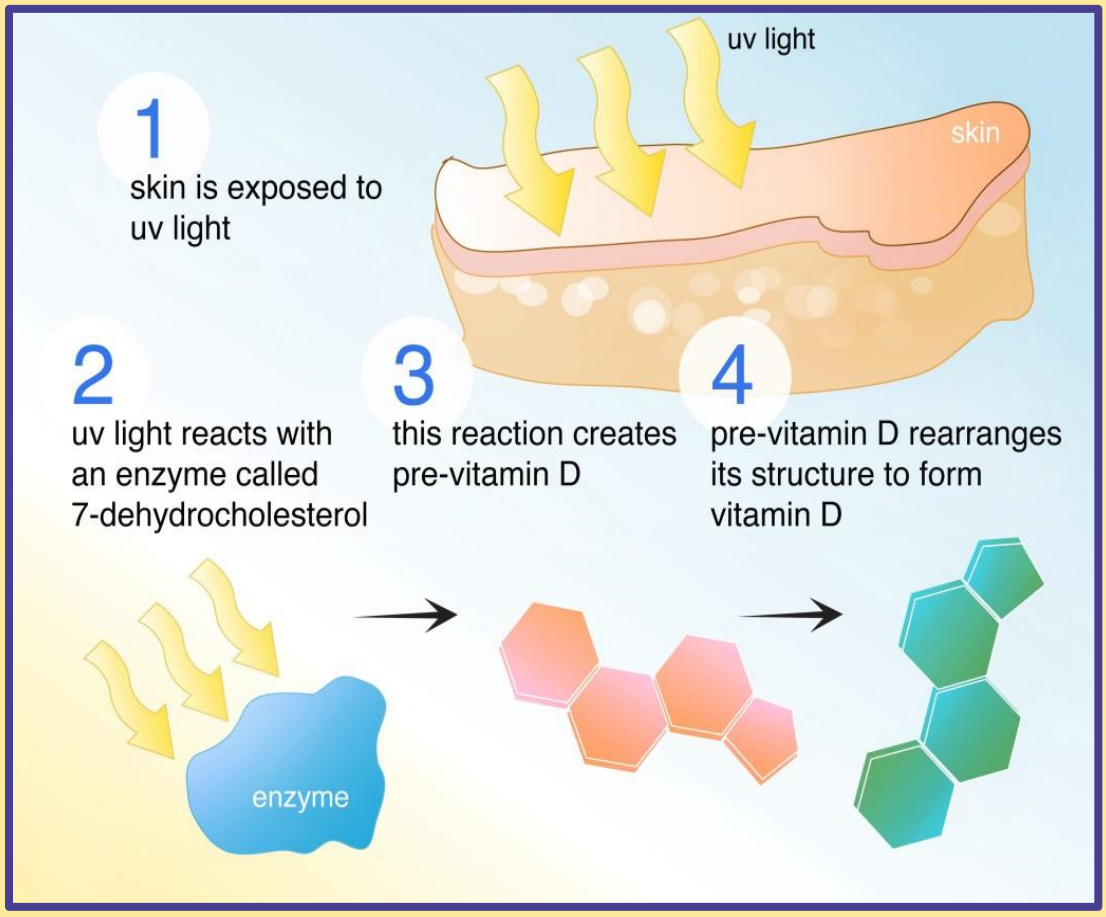
The protective effects of vitamin D

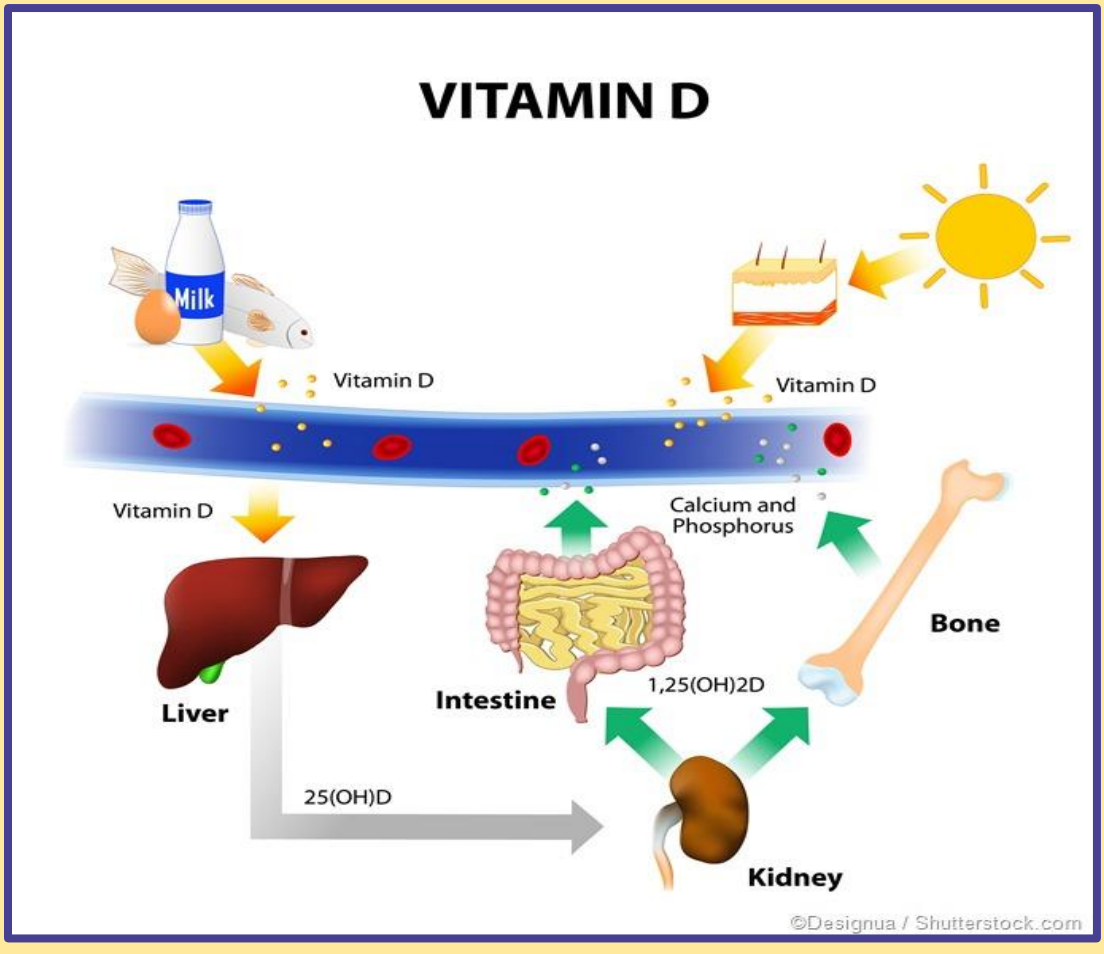
have been well documented in the prevention of chronic and inflammatory conditions, neuropsychiatric disorders and autoimmune diseases through its roles in regulation of calcium metabolism and modulation of cell proliferation and differentiation.

As we discussed in our September newsletter, Vitamin D in the human body is predominantly derived from skin after ultraviolet light exposure and much more minimally from dietary sources.

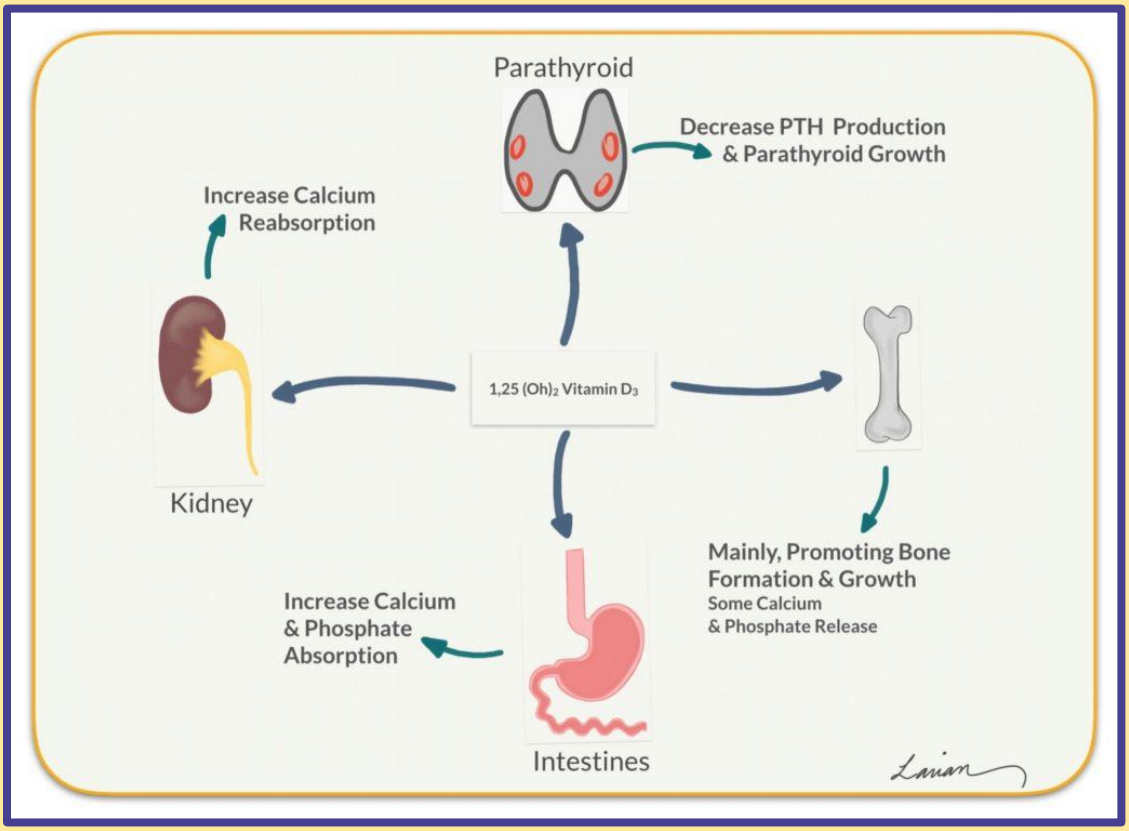
More than 90% of systemic vitamin D originates from the skin, derived from cholesterol upon exposure to ultraviolet light band B (UVB) and conversion to vitamin D3 (cholecalciferol), an inactive precursor. Around 10% of systemic vitamin D originates from dietary sources and absorption by the small intestine.

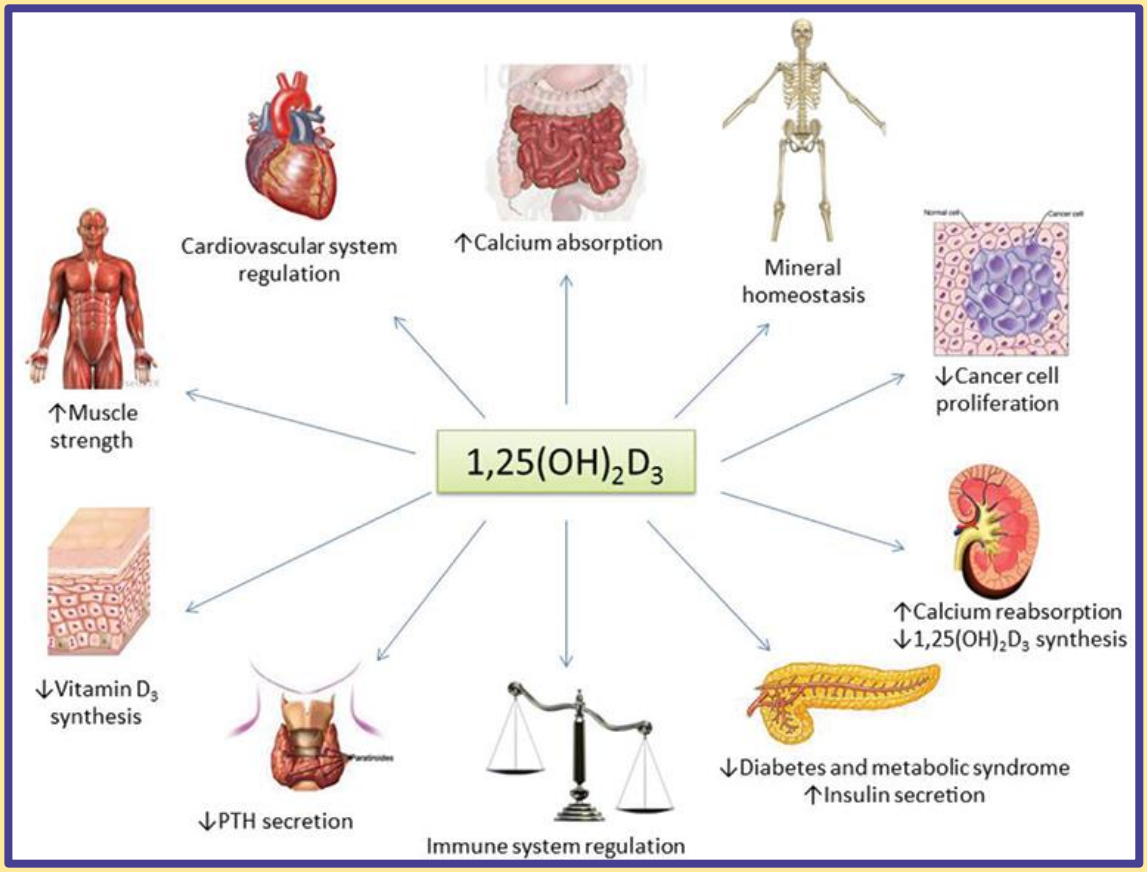
Through either route, inactive pre-metabolite forms are transferred through the bloodstream and subsequently activated within the Liver and Kidney to 25OHD and 1,25-(OH)2-D, respectively.





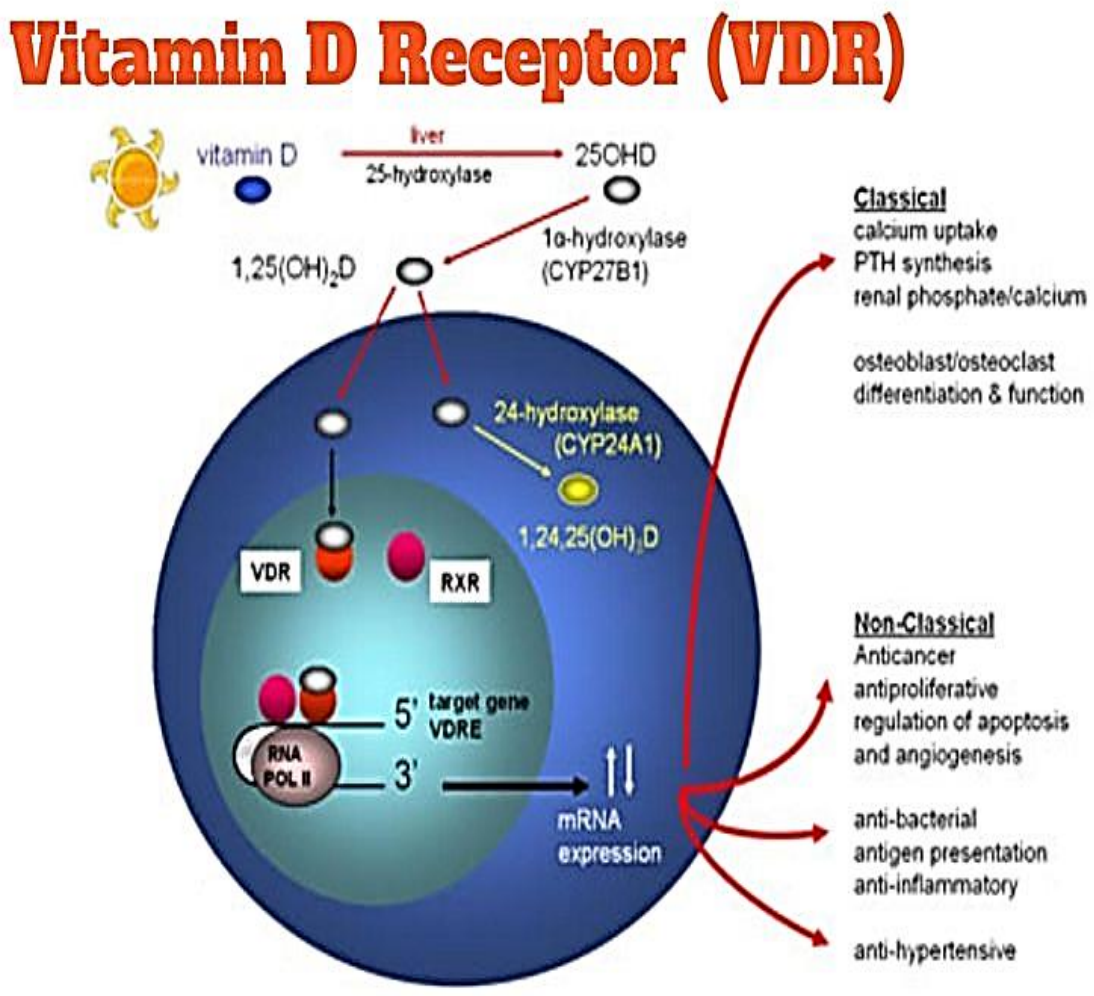
The most potent vitamin D metabolite [1,25-(OH)2-D] acts as a facilitator throughout the body for increasing absorption of calcium and phosphorus from the intestine; helping in maintenance and growth of bones and muscles; reducing inflammation and autoimmunity; and modulating cell growth and gene regulation. In recent years, accumulating epidemiological and laboratory evidence has documented that deficiency of its precursor, 25OHD, is correlated to the onset and progression of many chronic diseases



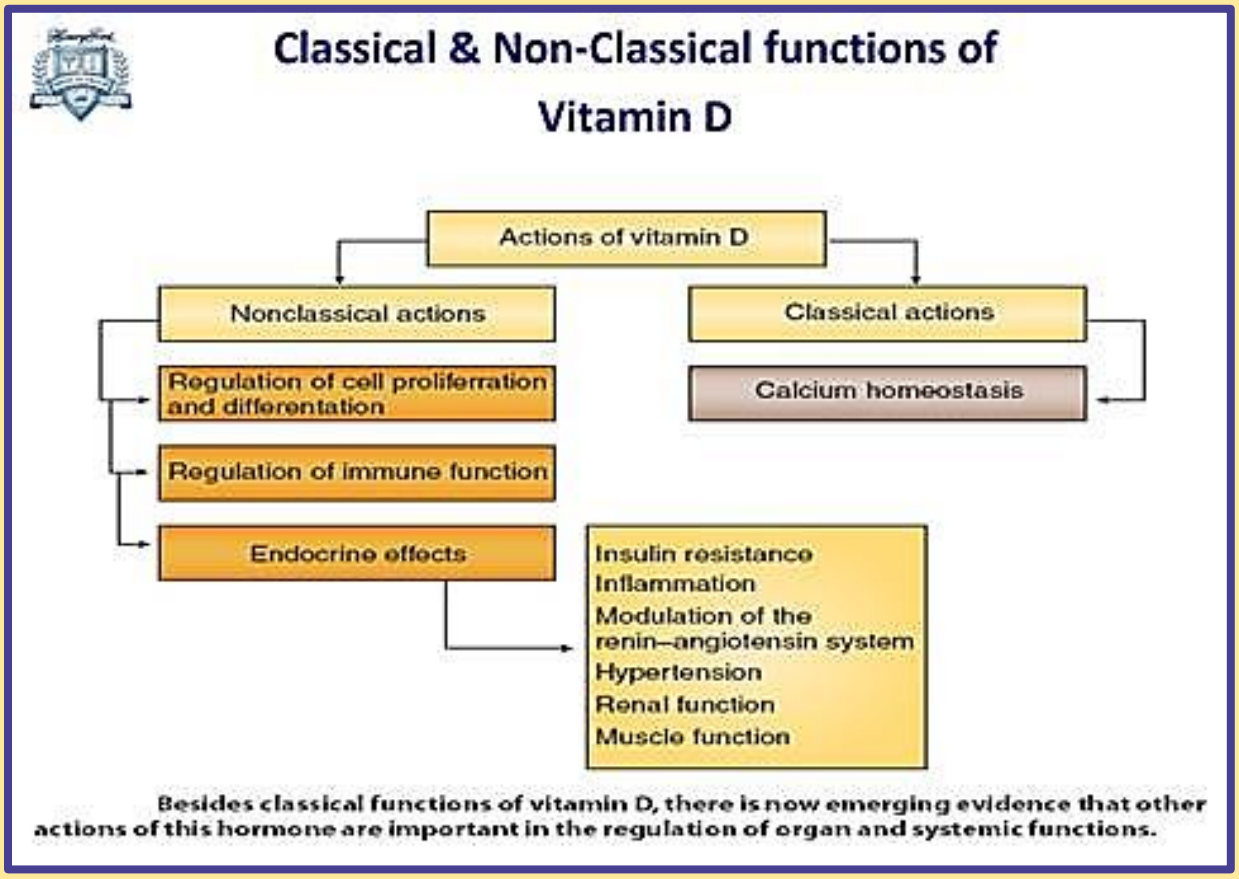


Although traditionally advertised strictly as a vitamin necessary for strong bones and teeth (remember all those Got Milk? commercials), Vitamin D actually operates and functions much like a hormone over a remarkable spectrum of functions and target organs. One reason for its versatility is that Vitamin D has binding sites located within the nucleus (or "brain") of the cells. These nuclear vitamin D receptors (VDR) are quite ubiquitous, appearing even in nerve (dendritic) cells and several different immune cells (macrophages, T lymphocytes).

In this way, nuclear vitamin D receptor (VDR) binding can influence expression down to the genomic level (genetic material encoded on chromosomes within the nucleus of each cell) as well as their subsequent direction of protein production and various responses. Thus, the levels and activities of vitamin D are closely related to the occurrences and development of many chronic conditions, such as malignancies, autoimmune diseases, metabolic disorders and infectious diseases.

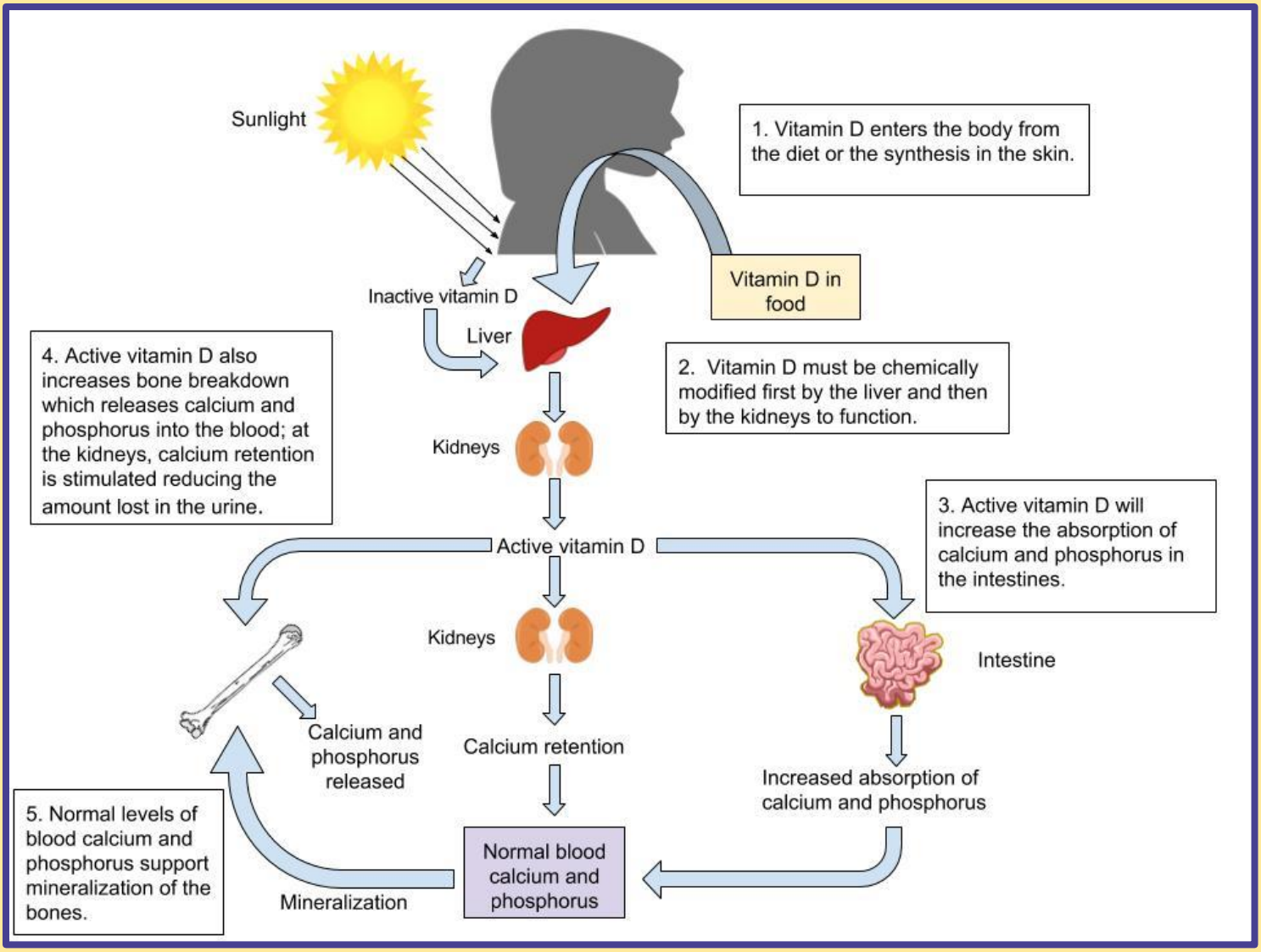


Currently, the biological effects of vitamin D are divided into 2 categories: First, in regulation of calcium and phosphorus metabolism, considered the classical pathway and second, the non-classical alternative pathway that mainly affects immune function, inflammation, anti-oxidation, anti-fibrosis and others, as well as inhibitory effects on the many kinds of malignancies.



Classical Pathway

Traditionally, we consume vitamin D for strong bones and teeth because of its support of calcium and phosphorus absorption. Without vitamin D, the small intestine absorbs no more than 10%-15% of dietary calcium. In a person with vitamin D sufficiency, the small intestine absorbs, on average, 30% of dietary calcium; during growth, lactation and pregnancy, the efficiency increases to 80%.

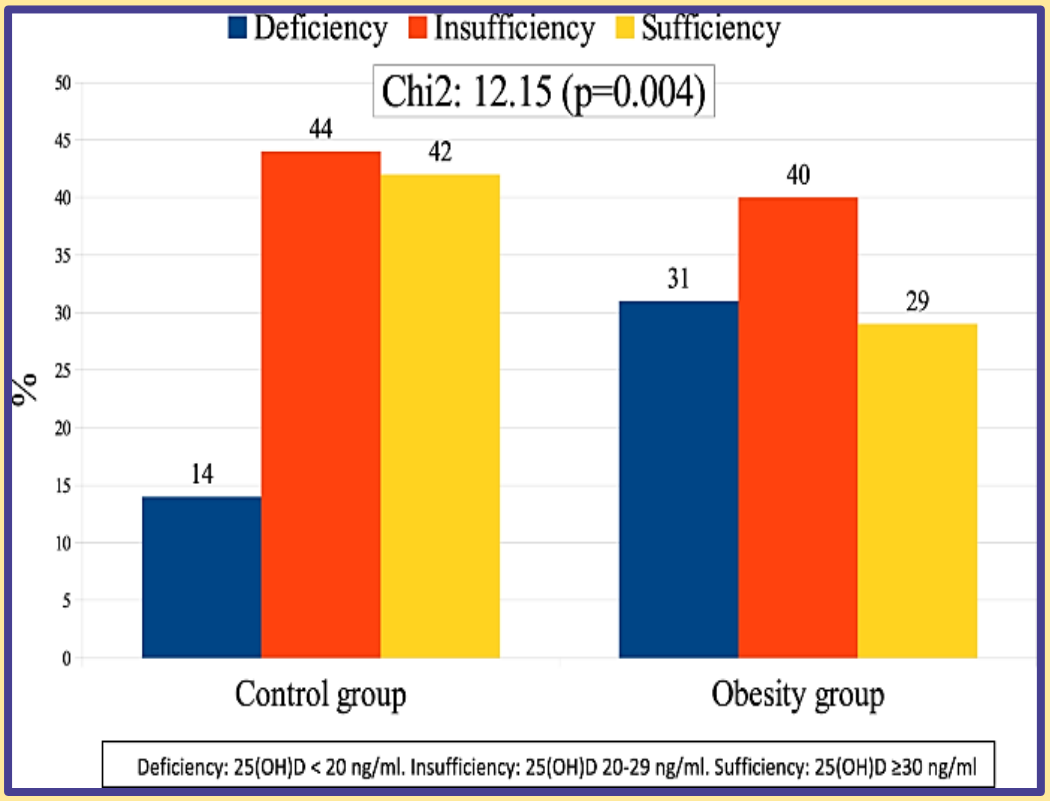


Vitamin D deficiency during bone development and growth causes the bone-deforming disease rickets, which has been less prevalent in the United States due to childhood consumption of dairy products. In adults bone growth stops and bone remodeling continues and in the face of vitamin D deficiency leads to a condition called secondary hyperparathyroidism, resulting in calcium to be leached from the bones to preserve serum blood calcium levels (calcium is essential for muscle contractions [including the heart], cellular transport and nerve signal propagation) and phosphorus to be lost in the urine. These mineral losses result in inadequate amounts of both serum calcium and phosphorus to promote mineralization, or proper hardening, in our skeletal bones. Thus, the matrix remaining is softened (osteomalacia) and cannot provide structural support, increasing the risk of osteoporosis and fracture.

Non-Classic Pathway

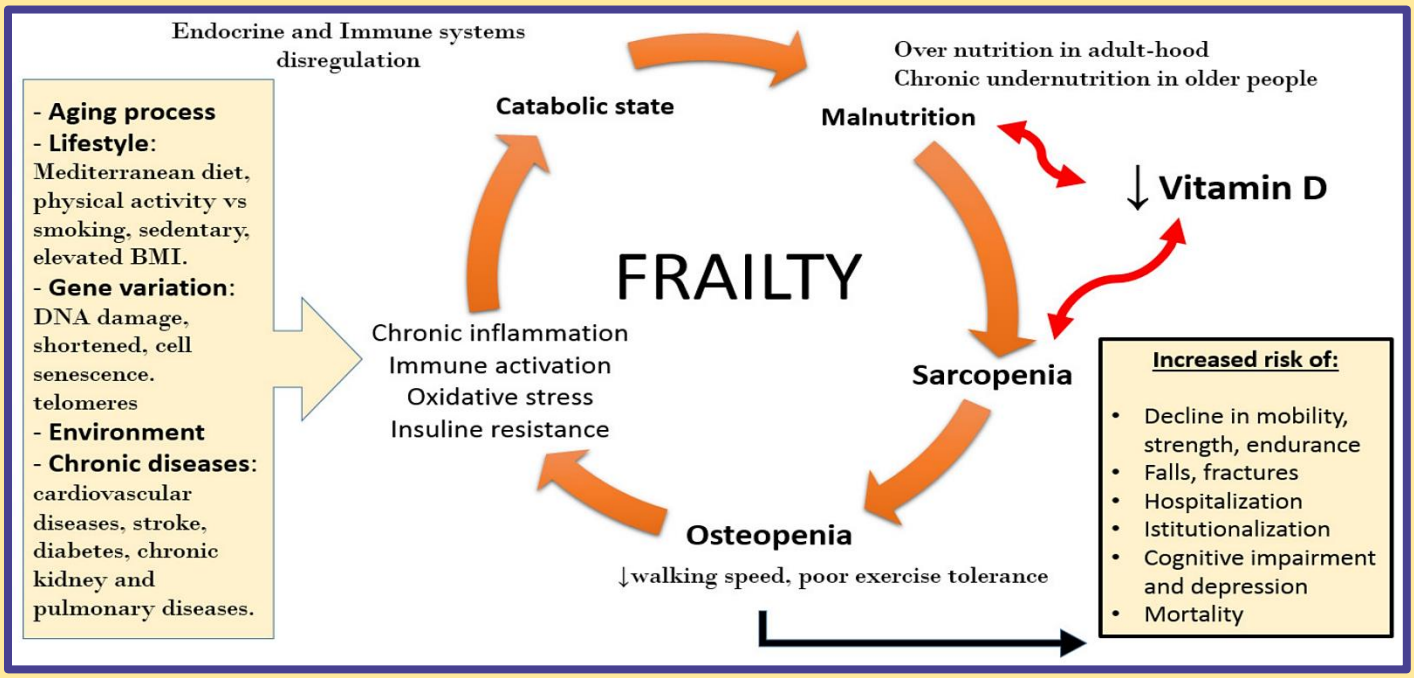
Beyond its critical function in calcium homeostasis, vitamin D has recently been found to play an important role in preventing inflammatory diseases by regulating production of inflammatory cytokines and inhibiting the proliferation of pro-inflammatory cells. (This should ring a distant bell from previous series' coverage in the spring and summer.)

Chronic inflammatory diseases, such as atherosclerosis-related cardiovascular disease, asthma, inflammatory bowel disease, osteoarthritis (OA), chronic kidney disease, nonalcoholic fatty liver disease (NASH) and others tend to have lower vitamin D status.

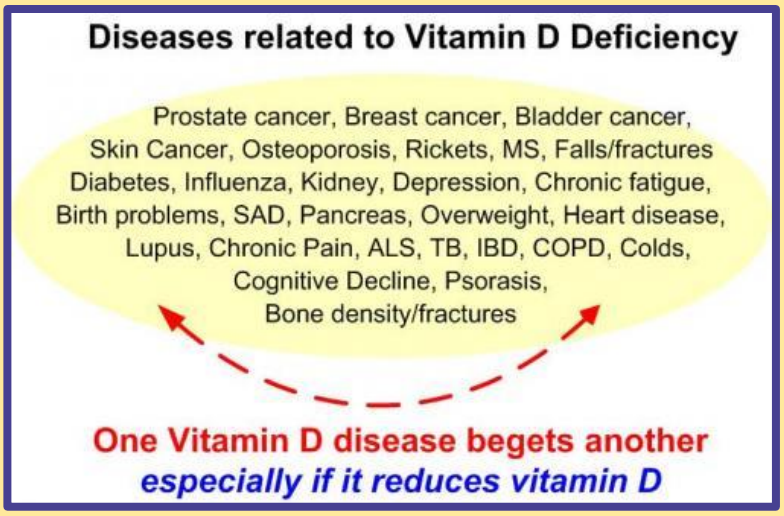


Furthermore, obesity is often associated with vitamin D deficiency as well. Remember that vitamin D is a fat-soluble vitamin, meaning it can be stored in adipose tissue. It is now recognized that whether vitamin D is ingested in the diet or obtained from exposure to sunlight it is efficiently deposited in the large body fat stores and is not bioavailable and cannot be utilized in bodily functions.

Vitamin D integration is a prime example of 1) how our bodies operate as their very own Internet, systemically networking together, with sum gains and losses rippling outward to cumulatively influence responses; and 2) how development of underlying conditions and appearance of deficiencies occur much more insidiously, are often misdiagnosed (e.g., vitamin D deficiency is frequently misdiagnosed as fibromyalgia), with both short-term and long-term consequences.

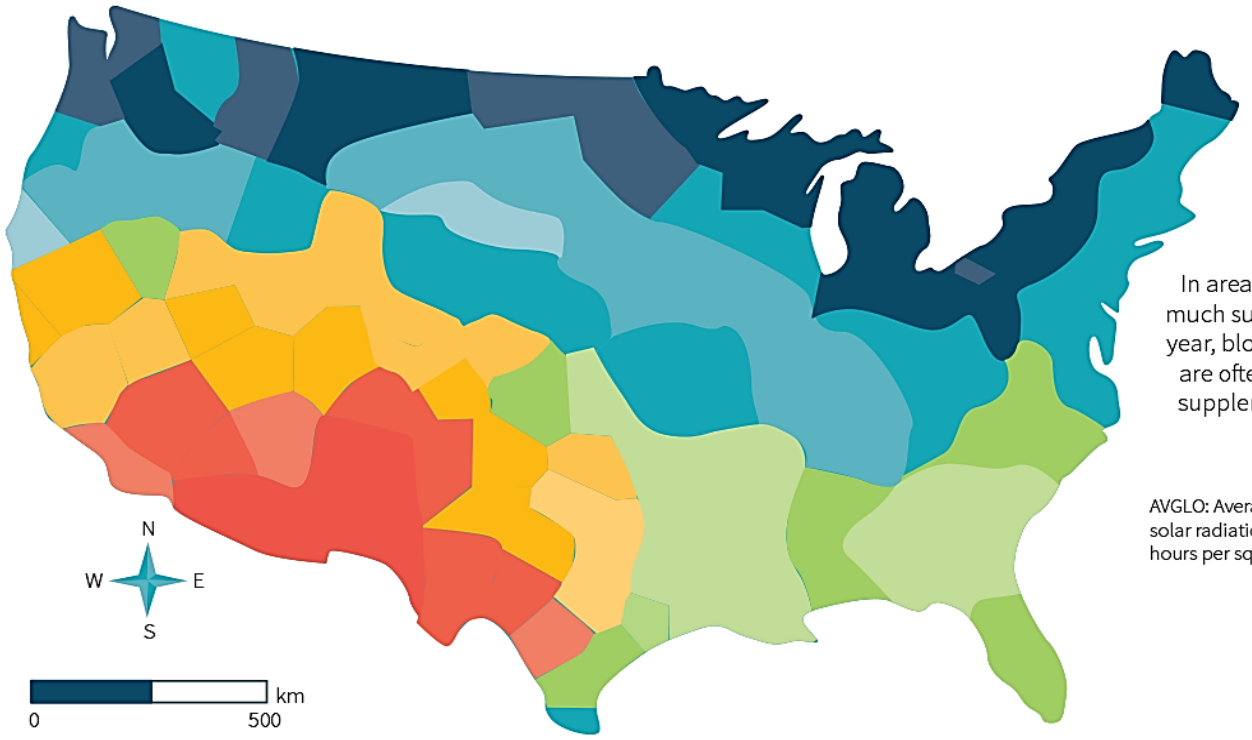


Vitamin D's important role in the modulation of our immune system/inflammatory responses has been well-documented since the 1940s when the effects of living at higher latitudes and concurrent decreased synthesis of vitamin D by the skin were noted to increase risk of common chronic diseases. Since then, it has been found that infants and young children who are vitamin D deficient may be imprinted for the rest of their lives with increased risks of type 1 diabetes, multiple sclerosis, rheumatoid arthritis and many common cancers (colon, prostate, breast). Adults with deficiencies are at increased risk of common cancers and cardiovascular disease, including congestive heart failure.



Other studies have documented that vitamin D can protect nerve cells by its antioxidant effects and can significantly reduce the risk of depression. Deficiencies in 25OHD show increased risk for Alzheimer disease, dementia, epilepsy and neurocognitive decline.

Sunlight exposure in the United States



In areas that do not receive much sunlight throughout the year, blood levels of vitamin D are often low, in which case supplementation may help.

AVGLO: Average daily total global solar radiation exposure in watt hours per square meter (Wh/m^2)

High: 5816

Low: 2858

Source: Tatalovich et al. *Cartography and Geographic Information Science*. 2013 March

As 25OHD deficiency is highly prevalent around the world and given the numerous adverse health repercussions, designing interventions and early treatments will be on the forefront of investigatory research for years to come.

Vitamin D can...

Reduce your risk of the **flu.**

Reduce your risk of **cancer.**

Reduce chronic **muscle aches.**

Reduce your risk of **cardiovascular disease.**

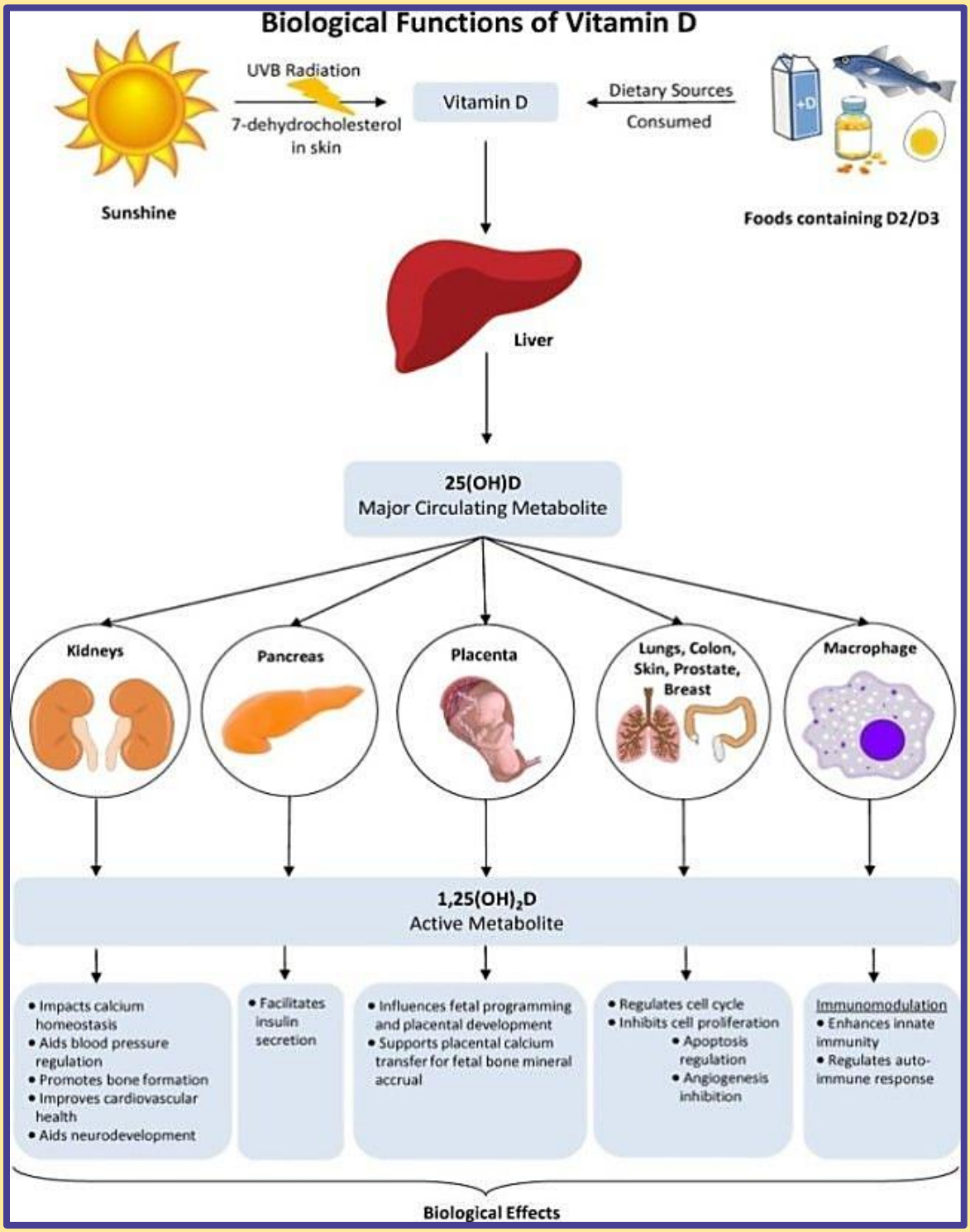
Reduce your risk of **depression.**

Reduce your risk of developing **diabetes.**

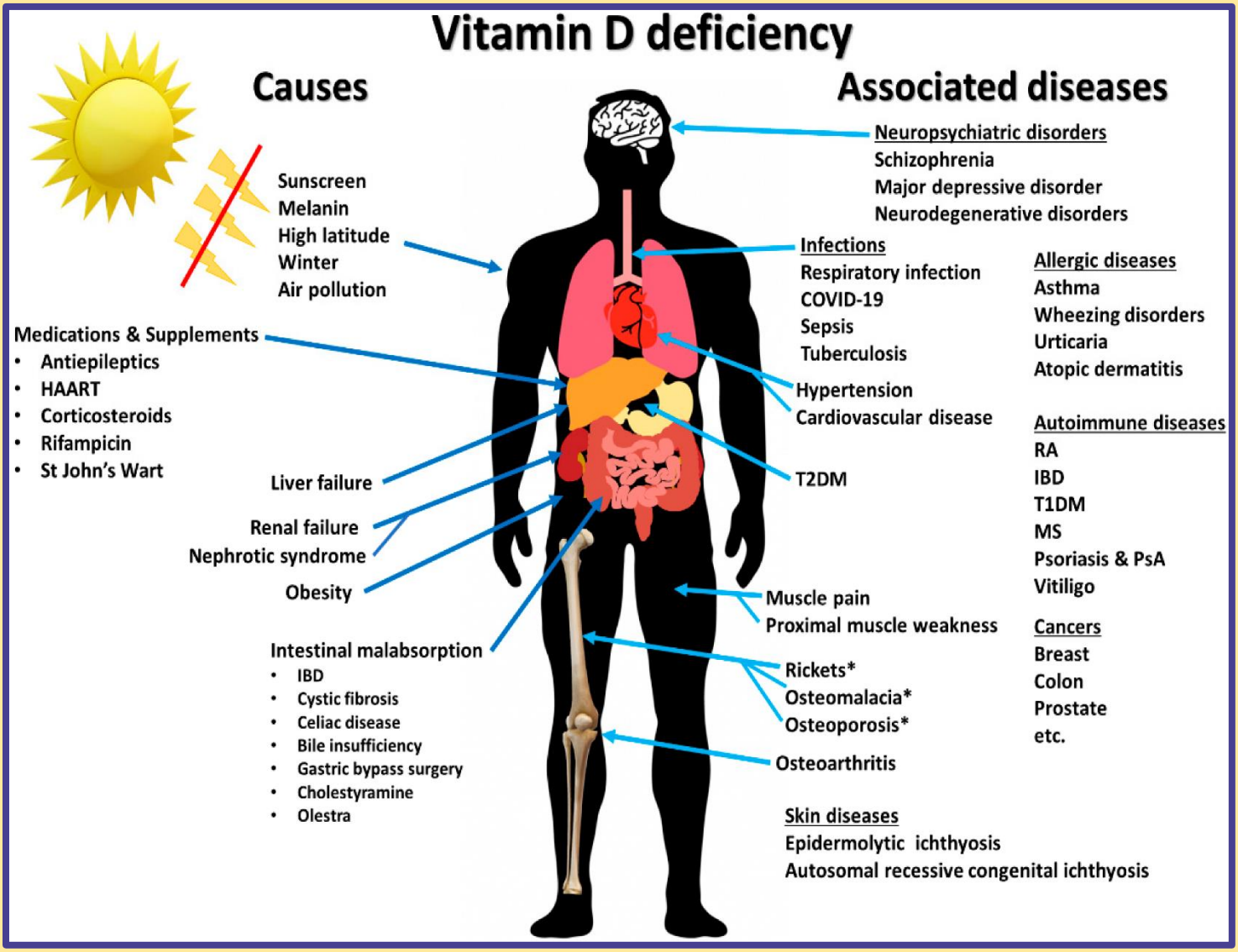
Reduce your risk of getting **autoimmune disease.**

Reduce your risk of **osteoporosis.**

In summary, it has been conclusively demonstrated that vitamin D has a diversity of effects on biological processes regulating calcium and phosphorus metabolism as well as effects on cell proliferation, differentiation, apoptosis, immune regulation, genome stability and neurogenesis. Recent studies have also found that vitamin D, and especially 25OHD deficiency, is closely associated with common chronic inflammatory diseases, such as bone metabolic disorders, tumors/cancers, cardiovascular diseases and diabetes, as well as autoimmune diseases, neuropsychiatric diseases, infectious diseases and others.



Takeaway 1:



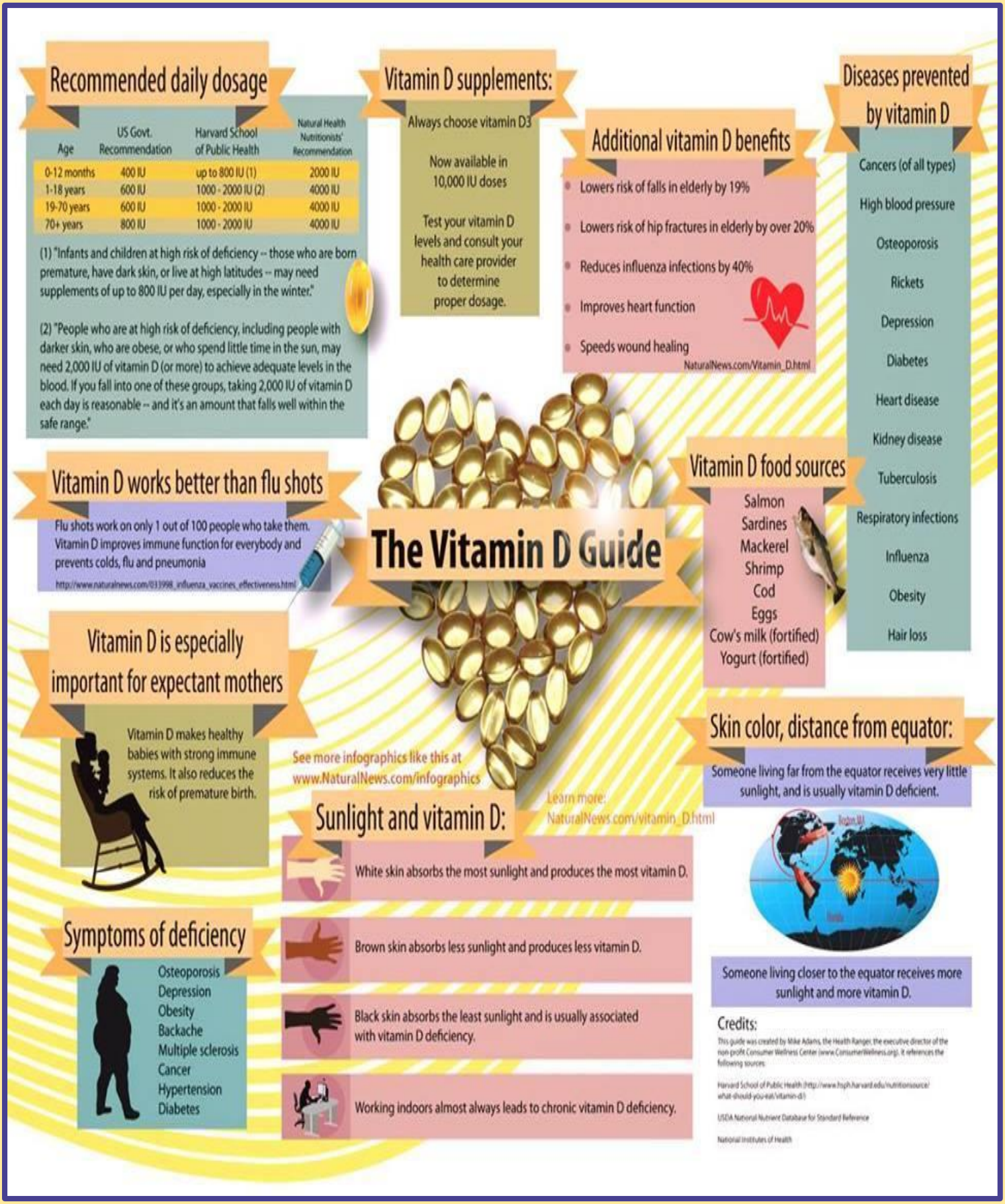
Resources:

Michael F. Holick. 'Vitamin D: Importance in the Prevention of cancers, type 1 diabetes, heart disease and osteoporosis.' The American Journal of Clinical Nutrition. 2004 March; 79(3): 362-371. https://academic.oup.com/ajcn/article/79/3/362/4690120

Wang et.al. 'Vitamin D and Chronic Diseases.' Aging and Disease. 2017 May; 8(3): 346-353. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5440113

Kai Yin and Devendra Agrawal. 'Vitamin and Inflammatory diseases.' Journal of Inflammatory Research. 2014 May; 7: 69-87. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4070857/

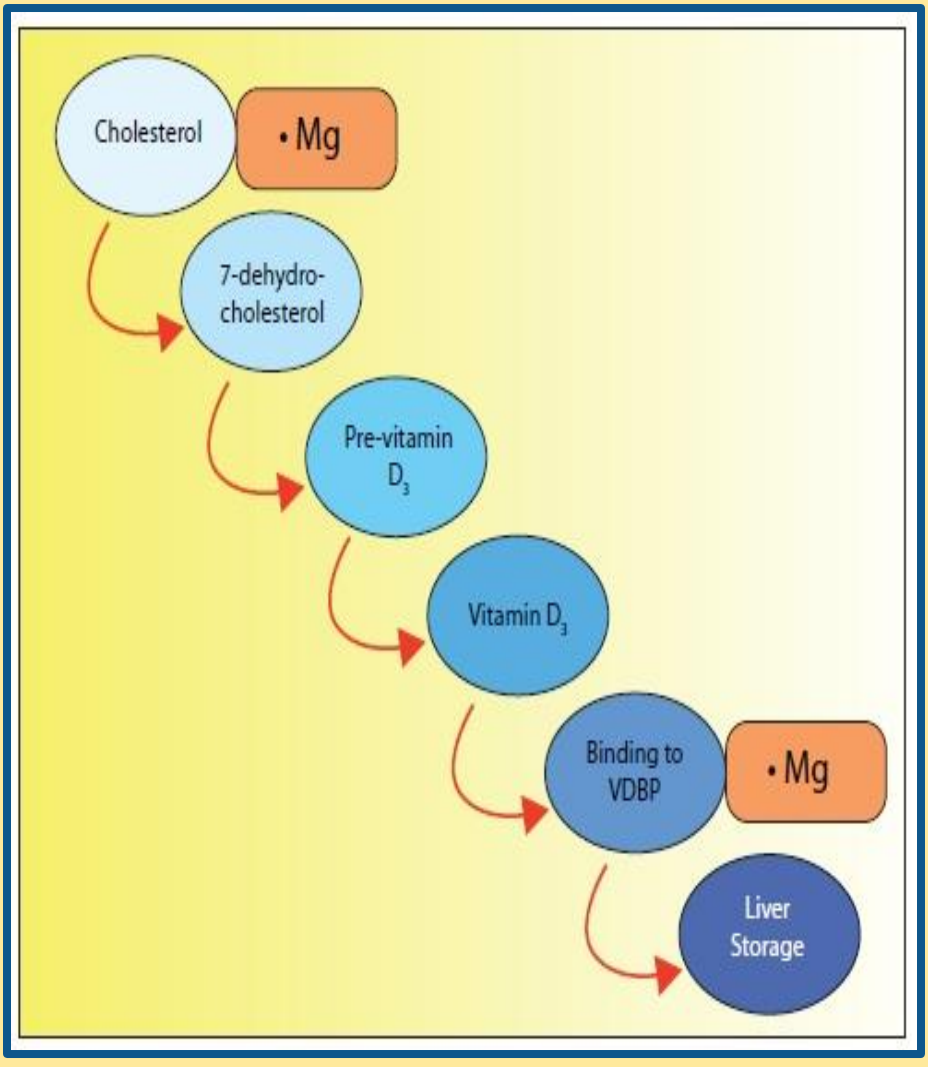
Takeaway 2:


Recommended daily dosage
Age | US Govt. Recommendation | Harvard School of Public Health | Natural Health Nutritionists' Recommendation
0-12 months | 400 IU | up to 800 IU (1) | 2000 IU
1-18 years | 600 IU | 1000 - 2000 IU (2) | 4000 IU
19-70 years | 600 IU | 1000 - 2000 IU | 4000 IU
70+ years | 800 IU | 1000 - 2000 IU | 4000 IU
(1) "Infants and children at high risk of deficiency -- those who are born premature, have dark skin, or live at high latitudes -- may need supplements of up to 800 IU per day, especially in the winter."
(2) "People who are at high risk of deficiency, including people with darker skin, who are obese, or who spend little time in the sun, may need 2,000 IU of vitamin D (or more) to achieve adequate levels in the blood. If you fall into one of these groups, taking 2,000 IU of vitamin D each day is reasonable -- and it's an amount that falls well within the safe range."
Vitamin D supplements:
Always choose vitamin D3
Now available in 10,000 IU doses
Test your vitamin D levels and consult your health care provider to determine proper dosage.
Additional vitamin D benefits
Lowers risk of falls in elderly by 19%
Lowers risk of hip fractures in elderly by over 20%
Reduces influenza infections by 40%
Improves heart function
Speeds wound healing
NaturalNews.com/Vitamin_D.html
Diseases prevented by vitamin D
Cancers (of all types)
High blood pressure
Osteoporosis
Rickets
Depression
Diabetes
Heart disease
Kidney disease
Tuberculosis
Respiratory infections
Influenza
Obesity
Hair loss
Vitamin D works better than flu shots
Flu shots work on only 1 out of 100 people who take them. Vitamin D improves immune function for everybody and prevents colds, flu and pneumonia
http://www.naturalnews.com/033998_influenza_vaccines_effectiveness.html
The Vitamin D Guide
Vitamin D food sources
Salmon
Sardines
Mackerel
Shrimp
Cod
Eggs
Cow's milk (fortified)
Yogurt (fortified)
Vitamin D is especially important for expectant mothers
Vitamin D makes healthy babies with strong immune systems. It also reduces the risk of premature birth.
See more infographics like this at www.NaturalNews.com/infographics
Learn more: NaturalNews.com/vitamin_D.html
Skin color, distance from equator:
Someone living far from the equator receives very little sunlight, and is usually vitamin D deficient.
Someone living closer to the equator receives more sunlight and more vitamin D.
Sunlight and vitamin D:
White skin absorbs the most sunlight and produces the most vitamin D.
Brown skin absorbs less sunlight and produces less vitamin D.
Black skin absorbs the least sunlight and is usually associated with vitamin D deficiency.
Working indoors almost always leads to chronic vitamin D deficiency.
Symptoms of deficiency
Osteoporosis
Depression
Obesity
Backache
Multiple sclerosis
Cancer
Hypertension
Diabetes
Credits:
This guide was created by Mike Adams, the Health Ranger, the executive director of the non-profit Consumer Wellness Center (www.ConsumerWellness.org). It references the following sources
Harvard School of Public Health (http://www.hsph.harvard.edu/nutritionsource/what-should-you-eat/vitamin-d/)
USDA National Nutrient Database for Standard Reference
National Institutes of Health

Addendum: The Magic of Magnesium

Magnesium is an essential macromineral vital in driving metabolism and biochemical reactions all over the body:

- Acts as a cofactor/catalyst in 100+ chemical reactions, particularly those involving the release of energy (aerobically & anaerobically)
- Involved in a lot of cell transport activities
- Transmission of nerve impulses
- Relaxation of muscles
- Vital to proper bone formation
- Essential for synthesis/breakdown of genetic material (DNA)



Pertinent to our discussion of vitamin D, magnesium is required by ALL of the enzymes that metabolize vitamin D. Without magnesium as a partner, or as a cofactor, the enzymatic reactions in the liver and kidneys for vitamin D biosynthesis, transport and activation cannot be completed. In other words, the presence of vitamin D is dependent upon adequate magnesium. *Low Mag = Low D*

Without Magnesium, Vitamin D is a Dud!

Since this mineral is a real dynamo with an incredible catalytic reach, not only into the activities of vitamin D but also cortisol, sleep and stress as well, we feel a brief salute is warranted given the support it brings to the contents of the October newsletter.

Over the past decades, the clinical relevance and biological significance of magnesium (Mg) have been well documented. Magnesium is a vital nutrient that is often deficient in the typical diet, compounded by the fact that modern soils can be depleted of minerals and magnesium is removed from water during routine municipal treatment. In fact, magnesium consumption in the US tends to be low to the point of marginal.

NOTE: The current RDA for magnesium in adults is between 320 and 420mg daily, and the average adult US intake is around 250mg daily.

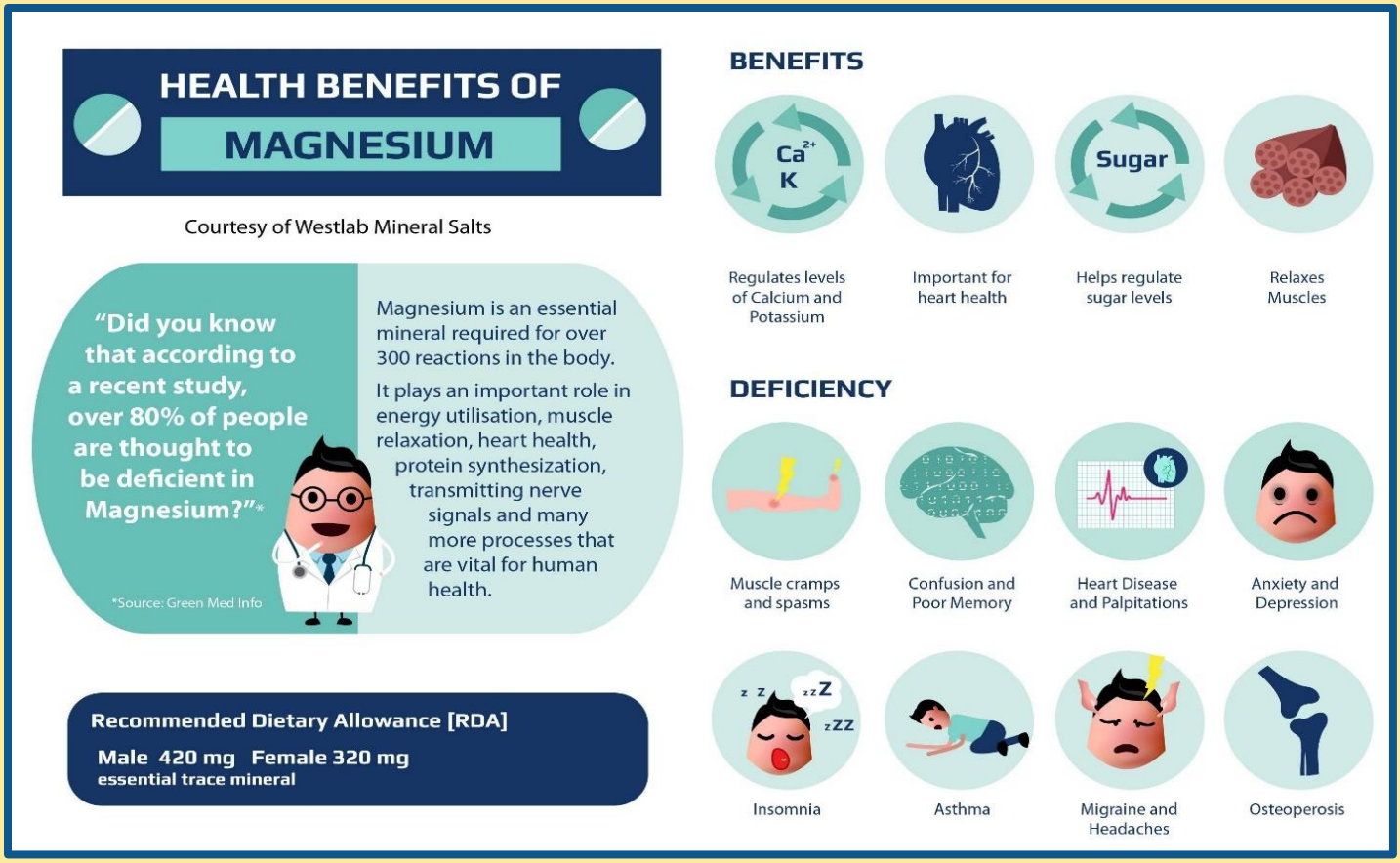
Let's take a moment to absorb some of magnesium's power plays in the body:

1) Magnesium regulates cortisol. Magnesium calms your nervous system and prevents excessive cortisol. Your stress hormonal system (called HPA, or hypothalamic-pituitary-adrenal axis) is your central hormonal system. When it is better regulated, then your other hormonal axes - thyroid and sex hormones - will function better.

2) Magnesium lowers blood sugar. Magnesium is so effective at sensitizing the insulin receptor that it can be referred to as our 'natural metformin'. Better insulin control means fewer sugar cravings. Healthy insulin sensitivity is important for weight loss and PCOS, and it also prevents osteoporosis.

3) Magnesium supports the thyroid. Magnesium is essential for the production of thyroid hormone. It is also anti-inflammatory which helps to quiet the autoimmune inflammation that underlies most cases of thyroid disease. (Other ways to address thyroid autoimmunity include gluten elimination and a selenium supplement).

4) Magnesium aids sleep. Magnesium is the great sleep-promoter, and sleep is crucial for hormone production. Sleep is when we should have a surge in anabolic hormones like DHEA and growth hormone.



5) Magnesium fuels cellular energy. Magnesium is so intricately involved with glycolysis and the Krebs cycle (ATP energy production), that we can safely say: "There is no cellular energy without magnesium." Glandular tissue, like the thyroid, ovaries and testes, is metabolically very active, so requires even more cellular energy and more magnesium than other tissue.

6) Magnesium makes hormones. Magnesium is involved in the manufacture of steroid hormones such as progesterone, estrogen and testosterone. Magnesium has been shown to reduce hot flashes by 50%.

7) Magnesium activates vitamin D. Without enough magnesium, vitamin D cannot do its job . Conversely, too much vitamin D supplementation can cause magnesium deficiency. According to a review of the interaction between magnesium and vitamin D in "Magnesium Research," a deficiency of magnesium is usually associated with low production of active vitamin D metabolites or byproducts. Magnesium is necessary to activate all the enzymes that metabolize vitamin D. For example, it's now known that vitamin D regulates hundreds of human genes, including those genes linked to major diseases such as cancer and diabetes. Magnesium is required in the synthesis of DNA, the genetic blueprint of your cells, and it is also needed for vitamin D's actions in switching certain genes on or off.

8) Magnesium is anti-aging. The mineral has been shown to prevent *telomere shortening, reduce oxidative stress, and enhance the production of glutathione.

*** Telomere: Think of these as shoelace caps on the ends of your DNA. Like shoelaces, as time goes by these caps get worn and begin to fray; eventually, they begin to strip off. It's overshortening of our telomeres that lead us to feel and see signs of aging. They send the signal, "Time to die." Magnesium aids in buffering the wear and tear on our telomeres.*

Read through the following article for more information regarding interactions with aging, disease and stress and tips on how to incorporate magnesium into your whole food or macro diet.

More Magnesium For Less Stress

by tasteforlife

Stress can come at you in many forms—both physical and mental. Our bodies respond to both types by increasing the use of and need for magnesium to manage the stress. Stress expert Andrea Rosanoff, PhD, talks about how you can protect yourself from stress and/or alleviate it and live a healthier life.

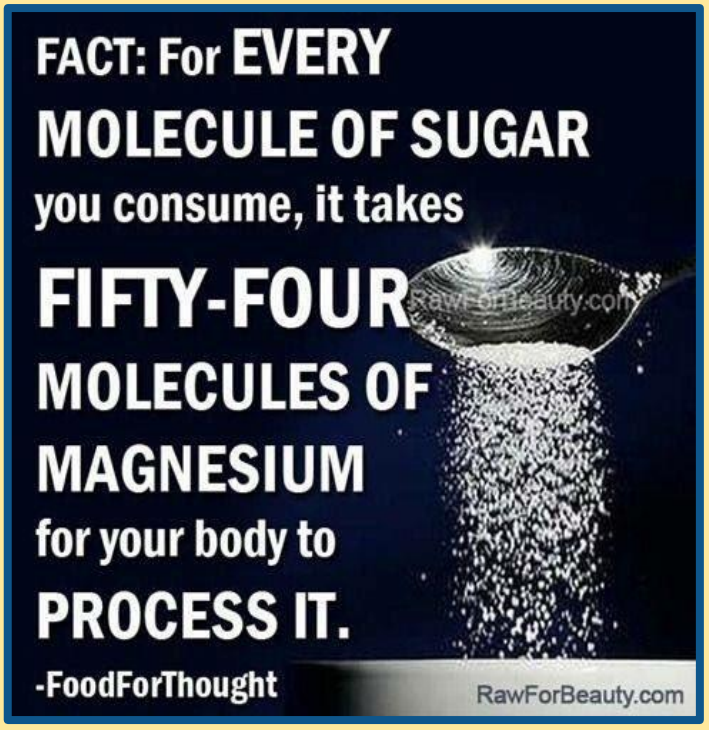
Stress increases the adrenal secretion of the stress hormones adrenaline (medulla) and cortisone (cortex), which are often called the fight-or-flight hormones because they help people survive during threatening situations.

Stress can cause magnesium depletion

AND

A lack of magnesium magnifies stress.

When stress becomes constant in our lives—be it mental, emotional, environmental or physical—the continual state of hypervigilence of our bodies and cells can make our health suffer. This is especially true when one is low in magnesium—often the case in today's diet of highly processed foods. Going through a stressful period without sufficient magnesium can set up a deficit that, if not corrected, can linger, causing more stress and further health problems.

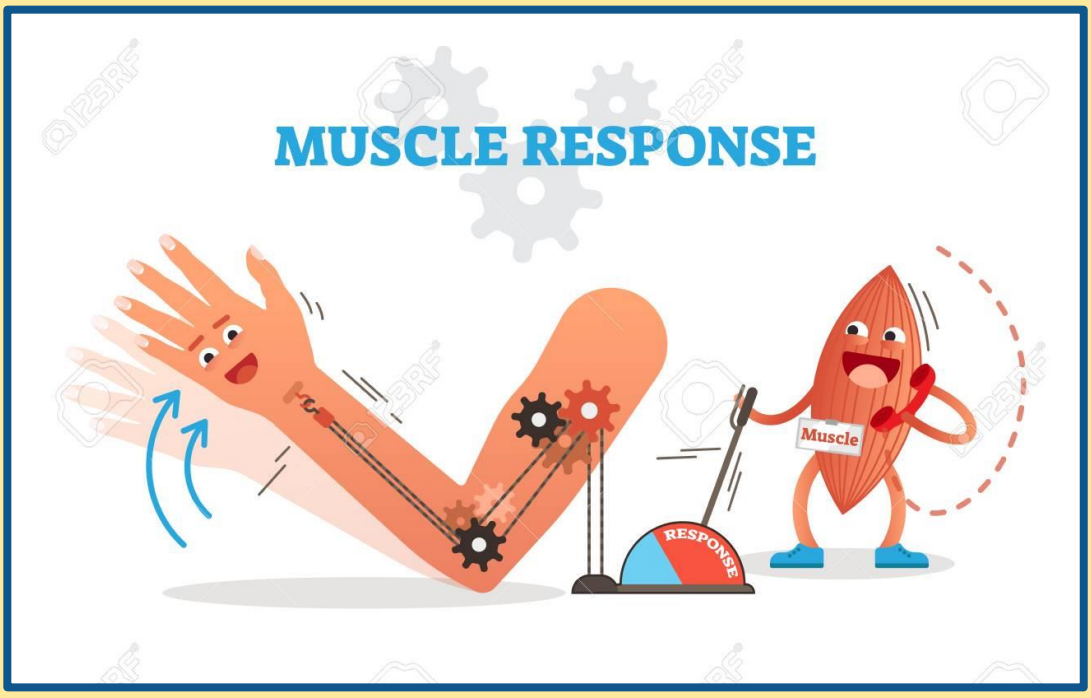


Magnesium supports our adrenals, which can be overworked by stress. A magnesium deficiency is significant because of the many vital enzyme systems that require magnesium, some being responsible for energy production and storage.

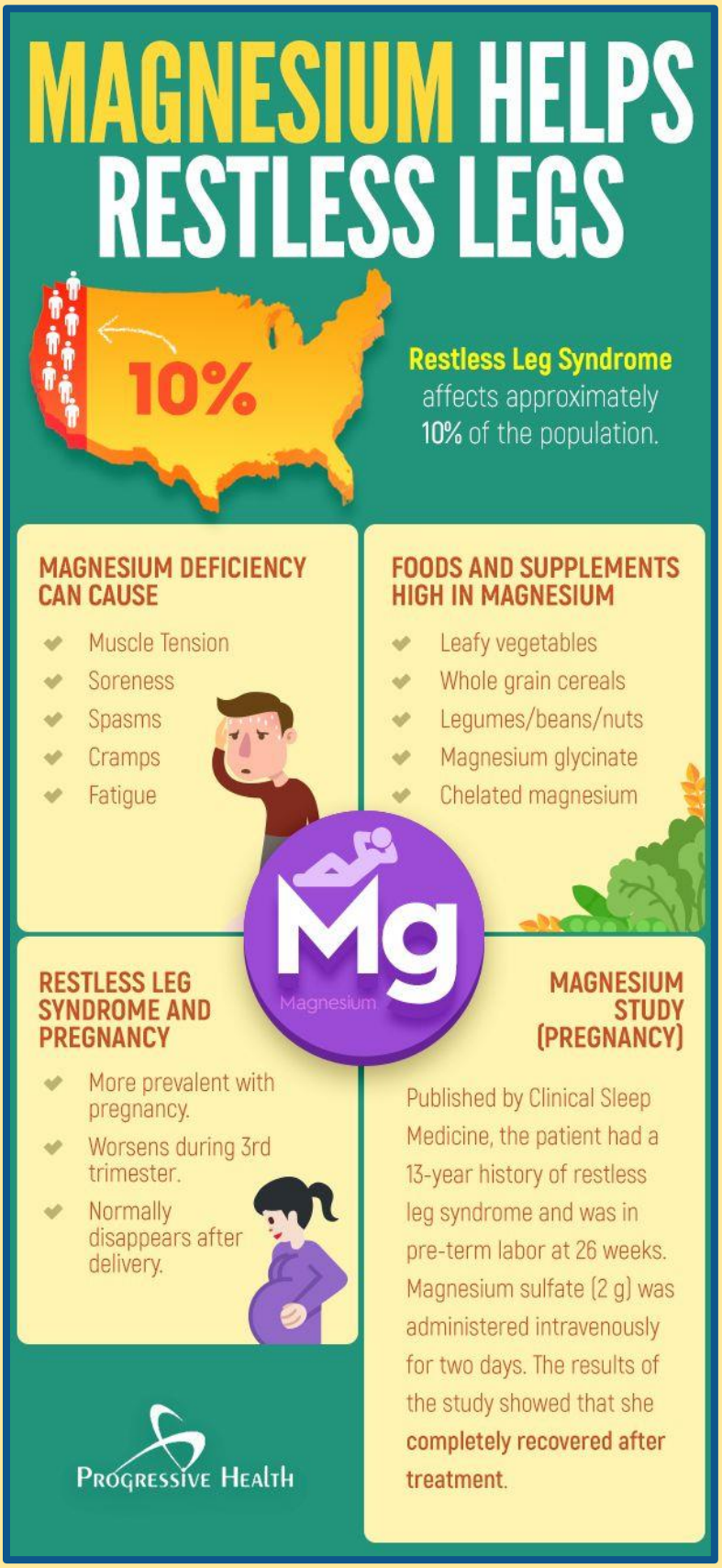
A strain on the adrenal glands puts a strain on the magnesium-dependent energy system of the body. A low magnesium level during stress can cause energy depletion that leads to listlessness and fatigue, weakening your ability to manage stress. Under prolonged stressful conditions, the body loses more magnesium than usual through one's urine and sweat, adding to magnesium depletion and lowering your stress defenses.

~Magnesium is the Anti-Stress Mineral~

Without sufficient magnesium, the nerve cells become excitable and over-reactive. This can cause a person to become highly sensitive and nervous even when away from the stressful environment. Feelings of nervousness, irritability, and being unable to relax or difficulty getting to sleep may be signs of needing magnesium. The stress response involves the influx of calcium into cells, resulting in a temporary, drastic change in the cells' internal magnesium-to-calcium ratio. Normal cells at rest contain 10,000 times more magnesium than calcium. If the amount of cellular magnesium falls, however, calcium flows into the cell when NOT required. Such an imbalance puts the cell into a hyperactive state. This can cause unwanted muscle contraction and lead to painful cramping. The muscles need a proper magnesium-calcium balance in order to relax.



For example, some of the most common symptoms of Restless Leg Syndrome (RLS) include throbbing and pained legs or arms, intense urge to move, itching, crawling and other abnormal sensations in the extremities. These sensations most commonly occur in the evening and become more prevalent and severe as the night goes on; this a defining characteristic of RLS. Symptoms are commonly aggravated or exacerbated when one attempts to relax by sitting down or sleeping.



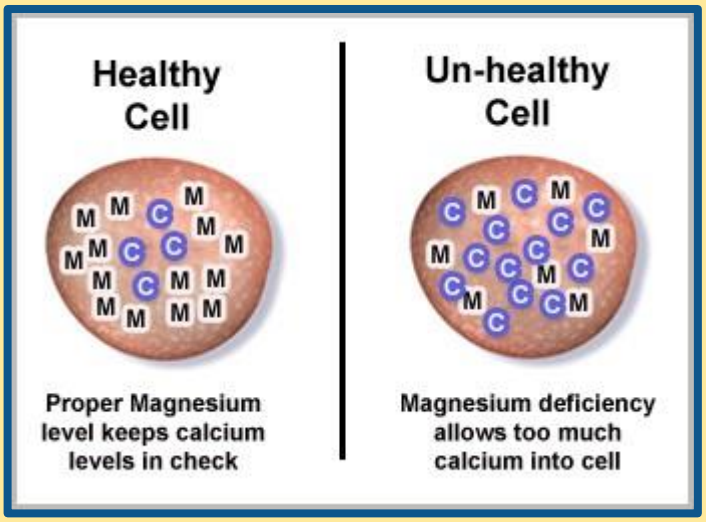
For this reason, Caralyn Dean, MD, medical director for Nutritional Magnesium Association, states, "the best treatment for Restless Leg Syndrome is with any form of magnesium because magnesium relaxes muscles and nerves." She goes on to explain that calcium is the prime causation of muscle contraction in skeletal fibers, which magnesium regulates.

In a cell if there is an overabundance of calcium and too little magnesium the result is sustained muscle contractions leading to twitches, spasms and convulsions. Magnesium acts as a gatekeeper, allowing the correct amount of calcium into nerve cells. By not allowing our muscles and brain to constantly fire impulses, this mineral protects against unnecessary burning of energy which ultimately leads to cellular death.

Stress affects heart health. Since stress depletes magnesium, low magnesium/high calcium levels can cause cells to physically change. High calcium makes bones stiff and hard, which is good, but when improperly assimilated in soft tissues it becomes a problem of calcification. This stiffness in artery and heart cells can hamper proper function and can be a factor in heart disease.

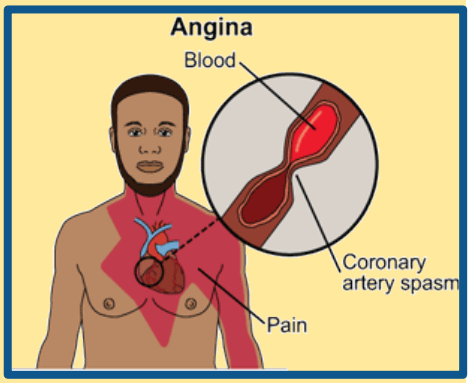
Excess calcium on top of low magnesium status is a widespread problem. Calcium supplements can be good for bones in a healthy body but cannot be properly assimilated in a low-magnesium body. Magnesium is essential for calcium absorption. Without magnesium, calcium may get deposited in soft tissues and can cause arthritis. Without magnesium, calcium cannot be reabsorbed. Excess calcium in an unbalanced body can deplete magnesium from the body and make a low-magnesium body worse.

MAGNESIUM CAN HELP DISSOLVE CALCIUM THAT BUILDS UP IN THE JOINTS CAUSING ARTHRITIS SYMPTOMS



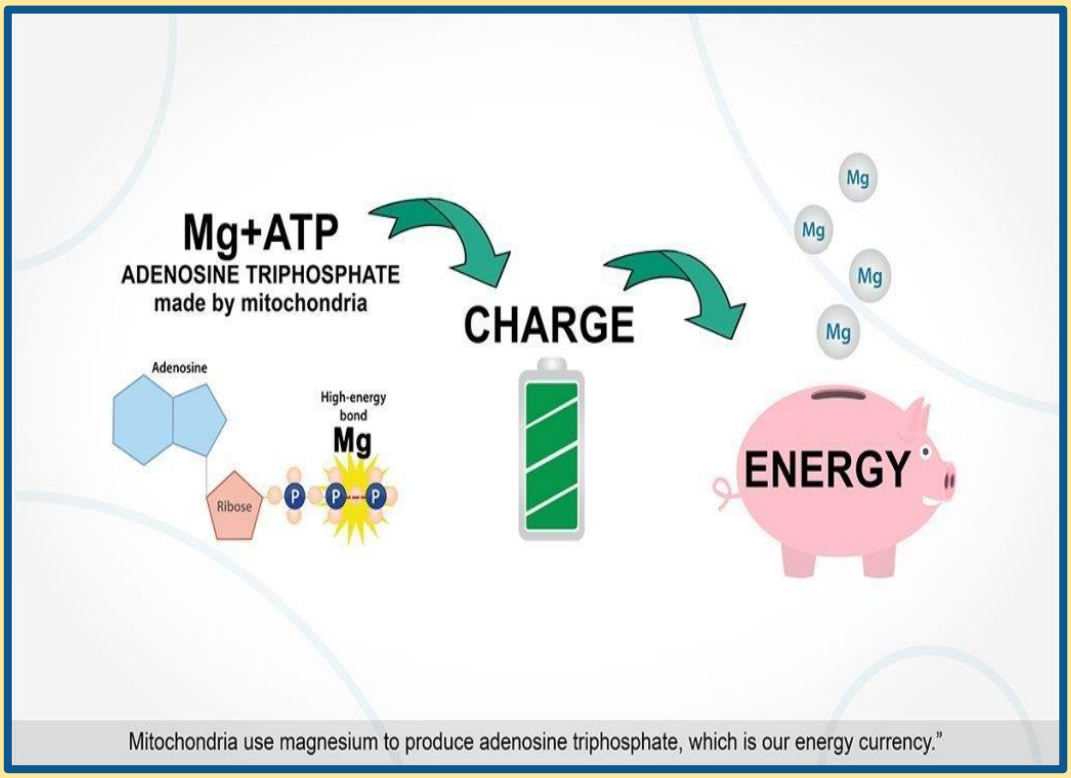
Noted author and researcher, Mildred S. Seelig, MD, explains "Calcium is an important essential nutrient, but it must be guarded and controlled and balanced by adequate magnesium if it is not to cause damage to the cells and the body as a whole." Calcium and magnesium are so important that they are known as Twin Minerals. The ideal ratio of calcium and magnesium is 1:1. Both have opposite effects; i.e., calcium contracts muscles, magnesium relaxes muscles. Low magnesium intake will increase more storage of calcium in the body. For these exact reasons excess calcium can become a problem if ingested in excess (i.e., mega doses of supplements); magnesium, on the other hand, is not a concern. Unlike calcium, magnesium does not build up in the body—excess amounts are flushed out.

When stress depletes magnesium stores to an abnormally low level, arterial spasms can result. Since adequate magnesium levels in arterial muscle cells cause the arteries to relax, or dilate, arteries constrict when magnesium levels are low. If this occurs in the coronary arteries, chest pain or angina can ensue.



Deficiency in magnesium, aside from having a negative impact on the energy production pathway required by mitochondria to generate ATP, also reduces the threshold antioxidant capacity of the aging organism and its resistance to free-radical damage.

Magnesium also acts as an antioxidant against free radical damage of the mitochondria. Chronic inflammation and oxidative stress have both been identified as pathogenic factors in aging and in several age-related diseases.



Chronic magnesium deficiency results in excessive production of oxygen-derived free radicals and low-grade inflammation. Aging is very often associated with magnesium inadequacy and with increased incidence of many chronic diseases, with muscle loss and sarcopenia, altered immune responses and vascular and metabolic conditions, such as atherosclerosis, diabetes and the cardiometabolic syndrome. Current evidence suggests that age-related chronic magnesium deficits may be proposed as one of the physio-pathological links that may help to explain the interactions between inflammation, oxidative stress with the aging process and many age-related diseases.

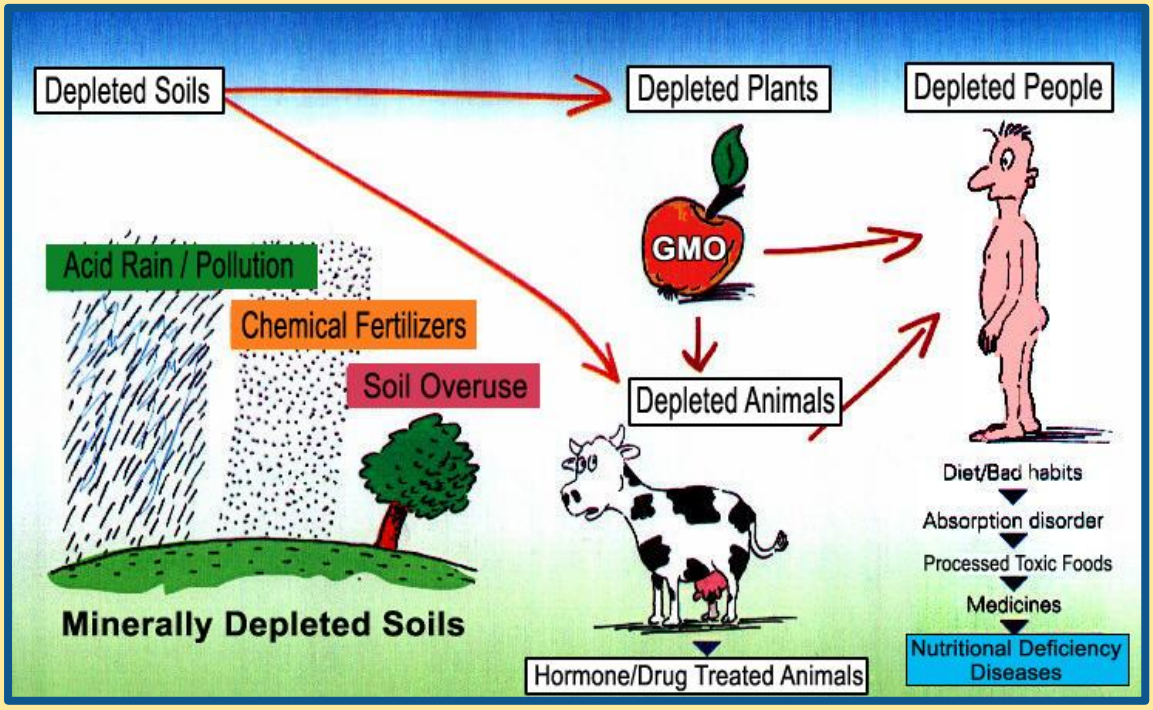
U.S. Department of Agriculture research shows

that *over half* of Americans do not get enough daily magnesium in their foods.

Unfortunately, our bodies are unable to make magnesium. Instead, we acquire it through diet and supplementation. Although uncommon to have a *dire* magnesium deficiency, there are numerous practices in modern day life which can prevent most Americans from consuming enough of this self-protective mineral:

♦Unbalanced diets due to low consumption of magnesium-rich foods, such as almonds, lima beans, old-fashioned oats, walnuts and whole wheat.

♦Modern soils can be depleted of minerals and thus our harvested food is also nutrient-poor



♦Removal of magnesium from water during routine municipal treatment.

♦Refining foods such as whole grains (think whole wheat bread to white bread) strip our foods so they are nearly devoid of magnesium.

♦Over-consumption of coffee or caffeine, diuretics and alcohol can have a detrimental effect on magnesium levels.

♦Prolonged exercise can result in loss of magnesium through sweat and urine.

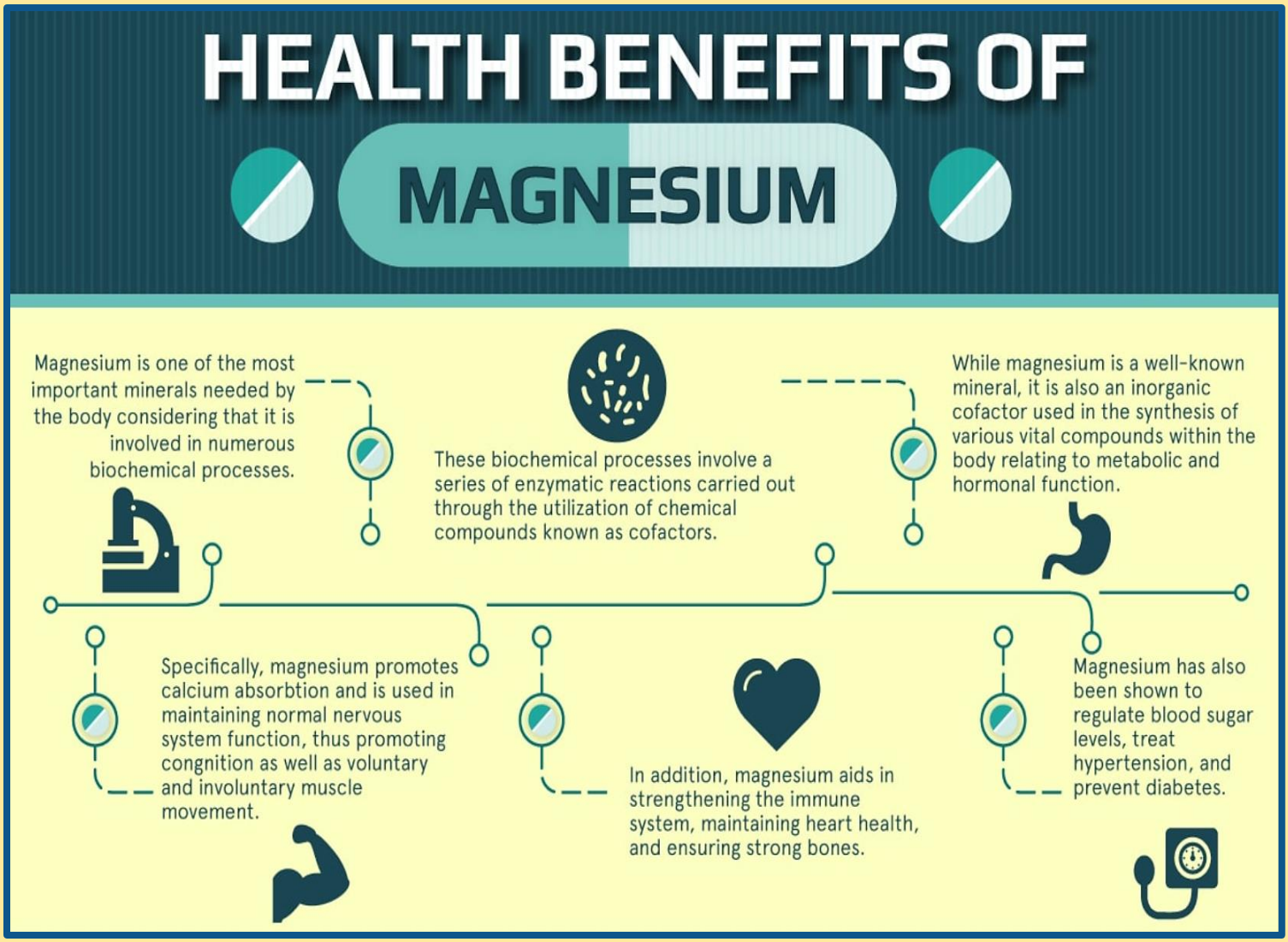
♦Conditions such as gastrointestinal diseases, diabetes, pancreatitis, kidney diseases and hypothyroidism can also lead to imbalances.

Taken together, the above confluence of factors produces an average US intake around 250 mg daily. The current RDA for adults is between 320 mg and 420 mg.

To preserve your magnesium status:

- Avoid processed foods
- Educate yourself on nutrition
- Eliminate stress from your life as much as possible
- Supplement your diet with the natural anti-stress mineral – magnesium.

One of the most absorbable forms of magnesium is magnesium citrate. In general, oral magnesium supplements are quite safe, especially when ingested by people with healthy kidney function. However, as always, consult with your doctor before adding supplements to your diet as magnesium can interfere with absorption of certain pharmaceuticals and may disrupt your medical regimen.



Takeaway:

Resources:

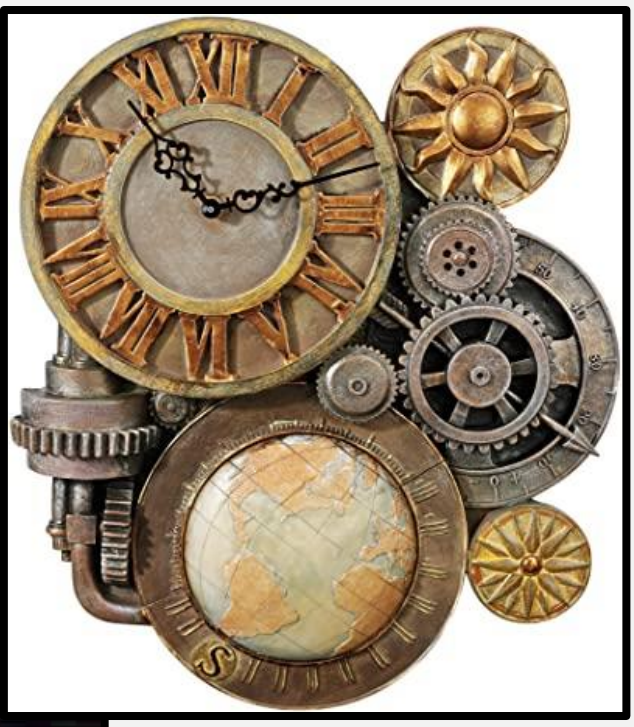
Stress expert, Andrea Rosanoff, Ph.D. is the Directing Scholar of the Center for Magnesium Education & Research, and an Advisory Board Member of the Nutritional Magnesium Association (www.nutritionalmagnesium.org). She is also the co-author of "The Magnesium Factor" (Avery, 2003). Dr. Rosanoff invites you to get more information that will help you handle stress and its health consequences through magnesium nutrition. Go to www.centerformaged.org

Magnesium: The Treatment for Restless Leg Syndrome (RLS), Naomi Parker, 08/23/2016

Vitamin D & Magnesium Interaction, Robert Wallace, 10/03/2017

Wellness Wizard — Let there be Light

~Rhythms & Blues~

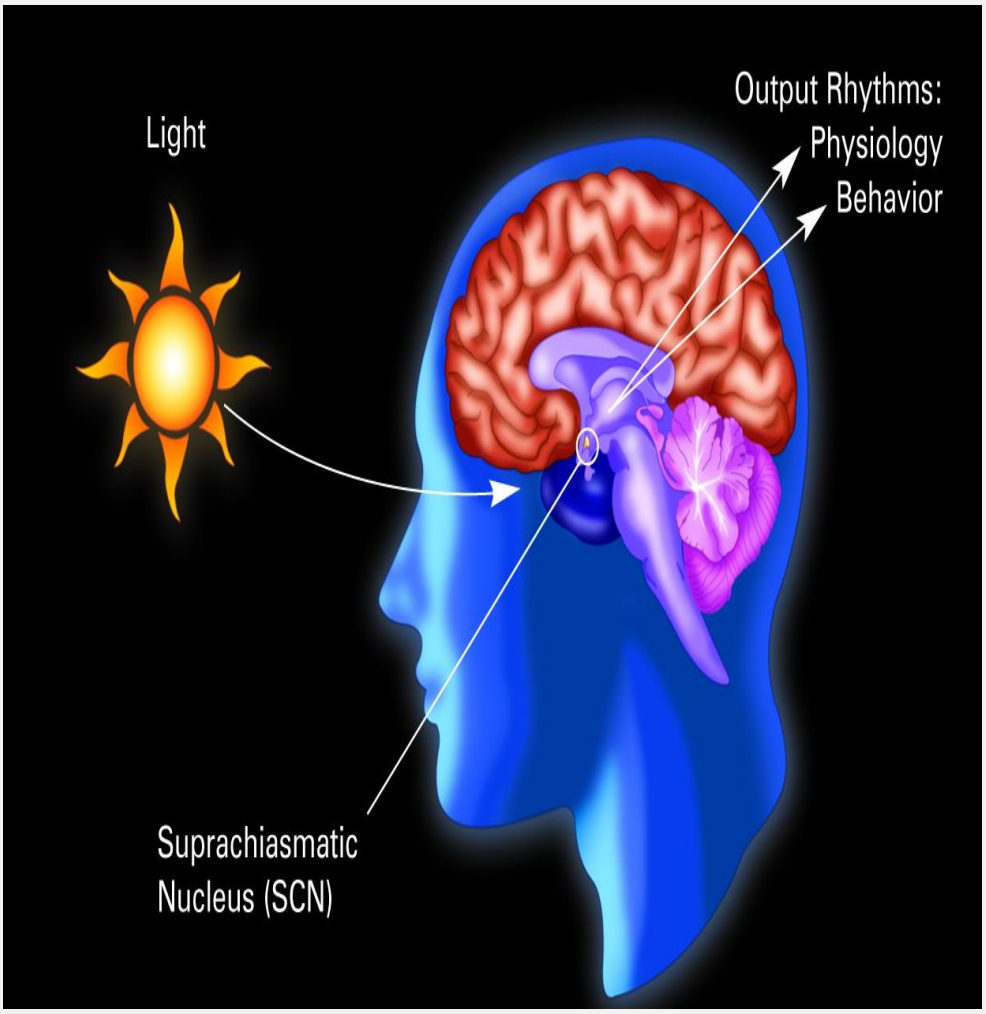


~(Part 1)~

Circadian Rhythms & Biological Clocks

Circadian rhythms are physical, mental and behavioral changes that follow a daily cycle (roughly a 24-hour cycle) and are found in most living beings, including plants, animals, fungi and cyanobacteria. The term circadian comes from the Latin phrase "circa diem", which means "around a day." Circadian rhythms are important in determining the sleeping and feeding patterns of all animals, including human beings, and are associated with clear patterns of brain wave activity, hormone production, cell regeneration and other biological activities linked to this daily cycle. The study of circadian rhythms is called chronobiology.

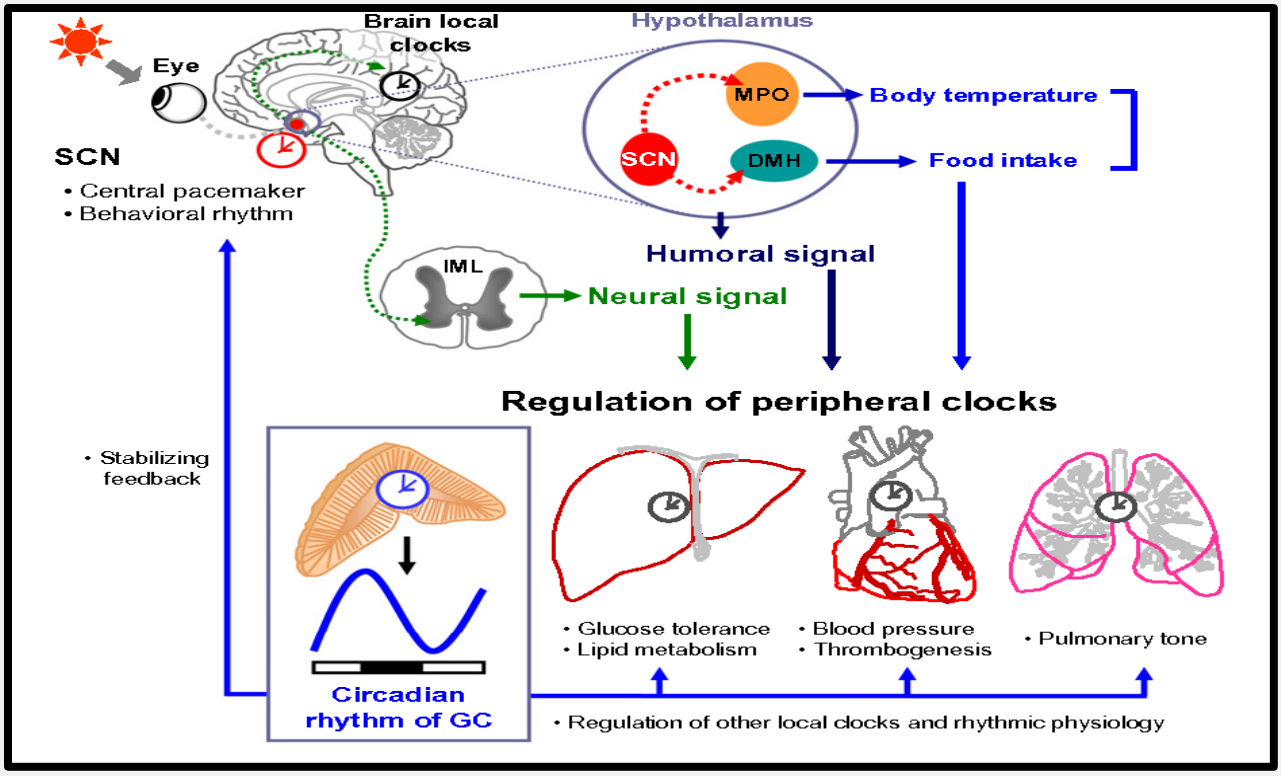
Circadian rhythms are part of the body's internal clock, running in the background to ensure essential physiological functions and processes are optimized at various points during a 24-hour period. For example, they help flowers open and close at the right time and keep nocturnal animals from leaving their shelter during the daytime when they would be exposed to more predators. In people, circadian rhythms coordinate mental and physical systems throughout the body. The digestive system produces proteins to match the typical timing of meals and the endocrine system regulates hormones to suit normal energy expenditure, but by far when people talk about circadian rhythms, it's most often in the context of sleep. The sleep-wake cycle is one of the most clear and critical examples of the importance of circadian rhythms.



Circadian rhythms throughout the body are connected to a master clock, sometimes referred to as the circadian pacemaker, which coordinates all the biological clocks in a living thing, keeping the clocks in sync.

Specifically, this master clock is composed of a grouping of 20,000 nerve cells (neurons) that form the structure called the suprachiasmatic nucleus (SCN), which is located in a part of the brain called the hypothalamus and receives direct input from the eyes. At different times of the day, clock genes in the SCN send signals to regulate activity throughout the body.

Natural factors within the body produce circadian rhythms. However, signals from the environment also affect them. The SCN is highly sensitive to light, which serves as a critical external cue that influences the signals sent by the SCN to coordinate internal clocks in the body. For this reason, circadian rhythms are closely connected to day and night. While other cues, like exercise, social activity, and temperature, can affect the master clock, light is the most powerful influence on circadian rhythms. Light can turn on or turn off genes that control the molecular structure of biological clocks. Changing the light-dark cycles can speed up, slow down, or reset biological clocks as well as circadian rhythms.



Hierarchical organization of the mammalian circadian timing system. The suprachiasmatic nucleus (SCN), which resides in the ventral hypothalamus, functions as the central clock responsible for the coordination of multiple clock networks throughout the body. It communicates with and synchronizes the peripheral clockwork in extra-SCN brain regions as well as peripheral organs. Peripheral oscillators constitute tissue-specific physiological output pathways. In particular, the adrenal peripheral clock plays a pivotal role in producing a robust daily rhythm of glucocorticoid (GC) biosynthesis and secretion, impacting the synchronization of other peripheral clocks and regulating rhythmic physiology, metabolism and behavior. It was recently reported that the adrenal rhythm may feedback to SCN to stabilize the central rhythm through a GC-mediated, indirect mechanism. Courtesy of Figure (2) published in Frontiers in Neuroendocrinology, Son et. al. 'The adrenal peripheral clock: glucocorticoid and the circadian timing system.' 2011 Oct; 32(4): 451-65.

Biological clocks are an organism's innate timing device. They're composed of specific molecules (proteins) that interact in cells throughout the body. Biological clocks are found in nearly every tissue and organ and help regulate the timing of bodily processes, including circadian rhythms. Note that a circadian rhythm is an effect of a biological clock but not all biological clocks are circadian. For instance, plants adjust to changing seasons using a biological clock with timing that is distinct from a 24-hour cycle.

Recent data illustrates the expanded influences on our biological clocks from the adrenal gland (cortex) via communication of glucocorticoid hormones (i.e., cortisol). Although most familiar as a mediator in our stress response, cortisol also plays a pivotal role in synchronizing peripheral clocks and regulating rhythmic physiology, metabolism and behavior (see Figure above). During chronic stress cortisol is overproduced which leads to clock and rhythm disruption.

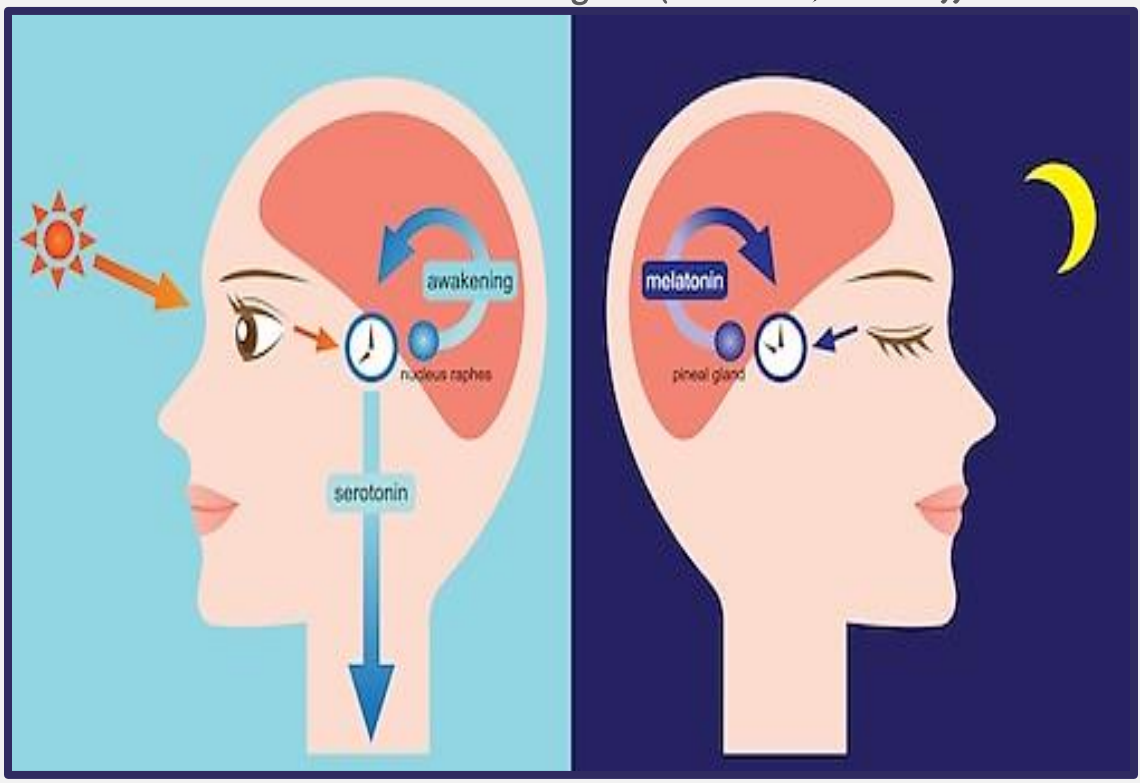
Circadian rhythms can influence sleep-wake cycles, hormone release, eating habits and digestion, body temperature, and other important bodily functions. Biological clocks that run fast or slow can result in disrupted or abnormal circadian rhythms. Irregular rhythms have been linked to various chronic health conditions, such as sleep disorders, obesity, diabetes, depression, bipolar disorder, seasonal affective disorder, heart disease, etc.

One of the more benign disruptions in circadian rhythms is felt by "jet lag" acquired when traveling. When you pass through different time zones, your biological clocks will be different from the local time. For example, if you fly east from California to New York, you "lose" 3 hours. When you wake up at 7:00 a.m. on the east coast, your biological clocks are still running on west coast time, so you feel the way you might feel at 4:00 a.m. Your biological clocks will reset, but this often takes a few days.

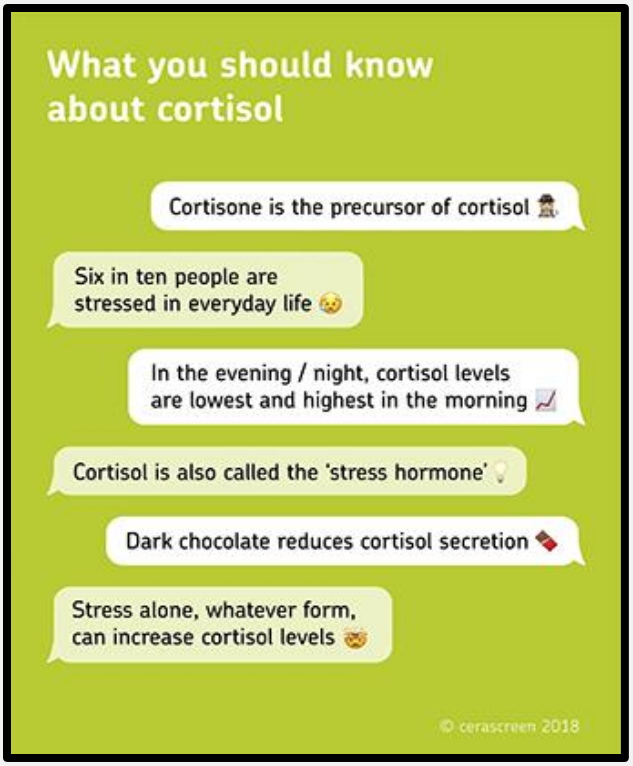
Circadian Rhythms & Sleep Patterns

Circadian rhythms help determine our sleep patterns; when properly aligned, a circadian rhythm can promote consistent and restorative sleep but when thrown off it can create significant sleeping problems, including insomnia. The body's master clock, or SCN, controls the production of melatonin, a hormone that makes you sleepy. It receives information about incoming light from the optic nerves, which relay information from the eyes to the brain.

During the day, light exposure causes the master clock to send signals (serotonin, cortisol)) that generate alertness and help keep us awake and active. As night falls, the master clock initiates the production of melatonin, a hormone that promotes sleep, and then keeps transmitting signals that help us stay asleep through the night.



Currently, researchers are studying how shift work as well as exposure to light from mobile devices during the night may alter circadian rhythms and sleep-wake cycles.



Another hot topic in sleep research is the relationship between CORTISOL and the quality and patterns of sleep. We already know of cortisol's role in driving the "fight or flight" stress response, but this hormone wears a lot of hats and also functions to:

→Regulate blood pressure

→Balance blood sugar

→Influence inflammation

→Regulate energy levels

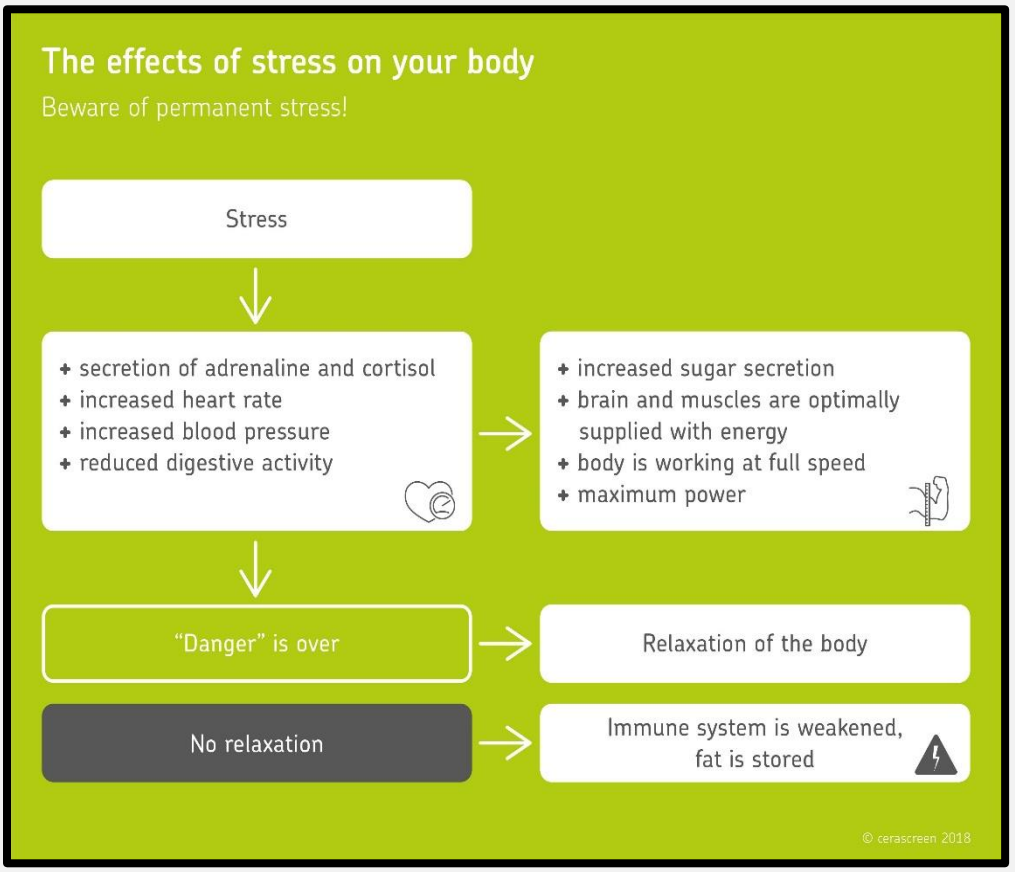
→Contribute to the cardiac system function

→Help control the sleep-wake cycle

During our discussions of inflammation, stress and disease over the past few months, cortisol may have been implicated with a bit of a bad rep, and there's no question that chronically elevated cortisol does contribute to sleep disruption and other health problems ~BUT~.....Hold the Press!!

But, Cortisol is an Essential component of human physiology, which we need to function properly!

The challenge for most of us is understanding its role, recognizing our behaviors that contribute to it rising too high and then moderating ourselves accordingly.



Now, thinking (or looking) back to our series on "The Metabolic Network," "Inflammation Nation," and our current "Cooling the Fires of Stress," we can begin to link up a lot of concepts through the actions of cortisol when it is elevated too frequently from too many sources over long periods of time.

***Check out the following health problems that can occur with cortisol amped up on overdrive because of chronic stress:

→Chronic illnesses, including high blood pressure, diabetes & heart disease

→Weight gain, both by appetite stimulation & encouraging the body to store fat more aggressively

→Fatigue

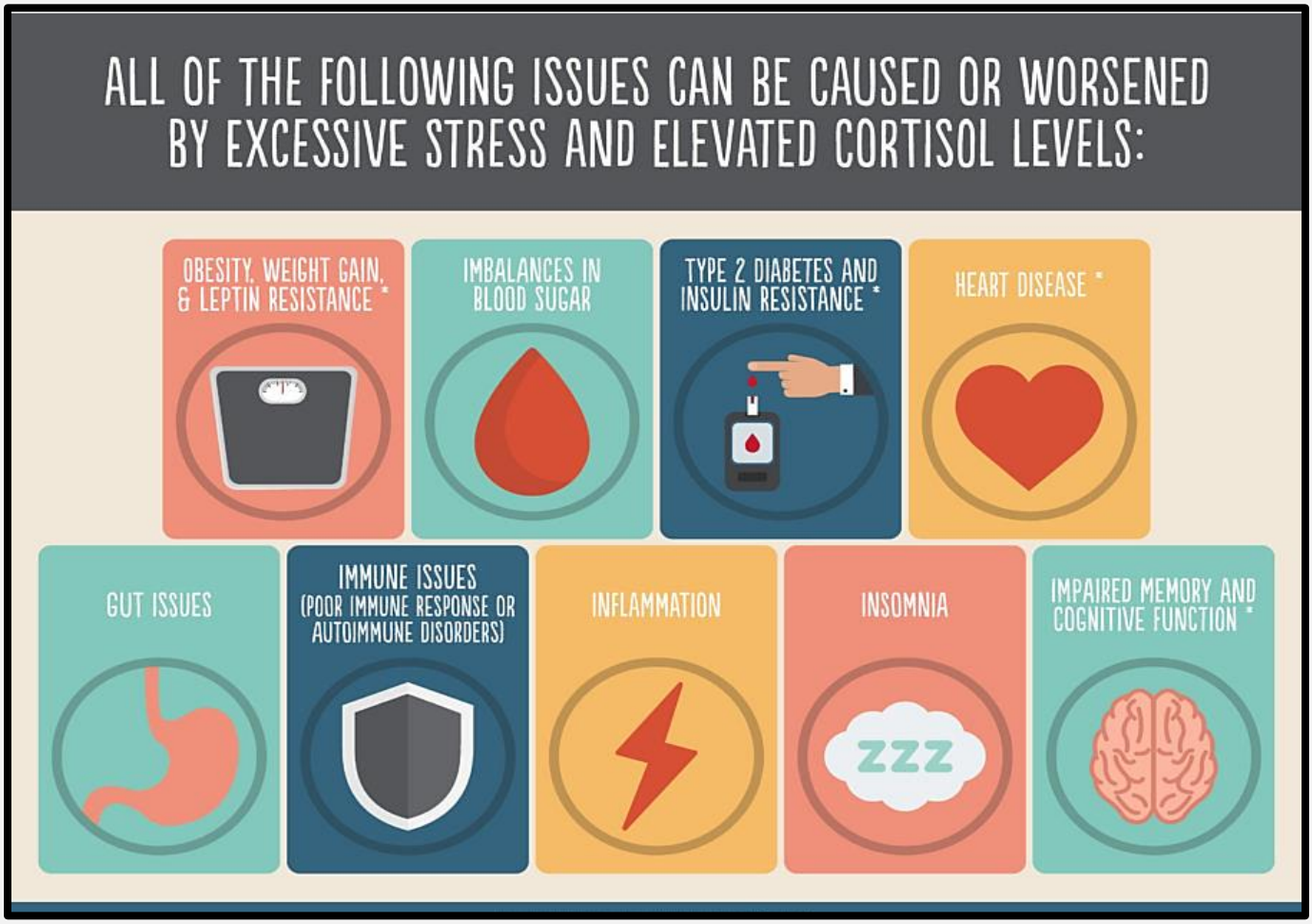
→"Foggy brain" and difficulty with memory and focus

→Compromises to the immune system, increased inflammation & greater vulnerability to illness, disease and other effects of aging

→Problems with digestion

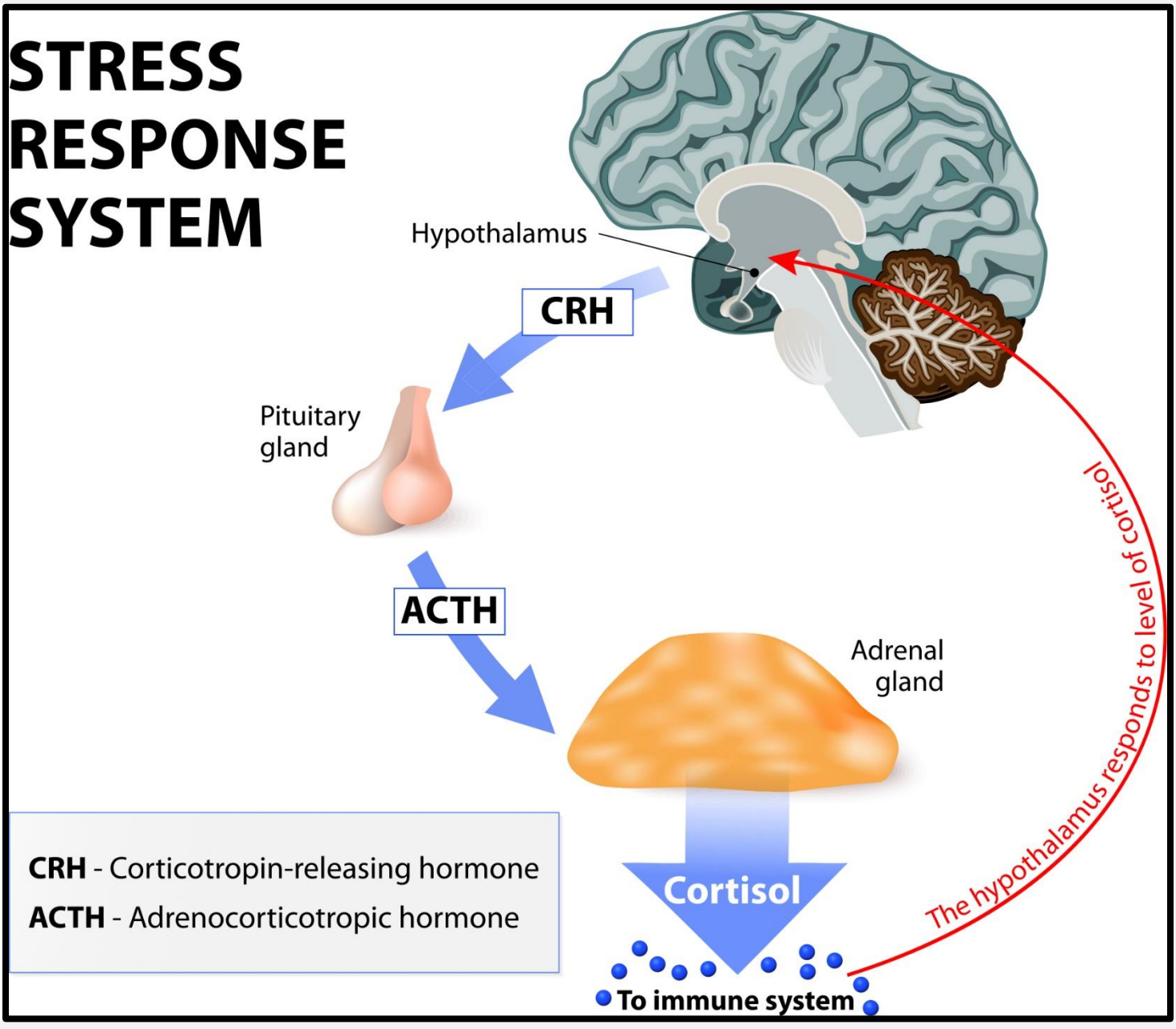
→Mood disorders, including depression & anxiety

→Sleep problems



Cortisol and the Stress Response

Cortisol doesn't operate in isolation. Instead, it's part of a complex system known as the HPA axis (that's short for the hypothalamic-pituitary-adrenal axis), which combines parts of the central nervous and endocrine systems. Cortisol is produced in the adrenal glands, and the hypothalamus and pituitary gland, located in the brain, monitor cortisol levels and send messages to the adrenal system to adjust its production, depending on the body's needs and circumstances. It's the complex, dynamic communication of the HPA axis that produces cortisol and helps to regulate body functions ranging from sleep-wake cycles to stress and mood to digestion and immune function.

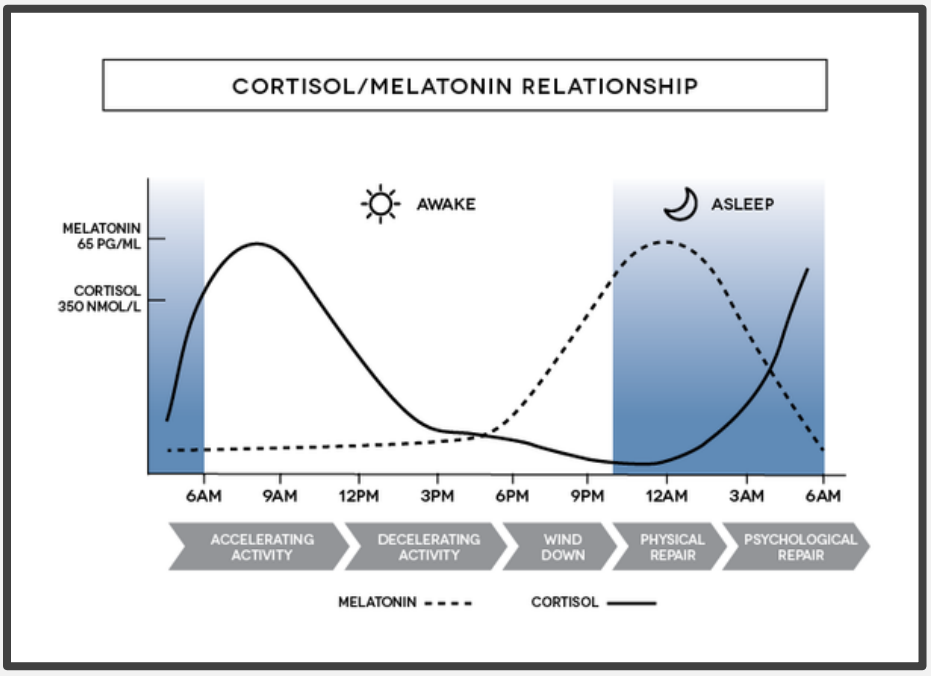


Cortisol is a major—but not the only—hormone that functions within this system, with direct effects on sleep. The sleep-facilitating hormone melatonin is another. Together, melatonin and cortisol work within the HPA axis to regulate sleep and wakefulness.

When it comes under prolonged or chronic stress, this network can become constantly activated, the hypothalamus and pituitary gland constantly signaling the adrenal system to produce more cortisol. It is cortisol's role as part of this axis that's attracted a lot of attention from sleep scientists in recent years since chronic stress has become such a widespread problem, with such deep effects on sleep. It's also because cortisol and the HPA axis it operates within interact with sleep in several different and important ways. Flipping back up to figure above for reference, levels of ACTH tend to be higher in people with insomnia than in good sleepers, suggesting excessive arousal and ongoing stressors contribute to insomnia. In another example, elite athletes can have difficulty getting to sleep because they tend to have high levels of cortisol throughout the day, including in the evening.

The Cortisol Rhythm & Sleep

Like nearly all hormones in the human body, cortisol has a daily 24-hour rhythm. For most biotypes, cortisol levels are at their highest in the morning, usually around 9 a.m. Cortisol begins to rise gradually in the second half of a night's sleep. The hormone begins a more rapid rise around the time you're waking up before peaking at about 9. From that point on, cortisol makes a gradual decline throughout the day, reaching its lowest levels around midnight. The activity of the HPA axis, which produces cortisol, reduces to its lowest levels in the evenings, right around your bedtime. In this way, cortisol plays a critical role in sleep-wake cycles: stimulating wakefulness in the morning, continuing to support alertness throughout the day, while gradually dropping to allow the body's own internal sleep drive and other hormones—including adenosine and melatonin—to rise and help bring about sleep.



Chronic stress is a major contributor to elevated cortisol, an excessively active HPA axis, and an ongoing state of arousal that's exhausting, anxiety-producing, and sleep-depriving. As we've discussed, elevated cortisol also contributes to a compromised immune system, chronic inflammation, weight gain, and, eventually, to chronic disease.

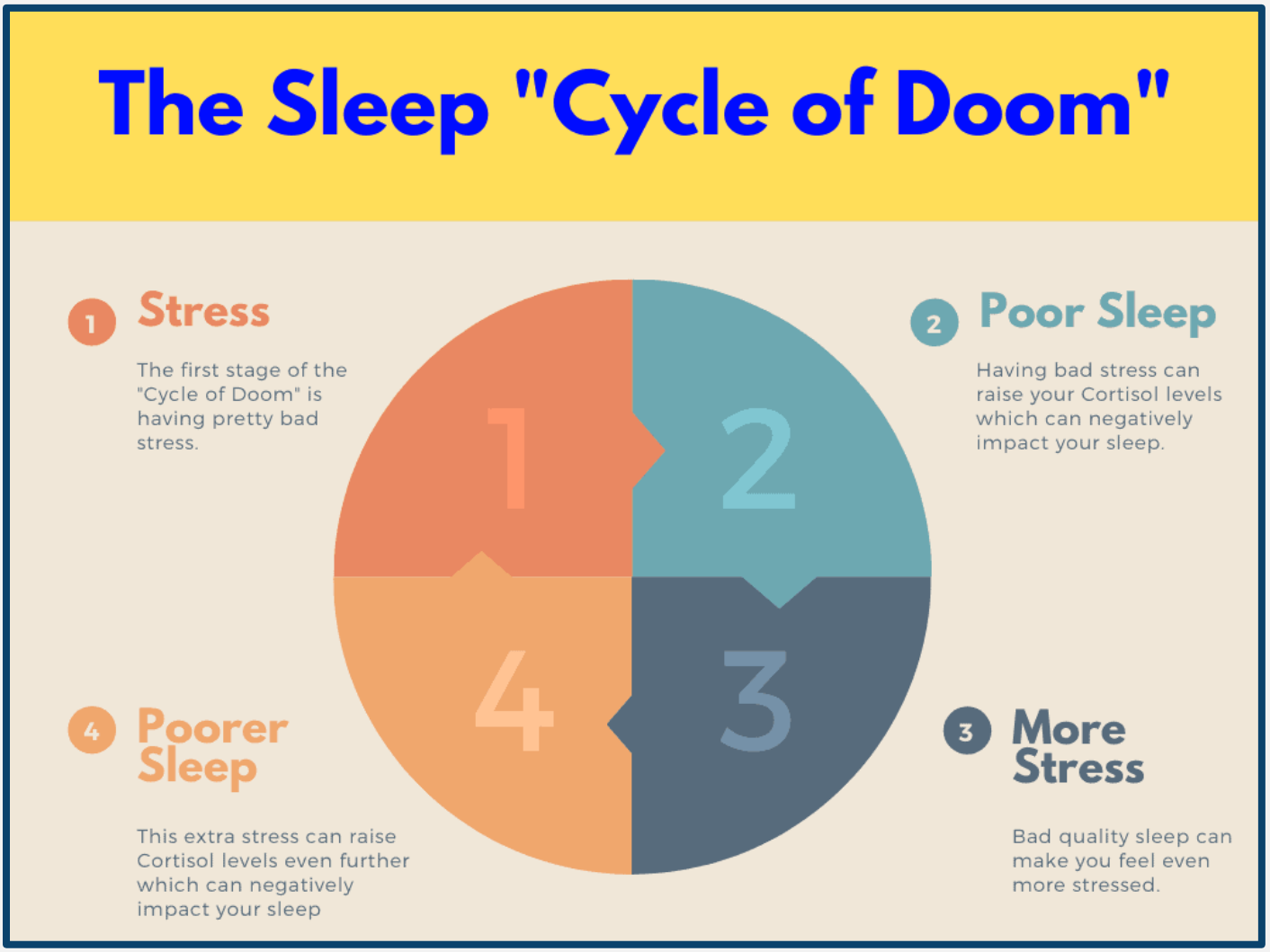
However, poor sleep itself can also increase cortisol production and dysfunction of activity along the HPA axis. Research shows that cortisol can be elevated by:

→Poor-quality sleep

→Lack of sufficient sleep

→Inconsistent sleep schedules (including rotating schedules adhered to by shift workers)

Research shows a complex 2-way street between the HPA axis (which produces cortisol and regulates its levels) and sleep. Poor, insufficient, irregular sleep increases the activity of that system, leading to more stress, greater arousal, and, over time, to the health complications mentioned above. And a more active HPA axis can interfere with the ability to maintain consistent sleep routines and to get enough sound, high-quality sleep. Hello, vicious cycle…

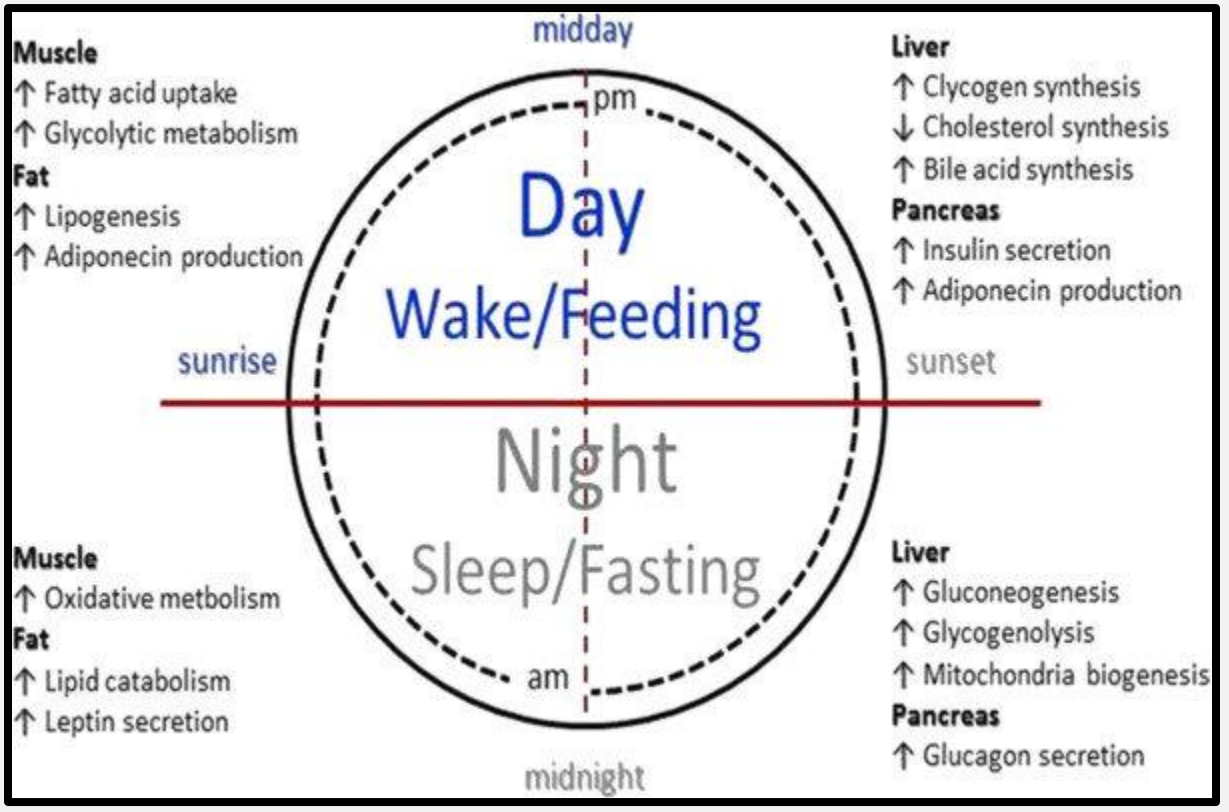


Circadian Rhythms & Broader Implications

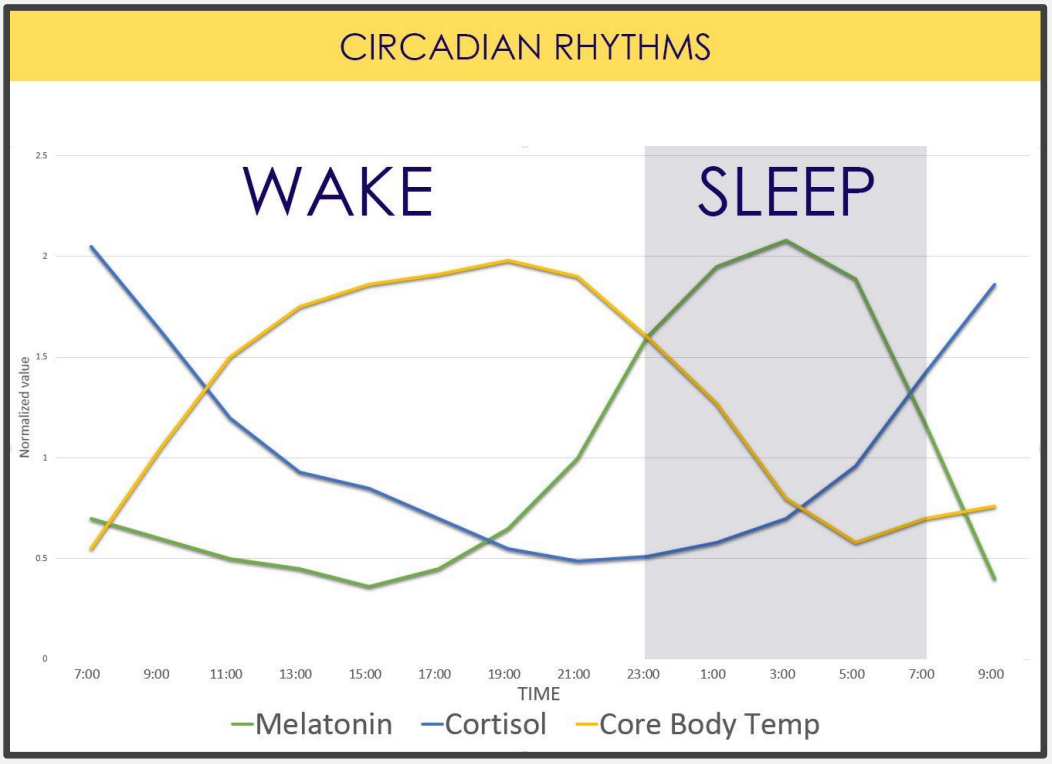
While the sleep-wake cycle is one of the most prominent circadian rhythms, these 24-hour internal clocks play a vital role in virtually ALL systems of the body!!

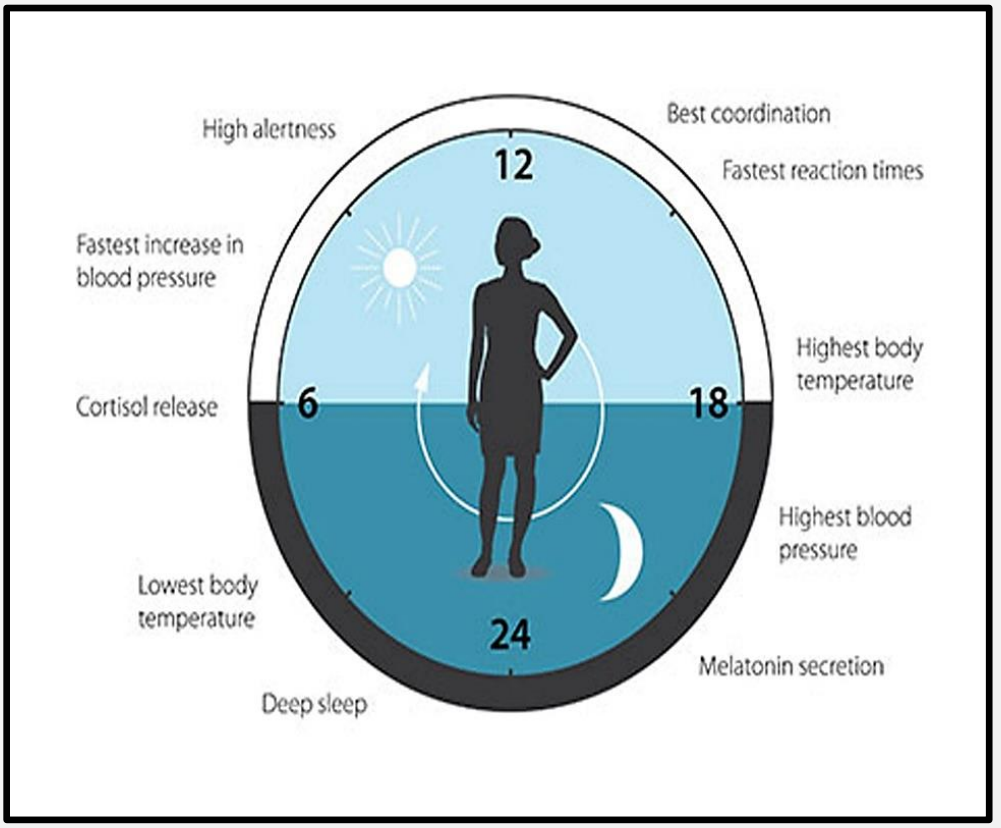
Research continues to uncover details about circadian rhythms, but evidence has connected them to metabolism and weight through the regulation of blood sugar and cholesterol. Circadian rhythms influence mental health as well, including the risk of psychiatric illnesses like depression and bipolar disorder as well as the potential for neurodegenerative diseases, like dementia.

There are indications that circadian rhythms have an important influence on the immune system as well as processes of DNA repair that are involved in preventing cancer. Early-stage research indicates that circadian cycles can influence the effectiveness of anti-cancer drugs and that new medications may be able to harness biological clocks to kill cancer cells.

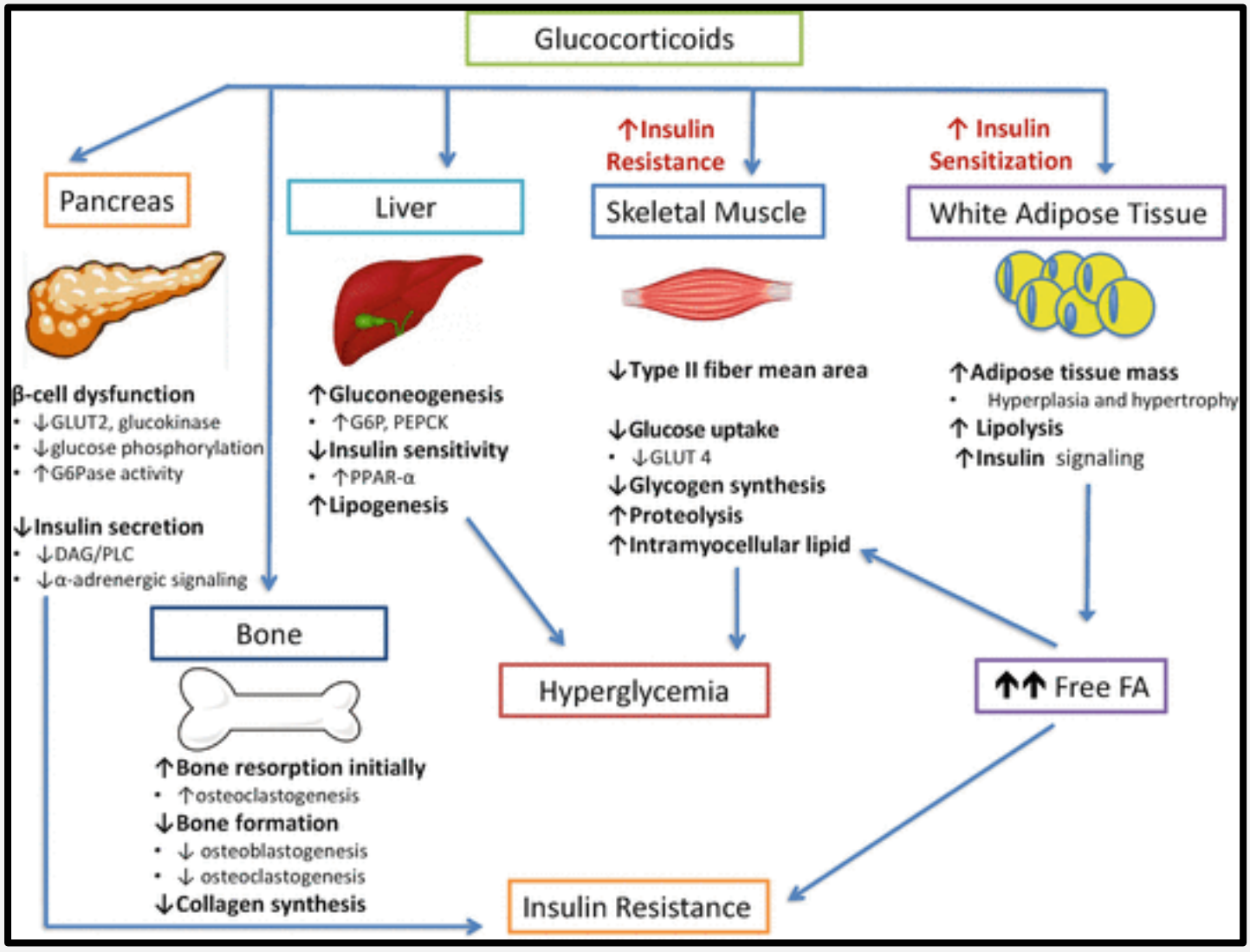


Takeaway 1: Cortisol production follows a daily 24-hour biorhythm, lowest overnight and highest first thing in the morning. When that rhythm gets disrupted, sleep does too. Expanding that thought, many hormones, such as GH, TSH, adrenocorticotropic hormone (ACTH), luteinizing hormone (LH), prolactin, melatonin, and even testosterone have regular diurnal cycles. Having a consistent sleep routine (going to bed and getting up at the same time each day) can cue the SCN and allow for a deep, regular sleep pattern.

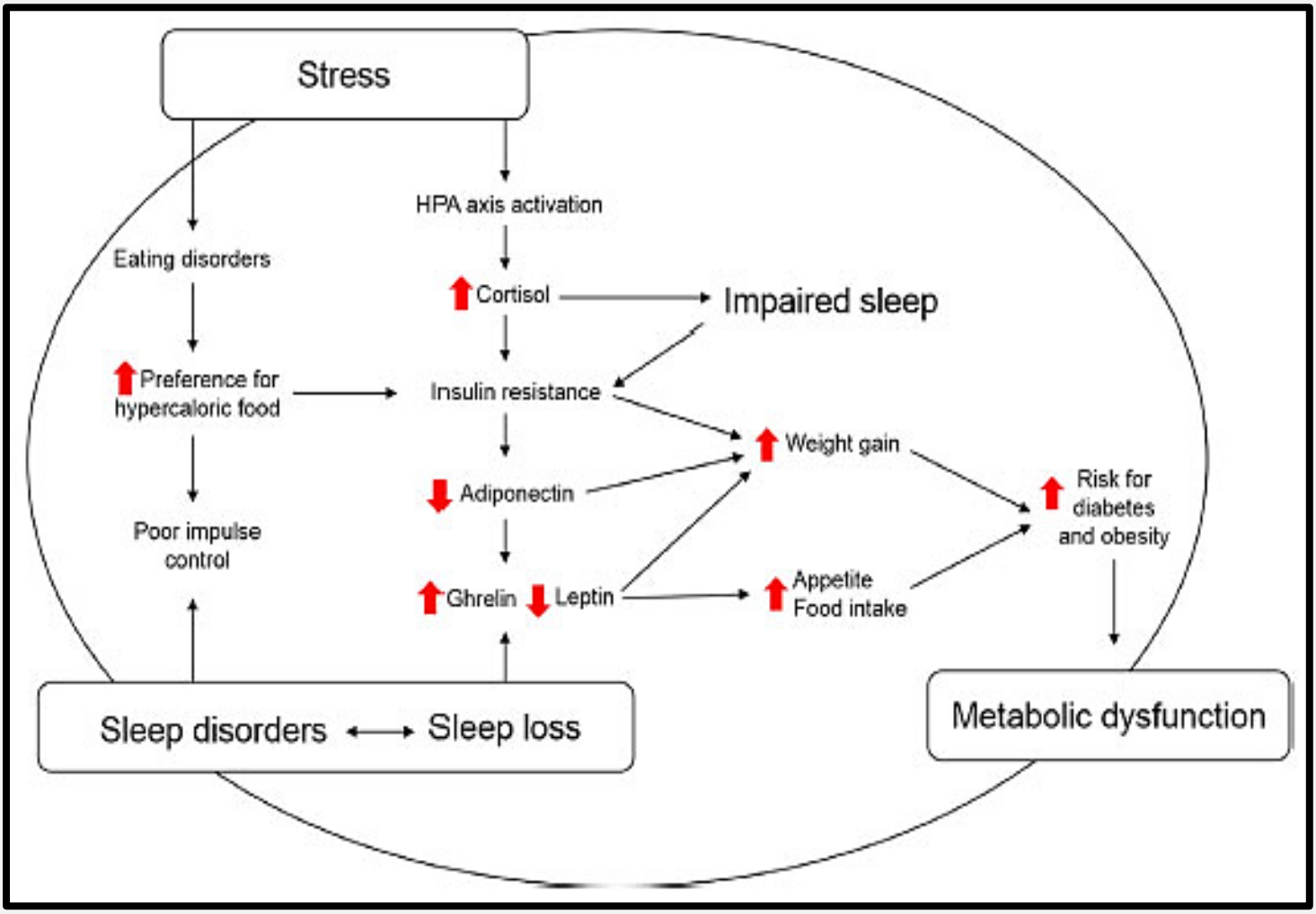




Takeaway 2: Glucocorticoid/Cortisol Regulation of Metabolism & Body Composition



Takeaway 3: The following graphic details the main interactions between sleep, stress and metabolism. Sleep disorders which can lead to sleep loss share common pathways with stress system via HPA axis activation on the metabolic dysfunction, contributing to increased risk of developing obesity and diabetes. (Figure courtesy of Sleep Science. Hirotsu et. al. 'Interactions between sleep, stress and metabolism: From physiological to pathological conditions.' as fully detailed below)



Resources:

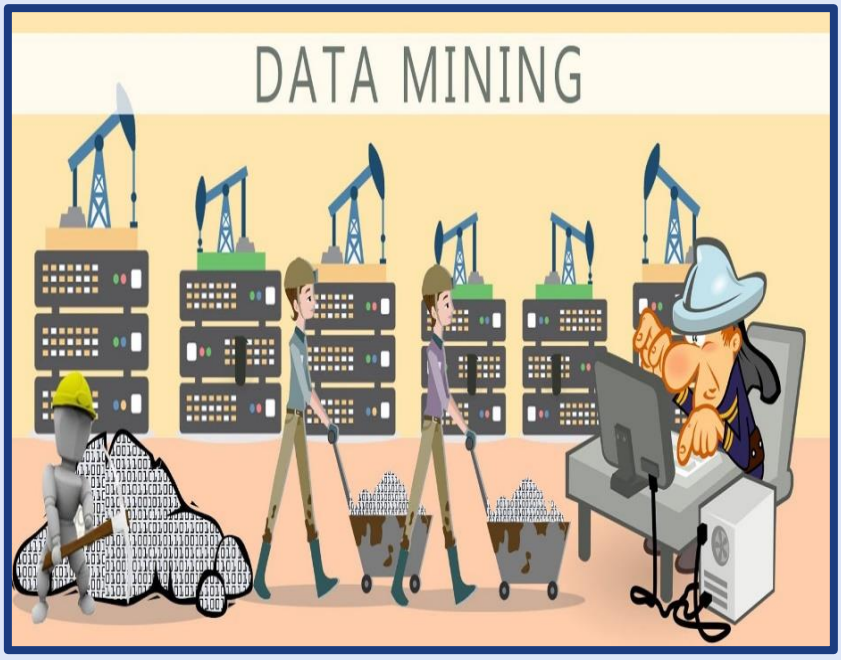
Jo Abbott. The Conversation. 'Chemical Messengers: How hormones help us sleep.' Sept 09, 2015. https://theconversation.com/chemical-messengers-how-hormones-help-us-sleep-44983

Michael Breus, Ph.D. Psychology Today. ;The Effects of Cortisol on Your Sleep.; April 10, 2020. https://www.psychologytoday.com/us/blog/sleep-newzzz/202004/the-effects-cortisol-your-sleep#:~:text=In%20this%20way%2C%20cortisol%20plays,and%20help%20bring%20about%20sleep.

Camila Hirotsu; Sergio Tufik; Monica Levy Andersen. Sleep Science. Review: 'Interactions between sleep, stress, and metabolism: From physiological to pathological conditions.' Vol. 8 Issue 3. 2015. http://sleepscience.org.br/details/236/en-US/interactions-between-sleep--stress--and-metabolism--from-physiological-to-pathological-conditions

Hormone Interplay: Cortisol & Top-Down Influences

The average American wakes up to a sleep deficit. In addition to the many well-established health consequences of poor or insufficient sleep, a sleep deficit increases production of the hormone cortisol. High morning cortisol levels are shown to be associated with depressive symptoms as well as a general feeling of stress. At the microscopic level, cortisol influences glucose and fat metabolism and plays a role in the functioning of our immune systems. What's more, high cortisol levels are found in a variety of disease processes and are commonly associated with greater overall metabolic stress on the body.



→SOURCE FILE: **Cortisol** is a stimulating, alerting hormone synthesized from cholesterol and one of the glucocorticoids produced by the adrenal cortex. It is the body's primary stress hormone, driving the "fight-or-flight" sympathetic response in the presence of a threat or stressor.

Our choices, behaviors, responses, feelings, moods are all under the influence of circulating levels of hormones. And where do all the circulating hormones ultimately sow their seeds of change? The Brain and Nervous System. Let's take a quick peek at what happens to the brain's circuitry when we're exposed to stress. Then we'll weave the threads of inflammation, stress and sleep into this seemingly random tangent to form a Big Picture.

Stick with Me!!

PREFRONTAL CORTEX: Higher-order brain functions

-ability to differentiate among conflicting thoughts
-ability to determine good/bad, better/best, same/different
-ability to understand future consequences of current actions
-ability to work toward a defined goal
-ability to predict outcomes of actions based on past experiences
-ability to exert social control/suppress urges

These functions not carried out/neural connections atrophy when the prefrontal cortex is bypassed for the amygdala!!!

The prefrontal cortex (colored in orange above) is our brain's center for higher-order or executive brain functions, such as our ability to:

-PLAN for the future

-EXPRESS empathy

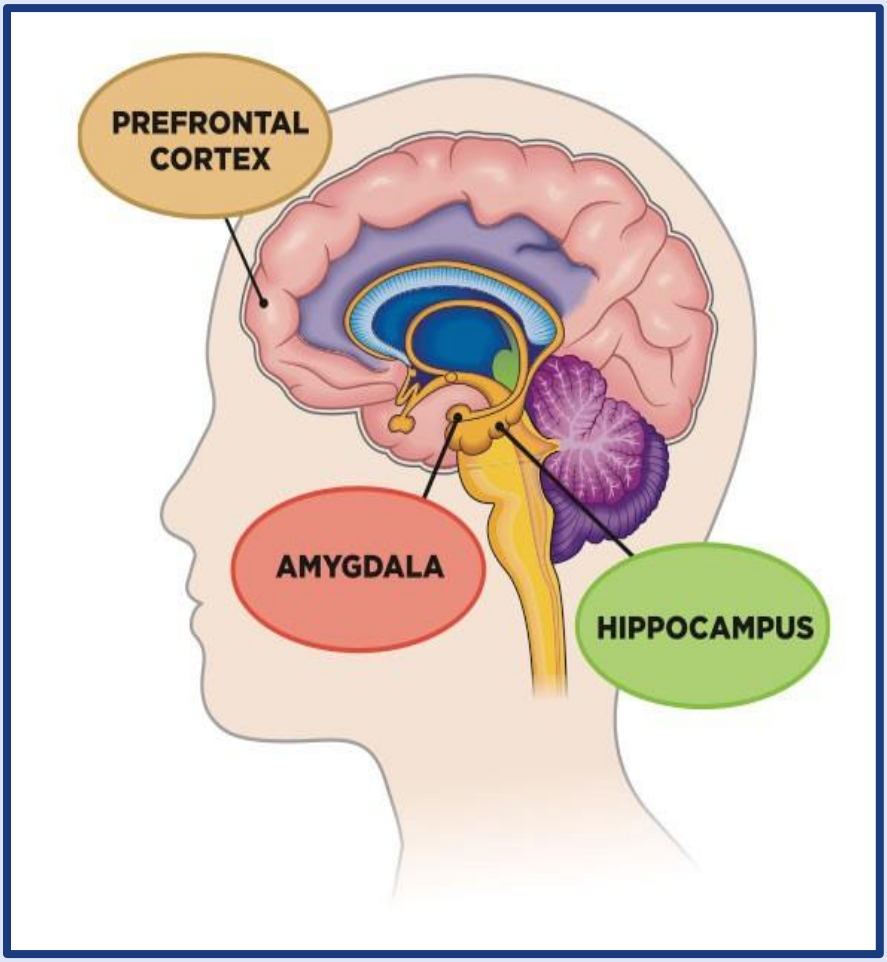
-ENGAGE in positive social behavior

-ORCHESTRATE thoughts & actions to help achieve our goals from simple objectives (cooking a meal) to complex tasks (writing a book)

Currently research on executive function is exploding, detailing many environmental factors within our control (diet, activity, stress levels, sleep and social interaction) that can affect the health/functionality of our prefrontal cortex and ultimately our behaviors and well-being.

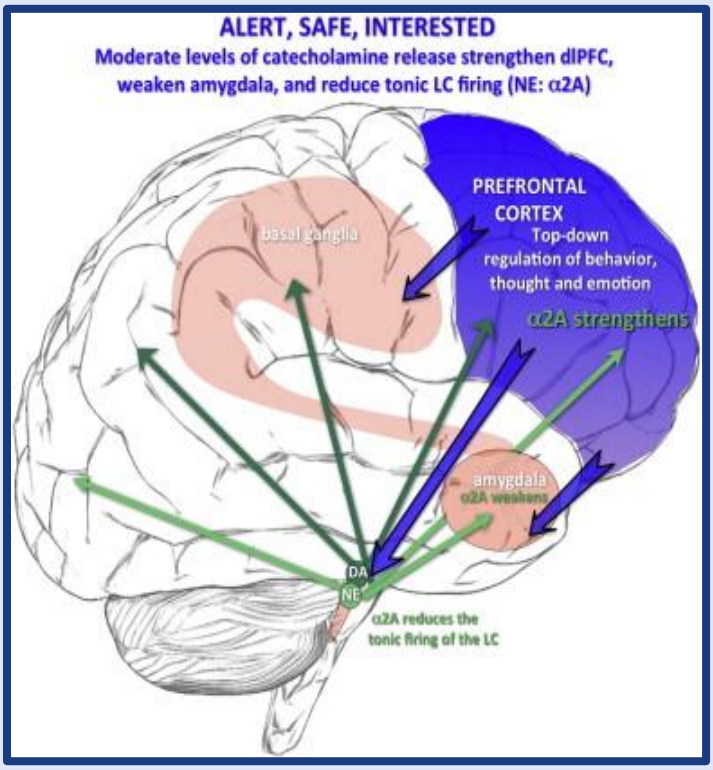
Now let's compare the amygdala, located much further back in our more primitive brain as part of our limbic system.

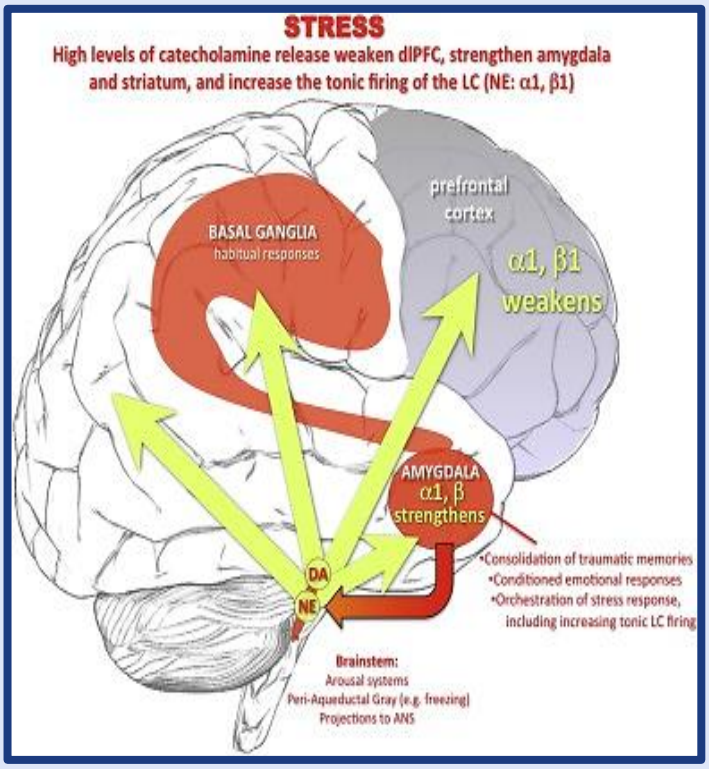
The amygdala is an information filter regulated by our emotional state. It is responsible for strong affective reactions (such as anxiety, fear, anger, aggression), emotions associated with sexual behavior and recognizing and remembering emotional experiences and facial expressions.



When we are calm, the filter is wide open and information flows in a top-down manner through the prefrontal cortex, the center of learning, reasoning and thinking. The prefrontal cortex controls our decision making, focuses our attention and allows us to learn how to read, write, compute, analyze, predict, comprehend and interpret (See LEFT in diagram below).

When we are aroused to a heightened state, the damper is shut, our prefrontal cortex filter shuts down and control is surrendered to the amygdala which launches the "fight-or-flight" response. Under stress, the rational, logical center of our brain is literally hijacked and the amygdala green lights the lability of our emotional responses instead (See RIGHT in diagram below).





So. Back to Cortisol. Cortisol is a total player in this little detour. High levels of circulating cortisol directly threaten the prefrontal cortex and empower the amygdala. Again, in this typified subversion we lose the benefit of dialing down our impulsivity and aggressive behaviors through employing our prefrontal filter.

Consider This Hypothetical: Silencing the blare from our alarm, feeling like we were rode hard and put up wet after a late night punctuated by poor sleep, we crawl out of bed with our cortisol level rocketing somewhere in the stratosphere and serotonin suppressed to the sub-basement. Parsing the subtext, we arise already suffering systemic-wide ravages derived from an interrupted sleep cycle and subsequent hormonal dysfunction.... cranky, depressed and bleary:

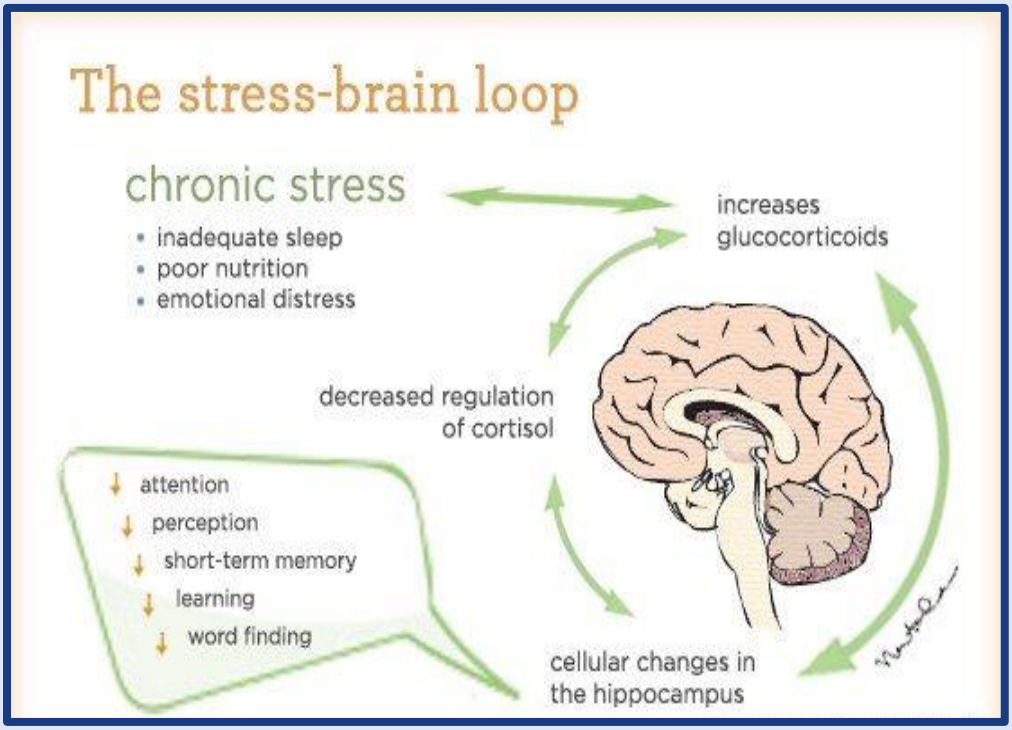
In a word → Stressed. By the time we schlump into work, we have further fed this dysfunction by kicking back an extra-large mocha latte/frappe/iced-blended coffee drink with a side of doughnuts/muffins/pop tart or other highly processed breakfast dessert in a vain attempt to jump start our reluctantly sputtering engines.

Reality Check: Large datasets indicate that these types of high-glycemic-index foods –foods that increase blood sugar quickly – may themselves contribute to depression through inflammation pathways (by antagonizing the actions of the neurotransmitter serotonin, as we will engage with in November).

BIRD'S EYE VIEW: *Anything* that enhances inflammation may threaten our ability to use our prefrontal cortices, leaving the amygdala to its own devices. Inflammation's ripple effects in the brain stemming from a conglomeration of poor/deficient sleep–high stress–high intake of sugar/fat and characterized by holistic metabolic dysfunction ultimately translates to us having less control over our actions and emotions.

<u>Talk about a Triple Threat!!!</u>

As we have previously/will soon encapsulate, inflammation is determined by what we consume in our diets (high fat/high sugar/high processing), the amount of sleep we prioritize, the amount of stress that we manage, the amount of social well-being we foster and the amount of activity we incorporate into our day. Scientific medical journals have now connected inflammation to amygdala-driven behavioral lapses, such as poor decision making and impulsivity through the actions of cortisol.



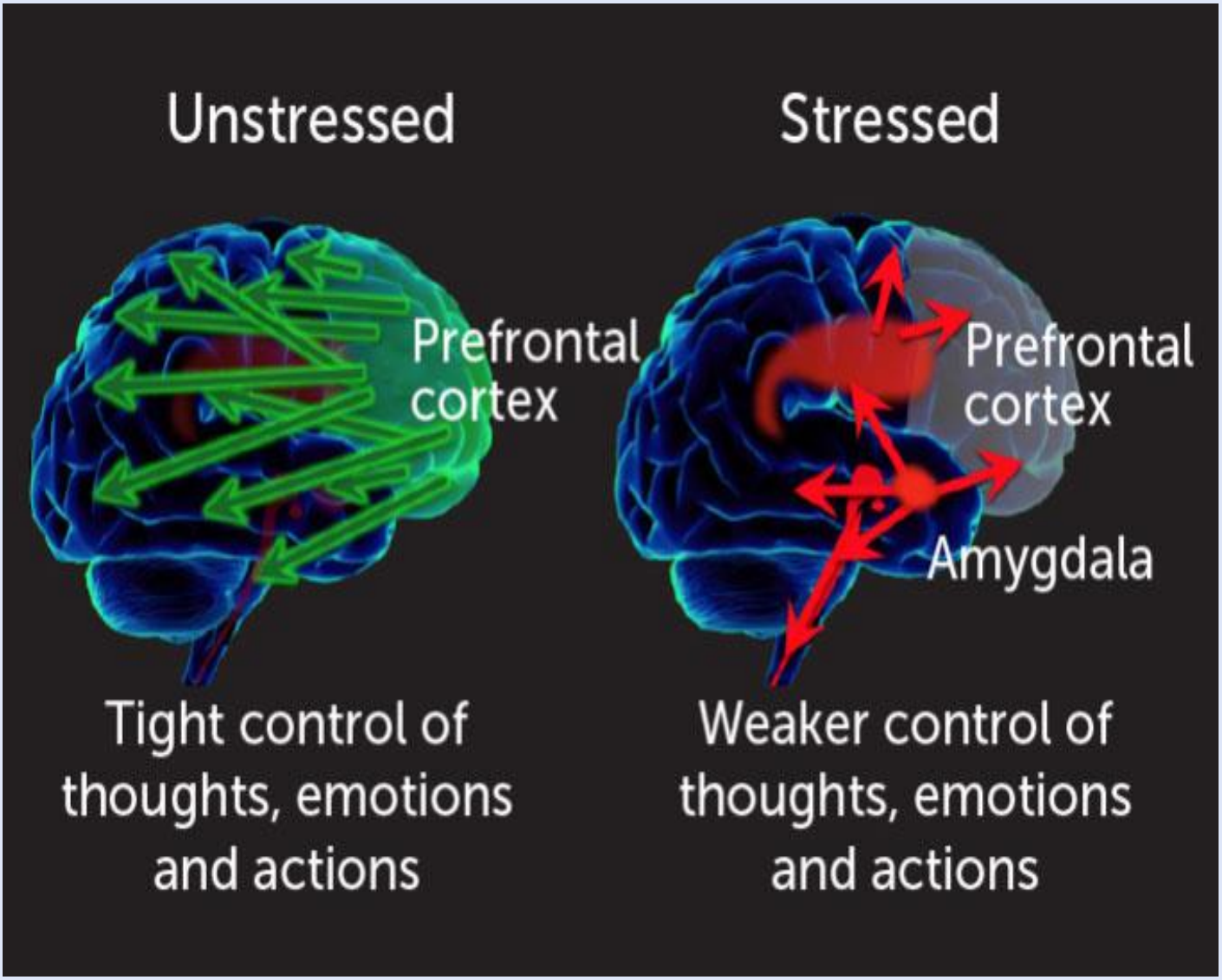
We know that chronic inflammation affects the entire body and is strongly tied to diseases such as depression and dementia. It should come as no surprise that inflammation is also linked to the day-to-day functions of our decision-making and advanced thinking processes.

Takeaway 1: Effects of Stress on the Brain:

Stress causes the cerebral cortex to begin a process that results in the release of chemicals to prepare your body to handle danger. But what else goes on in your brain when you handle too much stress? At first, you think more clearly and respond more quickly.

But after you've reached your stress tolerance point, your brain begins to malfunction: *You forget things. You lose things. You can't concentrate. You lose your willpower and indulge in bad habits like drinking, smoking or eating too much, which tend to exacerbate the problem.*

Like anything else, too much of a good thing can quickly turn bad. The production of the chemicals from stress response that make the brain react more quickly and think more sharply are directly related to the depletion of others that, under too much stress, keep you from thinking effectively or reacting quickly.



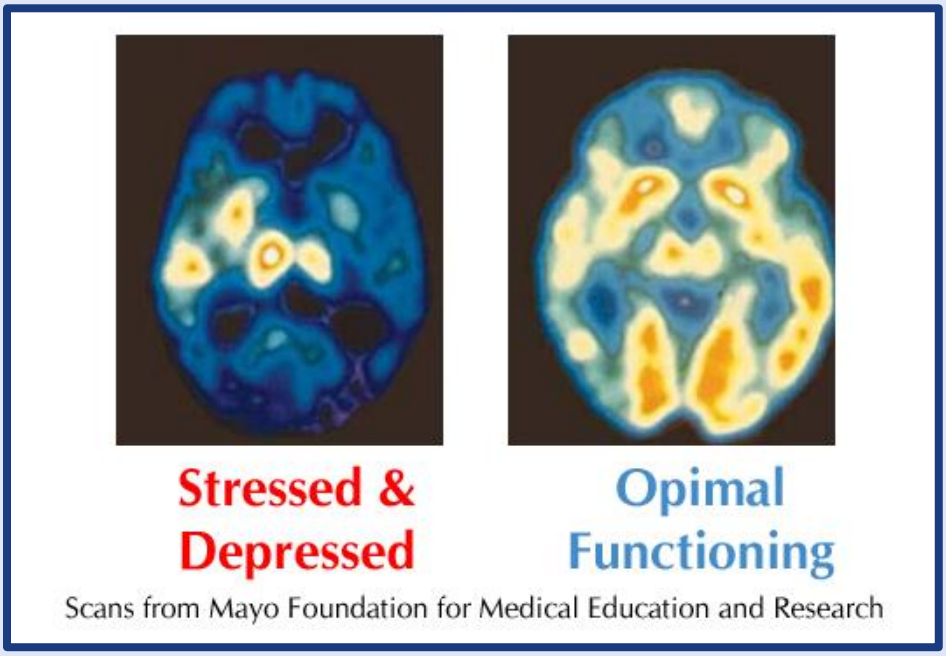
Takeaway 2: High levels of arousal chemicals/cortisol/stress/inflammation rapidly shut off the prefrontal cortex, impairing our top-down control which makes us:

Distracted, Forgetful and Disorganized

Less Thoughtful and More Reactive

Emotional, Irritable and Impatient

Rigid and More Concrete (thus, more vulnerable to scams)



Takeaway 3: Stress Changes the Way We Live

Changes the Brain's Structure & Increases Risk for Mental Illness

Both acute and chronic stress produce neuron (nerve cell) growth in the amygdala, literally increasing its size (hypertrophy) and resulting in increased anxiety, increased impulsivity, increased anger and increased aggression.

Kills Brain Cells and Shrinks the Brain

Meanwhile, nerve cells in your hippocampus and prefrontal cortex pull a disappearing act, literally shrinking their size (atrophy) and resulting in impaired memory and concentration, with loss of organized, logical thought processes!!

Lifestyle Bombarded by Stress: We Live by Limited Forethought and Emotional Lability, Dominated by Instant Gratification and Riskier Behaviors.

3 powerful ways to

REWIRE YOUR BRAIN AND BODY

1

REGULAR EXERCISE

reduces activation of our amygdala and sympathetic nervous system, the parts of our brain and body that generate the stress response

2

REGULAR MEDITATION

decreases the size of our amygdala and increases grey matter density in our prefrontal cortex, the brain area responsible for concentration, decision making, judgement, and social interaction

3

REGULAR ELICITATION OF THE RELAXATION RESPONSE

changes the expression of our genes in a way that makes us more resilient to stress and anxiety

Wellness Bites: PISTACHIOS, the Little Green Machine

Pistachios are edible seeds of the fruits of the Pistachio vera tree but nonetheless are considered nuts in culinary settings and classified as a tree nut allergen. Like most seeds, they are very nutritious and energy dense. The pistachio is native to Western Asia and the Middle East, with evidence indicative of their consumption as far back as 7000 BC. Today, the largest producers are in the dry climates of Iran, the US and Mediterranean countries. Their distinctive and natural green color and flavor makes pistachios a popular additive to ice creams, baked goods, sweets, butter, oil, sausages, grains, fish and meats.

Magnesium, protein, fiber, potassium, copper, iron, phosphorus, manganese, zinc, iron, selenium, vitamin E, choline, vitamin K, calcium, thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), pyridoxine (vitamin B6), folate (vitamin B9), healthy fats and antioxidants (i.e., carotenoids, phytosterols, flavonoids, resveratrol, lutein, zeaxanthin, polyphenols, tocopherols), essential amino acids.

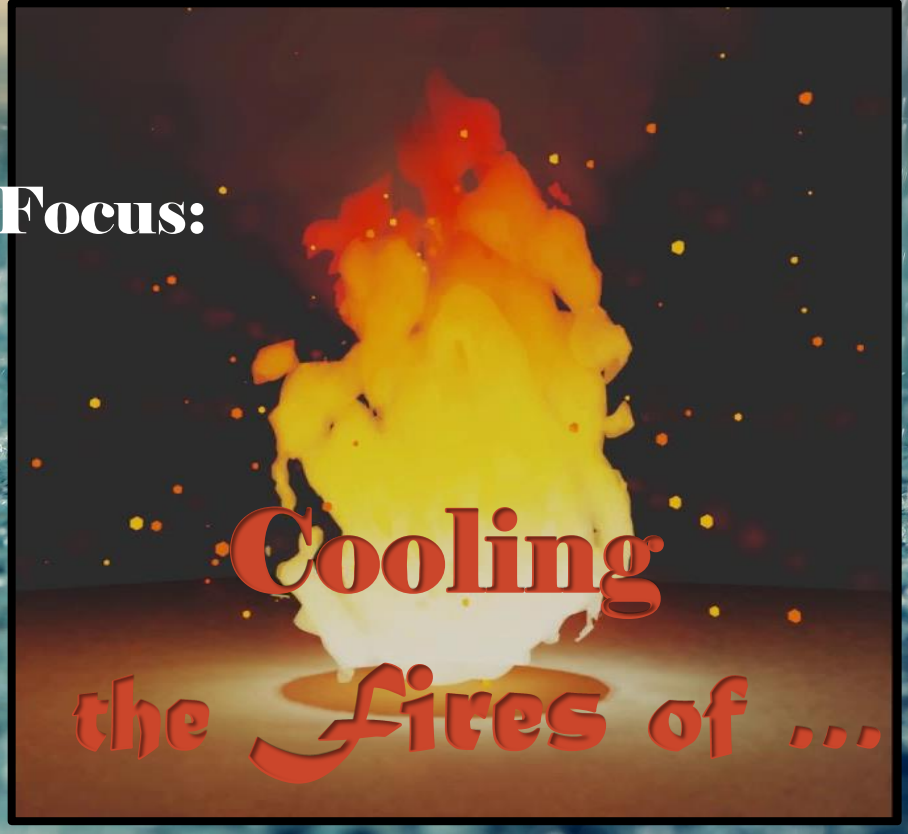
Eating pistachios has been linked to improved gut health, heart health, cholesterol levels (reduced total, LDL & boosted HDL), blood vessel dilation (reduced blood pressure) & blood sugar levels as well as an aid to weight loss. Notably, pistachios are one of the most vitamin B6-rich foods around, vital for blood sugar regulation, formation of hemoglobin (molecule carrying oxygen in red blood cells), protein regulation & cognitive development. Prevalence of antioxidants are protective for eye health (blue light/age-related macular degenerative damages), cancer and heart disease. Pistachios are a source of high vegan protein and provide adequate levels of ALL 9 essential amino acids, making them a reliable alternative protein source!!

Consumption in moderation is urged…by the handful, not the bowlful! In excess, pistachio's beneficial health effects can be reversed.

Besides being consumed as a snack, sprinkled as a salad garnish or pizza topping, pistachios can be used in baking and cooking, adding a green or purple color to various dishes (i.e., green-colored desserts) or specialty nut blends, such as pestos or nut butter. Additioanlly, pistachios can be baked on favorite fish, added to morning granola or combined with homemade dessert crust.

INEXPENSIVE! NUTRIENT-DENSE! Pistachio's high protein/low glycemic index, multitude of nutrients, & anti-inflammatory/antioxidant effects provide a great way to improve overall health. As a bonus, their unusual color can make a fun holiday additive for festive treats.

Wellness Focus:

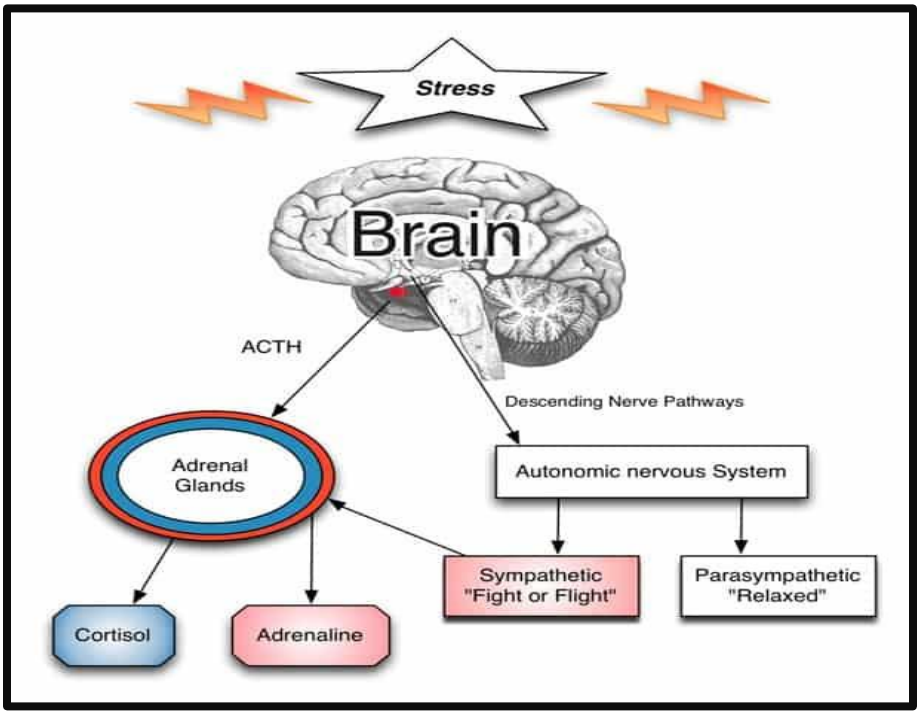


STRESS

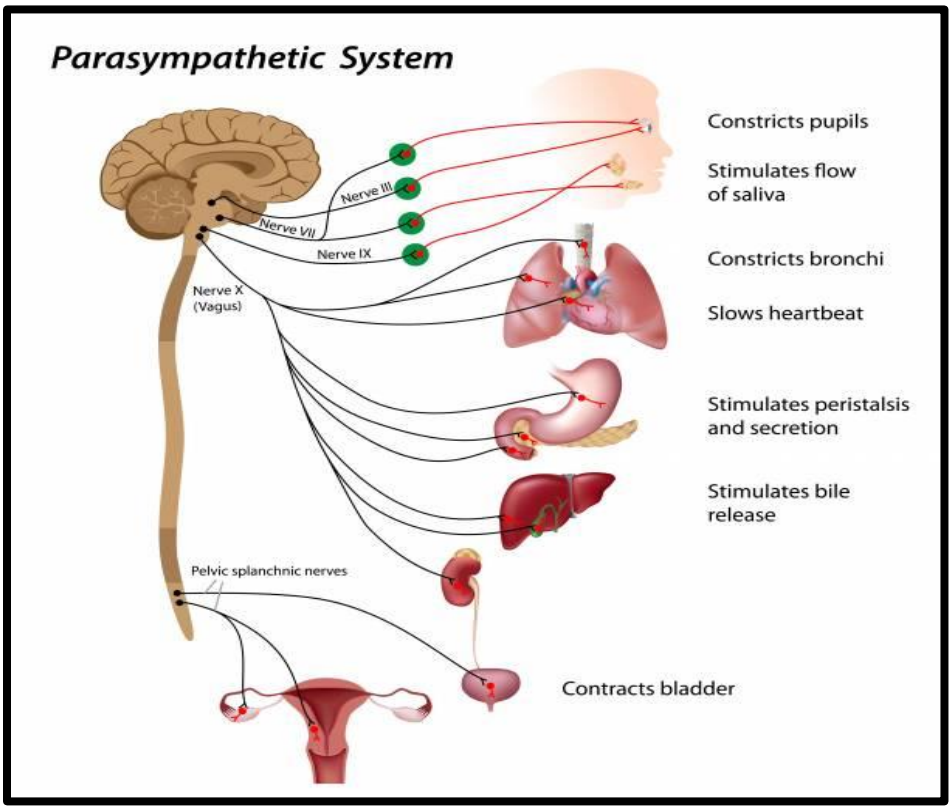
"Stress poisons every inch of the body. It cripples the immune system, upsets delicate hormones, and disrupts digestion, among other things. Most dangerous of all, it dials up inflammation. Stress lies at the root of every inflammatory disease."

Dr. Bharat Aggarwal, Chief of the Cytokine Research University of Texas MD Anderson Cancer Center Houston.

Last month we introduced the autonomic nervous system and discussed the sympathetic "fight-or-flight" pathway: sympathetic nerves from the level of the spine branch outward toward the organs to produce stress-activity for times of emergency or heightened activity.



We discovered that 1) epinephrine, aka adrenaline (neurotransmitter), from sympathetic nerves and the adrenal medulla as well as cortisol (hormone) from the adrenal cortex act as mediators in the creation of our stress responses; and 2) that stress and anxiety are associated with depressed vagal activity. Experienced as long-term conditions, they are linked with an increased risk for development of chronic diseases.



In the current October issue, we will be focusing our attention on the counteractions of the parasympathetic "rest-and-relax" pathway and detailing how its actions moderate and dial back the more destructive elements that stress creates in the body.

The parasympathetic branch of the ANS functions as a restorative, (generally responsible for slowing, healing and rejuvenating), designed to balance and mitigate actions of the sympathetic and return the system to its baseline. It acts through release of acetylcholine, the chief neurotransmitter of the parasympathetic nervous system. Acetylcholine is also known to play an important role in memory and learning and is in abnormally short supply in the brains of persons with Alzheimer disease.

❖ "Rest & Digest" or "Feed & Breed" Parasympathetic Responses:

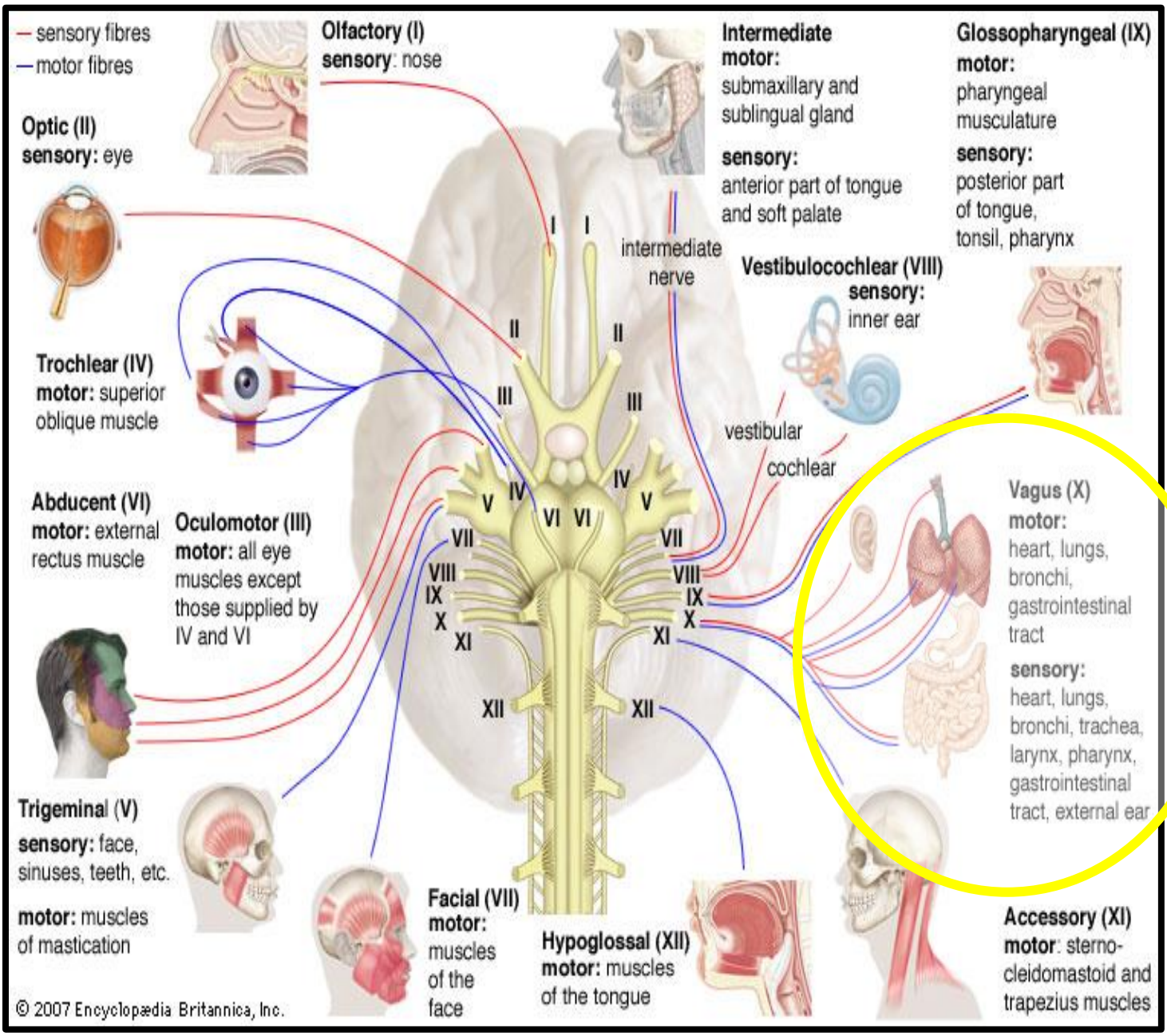
- Increase in blood flow to the gastrointestinal tract, which helps to meet the greater metabolic demands placed on the body by the GI tract
- Constriction of the bronchioles when oxygen levels are normalized
- Control of the heart via the vagus nerve cardiac branches and spinal accessory nerves of the thoracic spinal cord
- Constriction of the pupil, allowing for near vision control
- Stimulation of salivary gland production & speeds up peristalsis to aid digestion
- Relaxation/contraction of the uterus in women & erection/ejaculation in men.

→ Source File:

	Sympathetic	Parasympathetic
Function	To defend the body against attack	Healing, regeneration and nourishing the body
Overall Effect	Catabolic (breaks down the body)	Anabolic (builds up the body)
Organs and Glands t Activates	The brain, muscles, the insulin pancreas, and the thyroid and adrenal glands	The liver, kidneys, enzyme pancreas, spleen, stomach, small intestines and colon
Hormones and Substances It Increases	Insuin, cortisol and the thyroid hormones	Parathyroid hormone, pancreatic enzymes, bile and other digestive enzymes
Body Functions It Activates	Raises blood pressure and blood sugar, and increases heat production	Activates digestion, elimination and the immune system
Psychological Qualities	Fear, guilt, sadness, anger, willfulness, and aggressiveness.	Calmness, contentment and relaxation

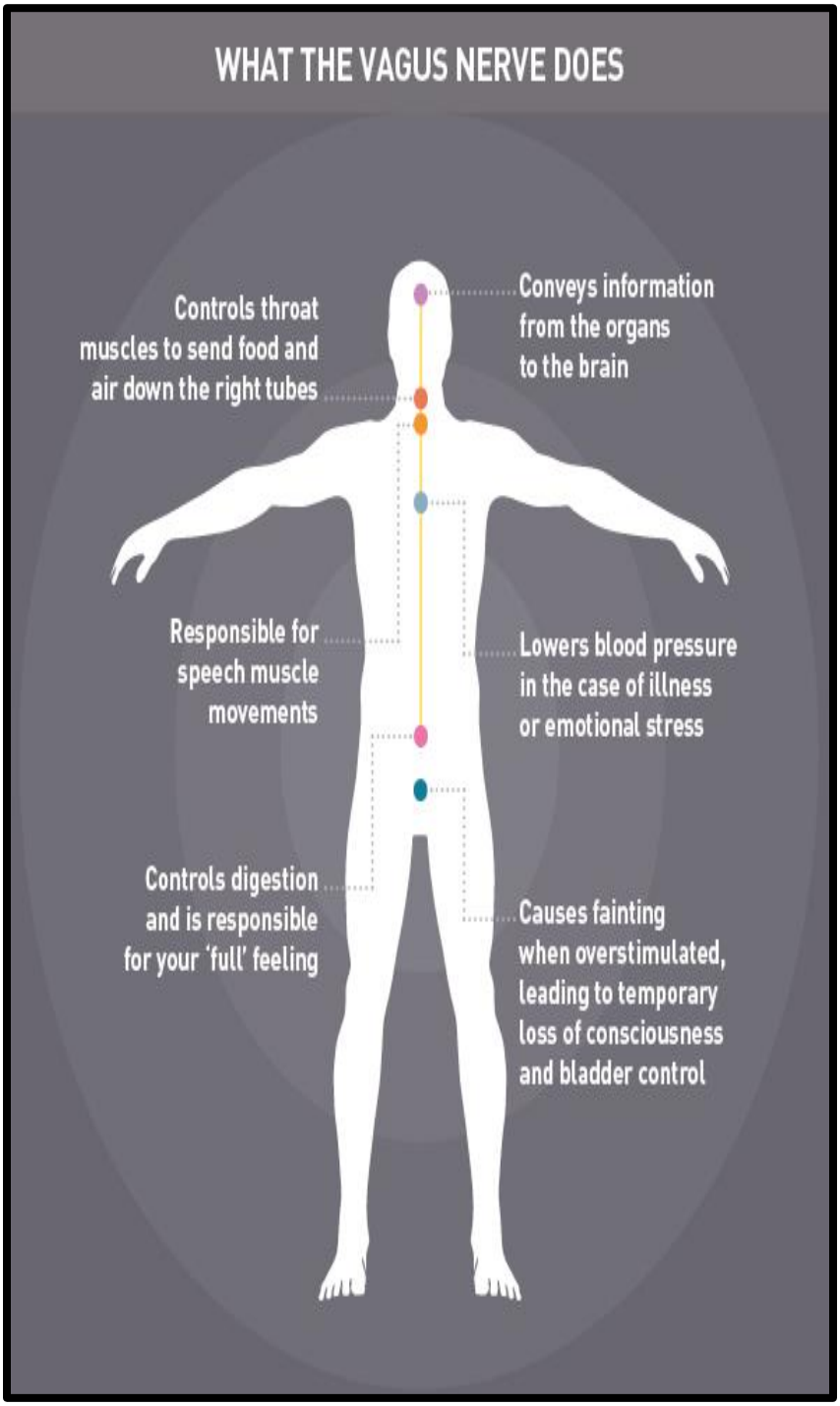
When delving into the how's and why's of dialing back stress, gearing down to eat, enjoy, rest and relax, it is imperative that we examine functions of the parasympathetic system through the all-encompassing lens of the vagus nerve, which directs its fibers into almost every organ of our bodies.

The vagus nerve or 10th (X) cranial nerve is the primary governor of the parasympathetic branch that directs control of the body's relaxation responses. Cranial nerves are pairs of nerves that connect the brain to different parts of the head, neck and trunk. There are 12 pairs of cranial nerves (I–XII), each being named according to their structure or function, with their functions usually categorized as being either sensory or motor.



In Latin vagus means "to wander," an apt descriptor for the largest, longest and most complex of all the cranial nerves. The vagus nerve dynamically engages in a host of biochemical and bioelectrical connections all over the body that quiet pain, ease stress and assist in defeating disease.

Stimulating the vagus nerve shuts off the inflammatory activity within the cells of the organs. This helps with immune system activity and the overall function of the body. External calming activities, such as stretching your muscles, breathing deeply or hugging a friend, bestow a sense of calm or comfort and generate these same healthful effects.



How does something as simple as a hug or handshake manage to soothe so effectively? Each of these activities stimulate a complicated network connecting the brain to the heart, the gut, the immune system and many of the organs...collectively, the network identified as the VAGUS NERVE.

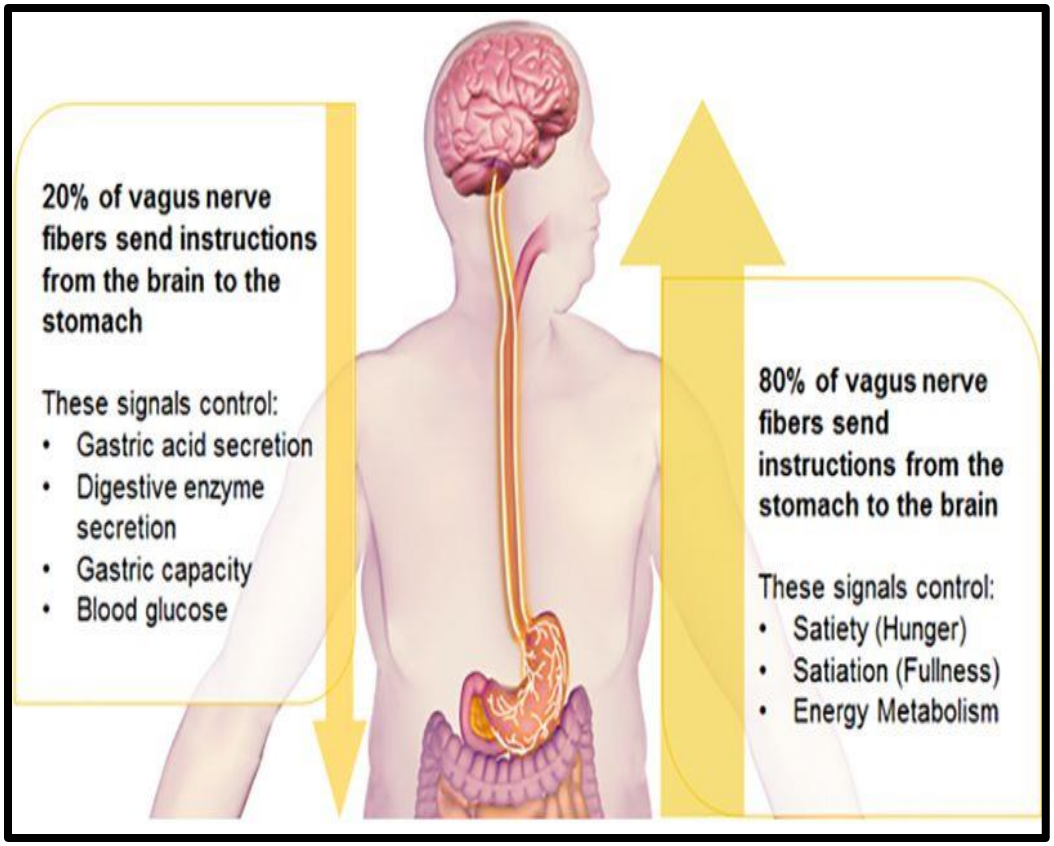
As we have previously outlined through depictions of other systemic networks, parasympathetic (and specifically vagal) activity is multi-layered and culminates in a series of cascades and interactions with other neurotransmitters, hormones and systemic conditions. For example, vagal activation or deactivation is tied to the ebb and flow of hormones such as cortisol and the digestive hormone ghrelin, the amount of inflammation the immune system produces and many other internal processes that shape human health and experience.

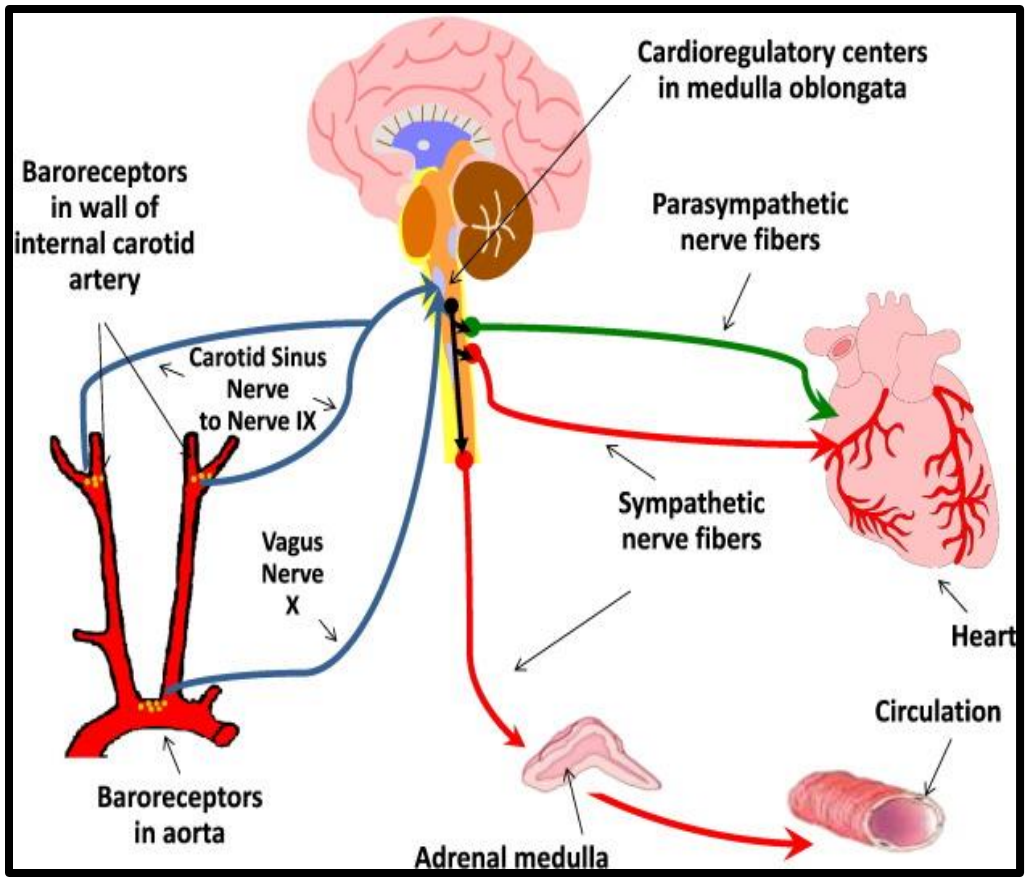
> "Experts have linked vagal activity to symptom changes in people with such diverse conditions as migraine headaches, inflammatory bowel disease, depression, epilepsy, arthritis, and many other common ailments. The more science learns about the nerve, the more it seems like a better understanding of the vagus nerve function could unlock new doors to treating all manner of human suffering."
>
> (Heid, Markham. "Science Confirms that the Vagus Nerve is Key to Well-Being." Elemental (on-line). 12-19-2019)

Let's take a moment to specify a few diverse impacts made by vagal activation recently elucidated by comprehensive scientific research:

- One branch of the vagus nerve connects to the head, face and neck/throat. Those suffering with depression also have less vagal activity which in turn is associated with less vocal intonation (rise & fall/pitch of speech) and less-active facial expressions. Since the early 2000s, the FDA has approved vagal nerve stimulation for the treatment of some forms of depression. Additionally, there is ever-increasing evidence that vagal activity is critical to attention and mood, with current findings suggesting that stimulation of the vagus nerve may improve working memory or help people suffering from those with ADHD.

- A separate branch of the vagus nerve runs down to the GI tract. Here, low vagal tone (or activity) is associated with slowed gastric motility, which interferes with proper digestion.

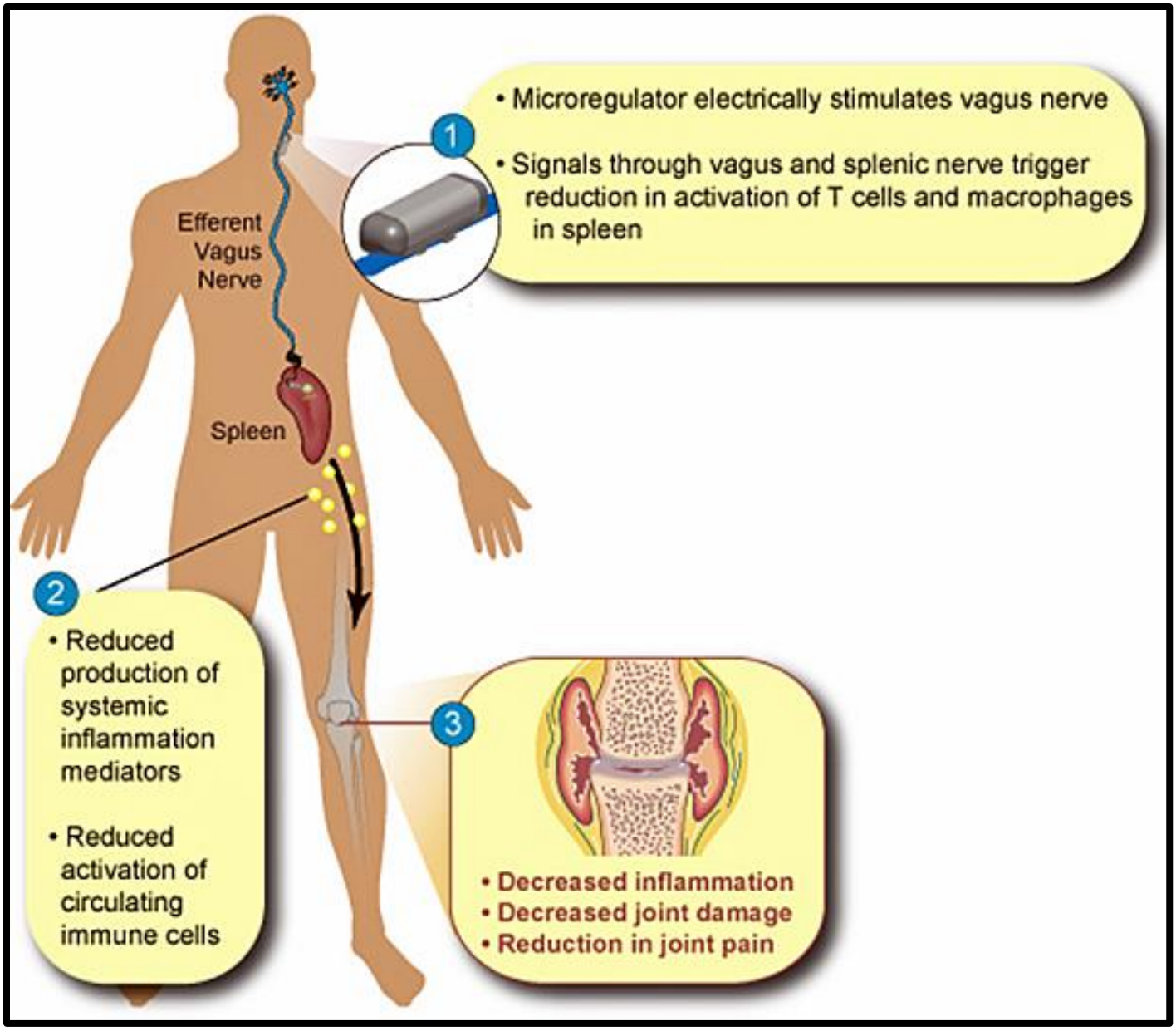




✓ Heightened vagal activity slows heart rate and also switches off inflammation, in part by triggering the release of immune system calming chemicals.

In fact, if we pick almost any common medical condition that's made worse by stress or inflammation — everything from arthritis to inflammatory bowel disease — there's research showing that vagus nerve stimulation can help treat it or relieve its symptoms.

It's no wonder that research is attempting to develop medical techniques and therapies capable of harnessing the power of vagus nerve stimulation for its alleviating effects.



Evidence shows that activating the vagus nerve through electronic stimulation can produce a range of health benefits. "Depending on the frequency of the stimulation, we know it can turn off an asthma attack or an epileptic seizure. It can turn off a migraine or cluster headache, and it can decrease the perception of acid reflux."

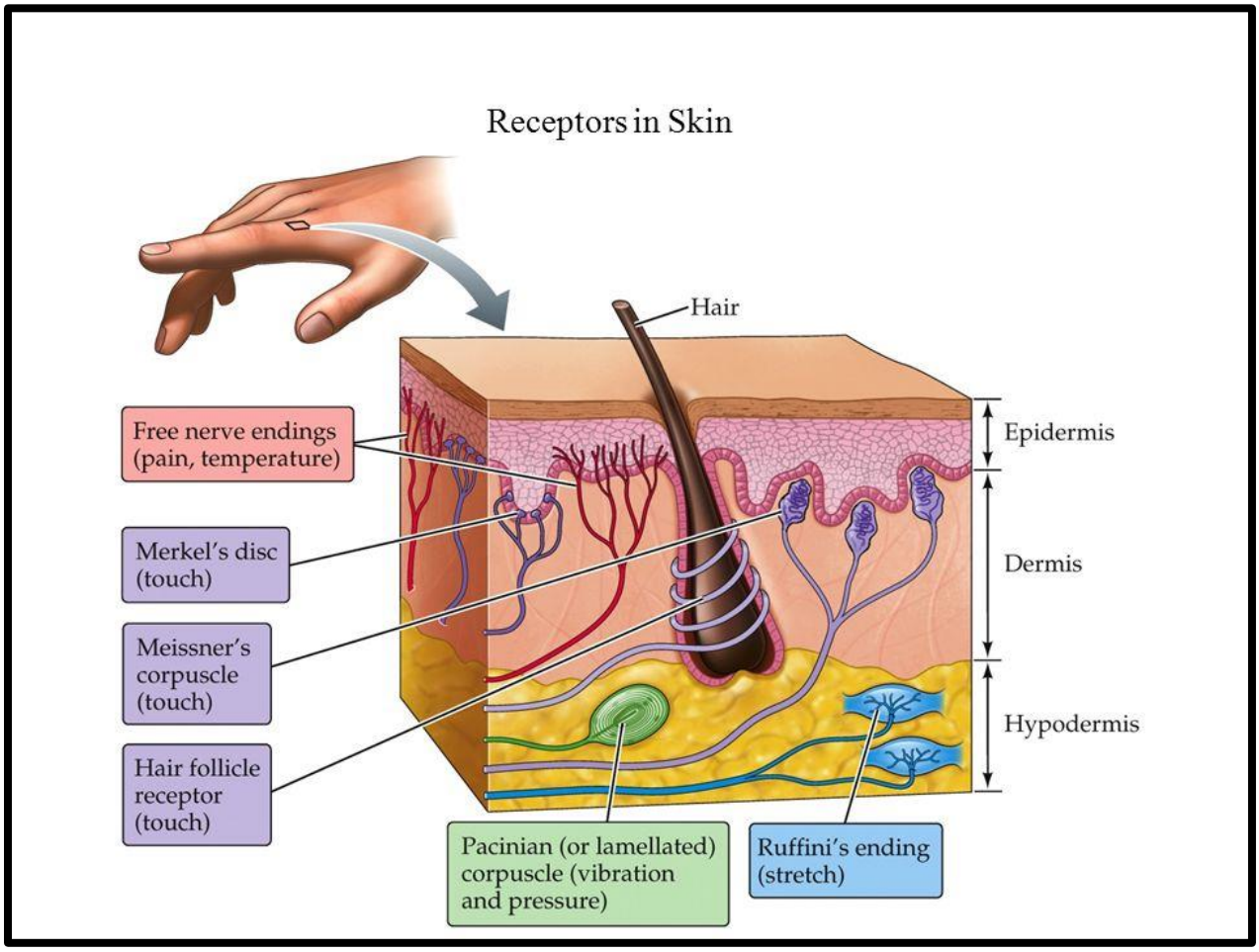
(Heid, Markham. "Science Confirms that the Vagus Nerve is Key to Well-Being." Elemental (on-line). 12-19-2019)

In the past, vagal stimulation required a surgical implant in the chest that transmitted electrical pulses directly into the vagus nerve. However, newer noninvasive devices for the treatment of migraine and cluster headaches are currently capable of stimulating the vagus nerve when pressed cutaneously against the skin of the neck.

Vagal electronic stimulation as an FDA-approved therapy is still in its infancy in terms of range and development. Although other less invasive stimulatory methods are already providing relief for a variety of stress-induced maladies, keep in mind that in our fall series quartet we are presenting proven methods that stimulate vagal activity without a device or implant that have been in practice for thousands of years, requiring only self-initiative to utilize.

Mindfulness, meditation, yoga, tai chi, deep breathing and other mind-body interventions (MBIs) enable the activation of the vagus nerve at various levels (brain, diaphragm, muscles, organs) and is also associated with heightened parasympathetic nervous system activity.

Massage, stretching, yoga and other such related activities inhibit sympathetic activity and stimulate vagal activity via pressure receptors buried beneath the surface of the skin (Ruffini's ending seen below) throughout the body that can only be reached via firm sustained pressure or a deep stretch. This is why light touching or stroking is felt as more arousing motions, while a bear hug or powerful handshake is inherently more soothing through their promotion of parasympathetic activity.



There's still a lot about the vagus nerve that science has yet to uncover but ongoing discoveries are full of promise, revealing new and more effective ways to relieve pain, inflammation, sadness and disease.

Takeaway 1:

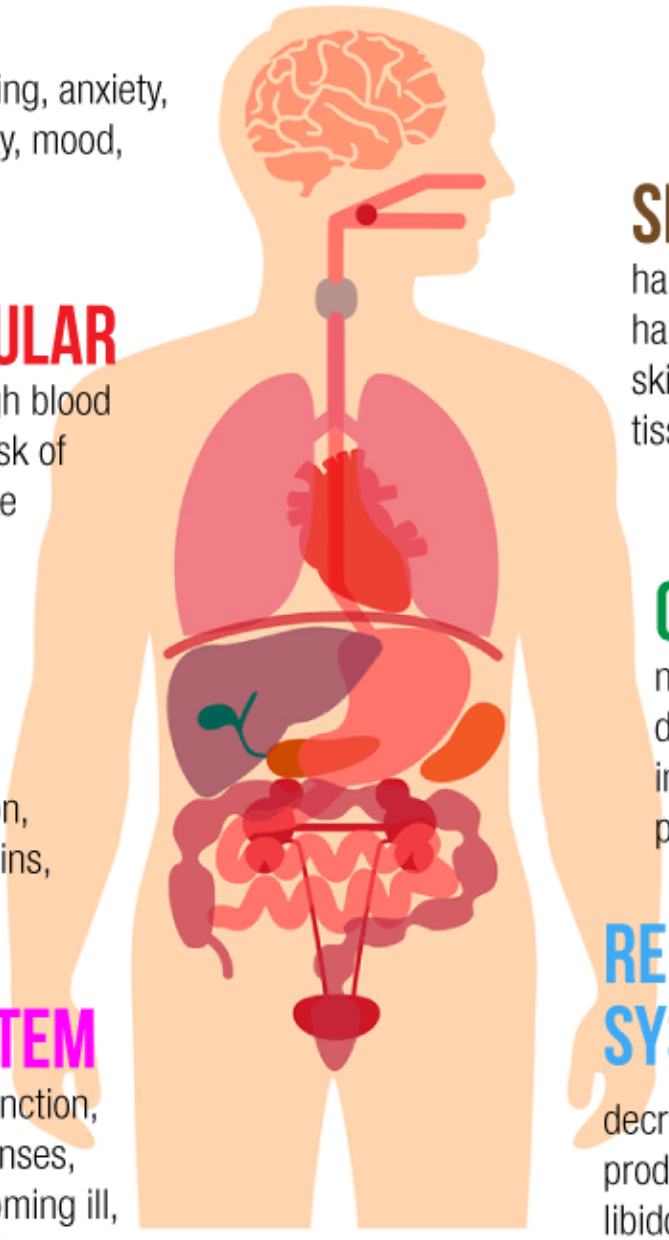
HOW STRESS AFFECTS THE BODY

BRAIN
Difficulty concentrating, anxiety, depression, irritability, mood, mind fog

CARDIOVASCULAR
higher cholesterol, high blood pressure, increased risk of heart attack and stroke

JOINTS AND MUSCLES
increased inflammation, tension, aches and pains, muscle tightness

IMMUNE SYSTEM
decreased immune function, lowered immune defenses, increased risk of becoming ill, increase in recovery time

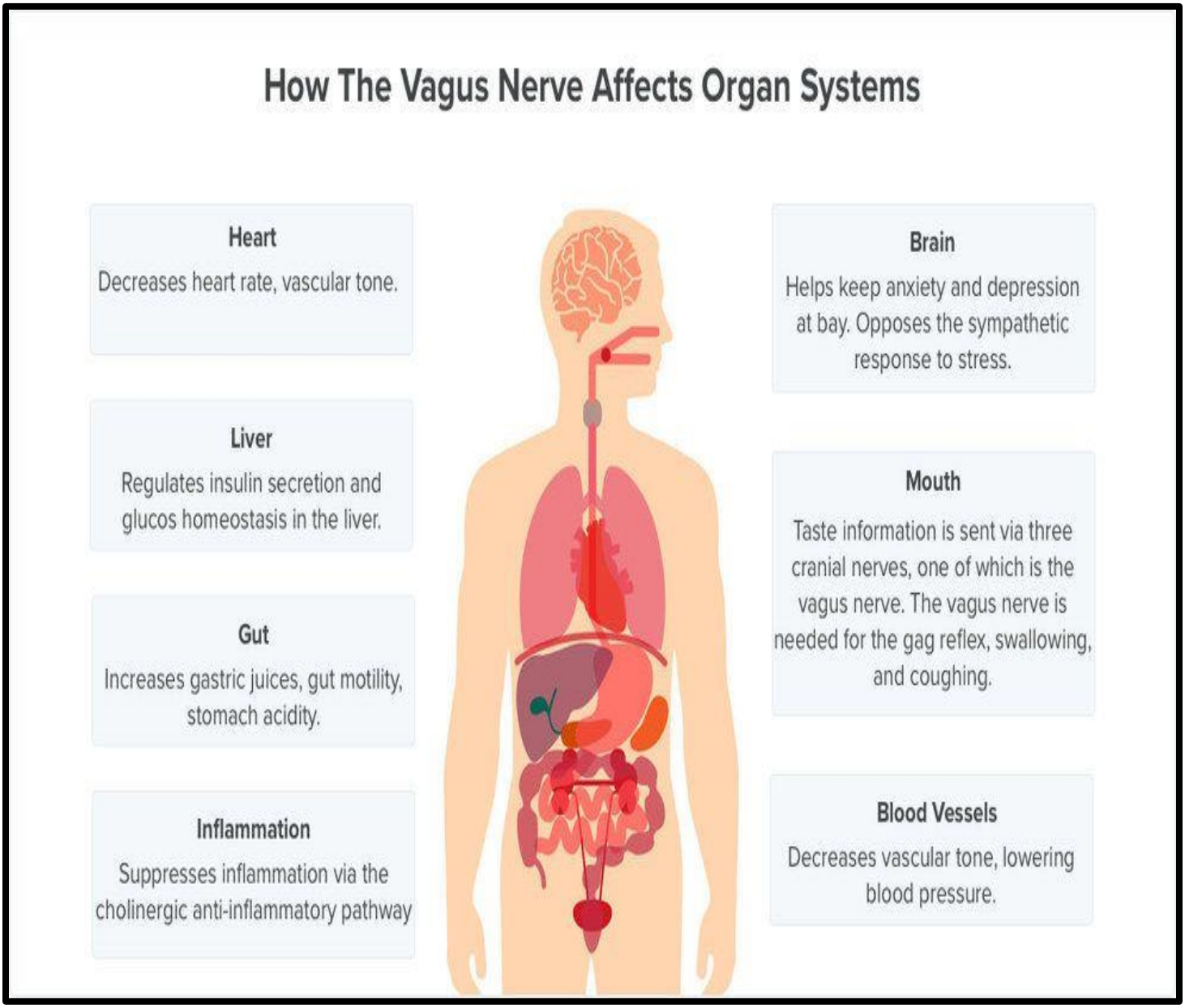


SKIN
hair loss, dull/brittle hair, brittle nails, dry skin, acne, delayed tissue repair

GUT
nutrient absorption, diarrhea, constipation, indigestion, bloating, pain and discomfort

REPRODUCTIVE SYSTEM
decreased hormone production, decrease in libido, increase in PMS symptoms

Takeaway 2:



Resources:

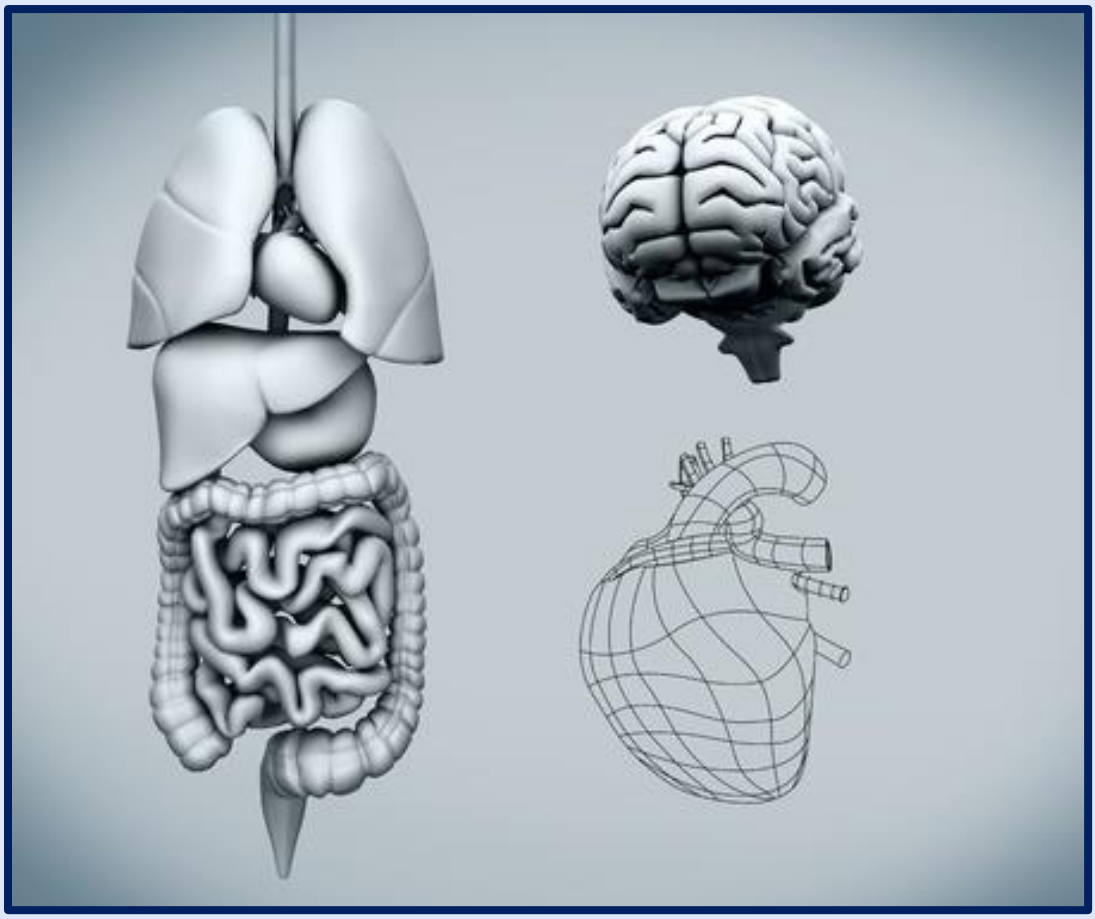
Markham Heid. 'Science Confirms that the Vagus Nerve is Key to Well-Being. December 19, 2019.

https://elemental.medium.com/science-confirms-that-the-vagus-nerve-is-key-to-well-being-c23fab90e211

Wellness Wizard —

From Gut to Brain: The Inflammation Connection

by Kelly Brogan, MD



When someone experiences fatigue, brain clouding, flat mood, PMS and/or constipation, it is diagnosed as anxiety or stress and frequently an antidepressant is prescribed that will likely be taken for the rest of a person's life. Where in this protocol have we investigated why someone is feeling that way? How have we personalized the treatment to unique biochemistry? What is the plan for side effects, including new and different psychiatric symptoms resulting from this prescription?

We haven't.

We've applied a one-size-fits-all treatment to mask symptoms without consideration for the cause.

The Immune System and Depression

Psychiatry has known about the role of the immune system in certain presentations of depression for the better part of the last century, and more recently pioneering thinkers like Maes, Raison, and Miller have written about the role of altered immune set points and inflammation in models of depression. Our immune systems are largely housed in the gut and the interplay between the gut and the brain is a complex and profoundly important relationship to appreciate.

We all recognize that anxiety or nervousness can impact our guts – most of us have had butterflies before a date or even diarrhea with extreme performance anxiety. We are just learning that this relationship is bidirectional, however, and that the gut can also communicate its state of calm or alarm to the nervous system. We think that the vagus nerve is a primary conduit of information and that inflammatory markers are the vehicles traveling this highway. Scientists have studied the "protective effects" of severing this nerve when animals are exposed to gut-related toxins that normally cause depressive symptoms. We are getting ahead of ourselves, however, because we need to better elucidate why inflammation matters, where it comes from, and why it is the universal driver of chronic illness.

How Does Inflammation Start?

When a patient feels foggy, run-down, easily overwhelmed and flat, we know that the hormones as messengers between the gut and brain are out of balance. From my perspective, however, hormone derailment is a downstream effect of cellular dysfunction from **oxidative stress and inflammation**. Inflammation stems from many sources, including hallmarks of the modern American lifestyle:

- Sugar. Sugar, particularly in the form of fructose and sucrose, spikes insulin and triggers release of inflammatory cytokines. It forms advanced glycation end-products when it binds to proteins and oxidizes lipids which form cell and mitochondrial membranes.
- Chemicals. Pesticides, environmental pollution from industrial waste, hormonally-modulating plastics, fire retardants and cosmetic additives all stimulate our immune systems to varying extents and disrupt optimal production of energy on a cellular level, particularly in vulnerable tissues like the thyroid.

- Pathogens. The aforementioned culprits, and notably herbicides, gluten grains and genetically modified foods, promote intestinal permeability, changes in our intestinal flora that facilitate growth of pathogenic bacteria, yeast, and fungus which keep our immune systems in a state of alarm.
- Stress. This catch-all term, broadly defined, represents the ultimate link between hormones and inflammation because stress, whether it's psychological or physiologic, triggers the release of cortisol. Cortisol helps to mobilize blood sugar so that you can run effectively and efficiently from that tiger chasing you. It also acts as a systemic immune suppressant, lowering levels of secretory IgA, an important body guard of the gut mucosa.

Cortisol and insulin are like stress-response sisters: high cortisol states will also contribute to insulin resistance (or high insulin and high sugar) while the cells, themselves, are starving. Insulin protects fat storage (inhibits lipolysis) and fat cells secrete their own inflammatory signals in addition to aromatizing testosterone to estradiol, contributing to states of estrogen dominance while also increasing DHEA and androgens to fuel that process (as well as acne, hair growth, and agitation).

Cortisol also inhibits the conversion of storage thyroid hormone to active hormone leading to states of hypothyroidism, even with normal-looking labs.

What Does Inflammation Do?

Once inflammation is active, it is highly self-perpetuating. These inflammatory cytokines travel throughout the body causing oxidative stress to the fragile machinery of the tissues and mitochondria specifically. In the brain inflammation serves to shunt the use of tryptophan toward production of anxiety-provoking chemicals like quinolinic acid instead of toward serotonin and melatonin. They produce a replicable collection of symptoms called "sickness syndrome," noted for its overlap with "depressive" symptoms: lethargy, sleep disturbance, decreased social activity, mobility, libido, learning, anorexia and anhedonia (inability to feel pleasure). Psychiatric researchers have observed that patients with higher levels of inflammatory markers (like CRP) are less likely to respond to antidepressants and more likely to respond to anti-inflammatories.

Where Do We Begin to Heal?

How is any of this good news? This approach to chronic illnesses (such as depression) views it as a complex non-specific symptom reflecting a state of bodily disharmony. It isn't that you were born with bad genes or low serotonin. It is far more likely that you are experiencing an unhealthy inflammatory balance, driven by cortisol dysfunction and stemming from a sick gut. We can come at modifying your system from many angles but here is a basic starter kit:

- Exercise – Burst exercise is my primary recommendation. It is the most bang for your buck in terms of cardiovascular benefit and specifically enhancing mitochondrial health because it puts a special kind of stress on the body when you move to your max for 30 seconds that then recover for 90 seconds. I recommend 8 intervals 1-3x/week.
- Meditation – The effects of stimulating the relaxation nervous system, even through listening to a 20-minute guided meditation, can be far-reaching. Enhanced genomic expression of anti-inflammatory genes and suppression of inflammatory ones were demonstrated in this study.
- Diet – I recommend a diet that controls for glycemic fluctuations through elimination of refined carbs and grains and through high levels of natural fats to push the body to relearn how to use fats for fuel. This is the brain's preferred source.
- Strategic supplementation – Natural anti-inflammatories like polyunsaturated fats (evening primrose oil and fish oil), curcumin (the active component of turmeric) and probiotics, to name a few, can help promote a synergy of beneficial effects from the above interventions.

In my practice, despite some suggestion that antidepressants may actually be having their effect through an anti-inflammatory mechanism, these medications have become obsolete. An appreciation of the role of inflammation and immunity in driving hormonal imbalance which directly impacts mood, energy and wellness is at the core of personalizing the definition of "depression." Don't be lured into the simplicity of a 1-disease 1-drug model. There's no room for *you* in that equation.

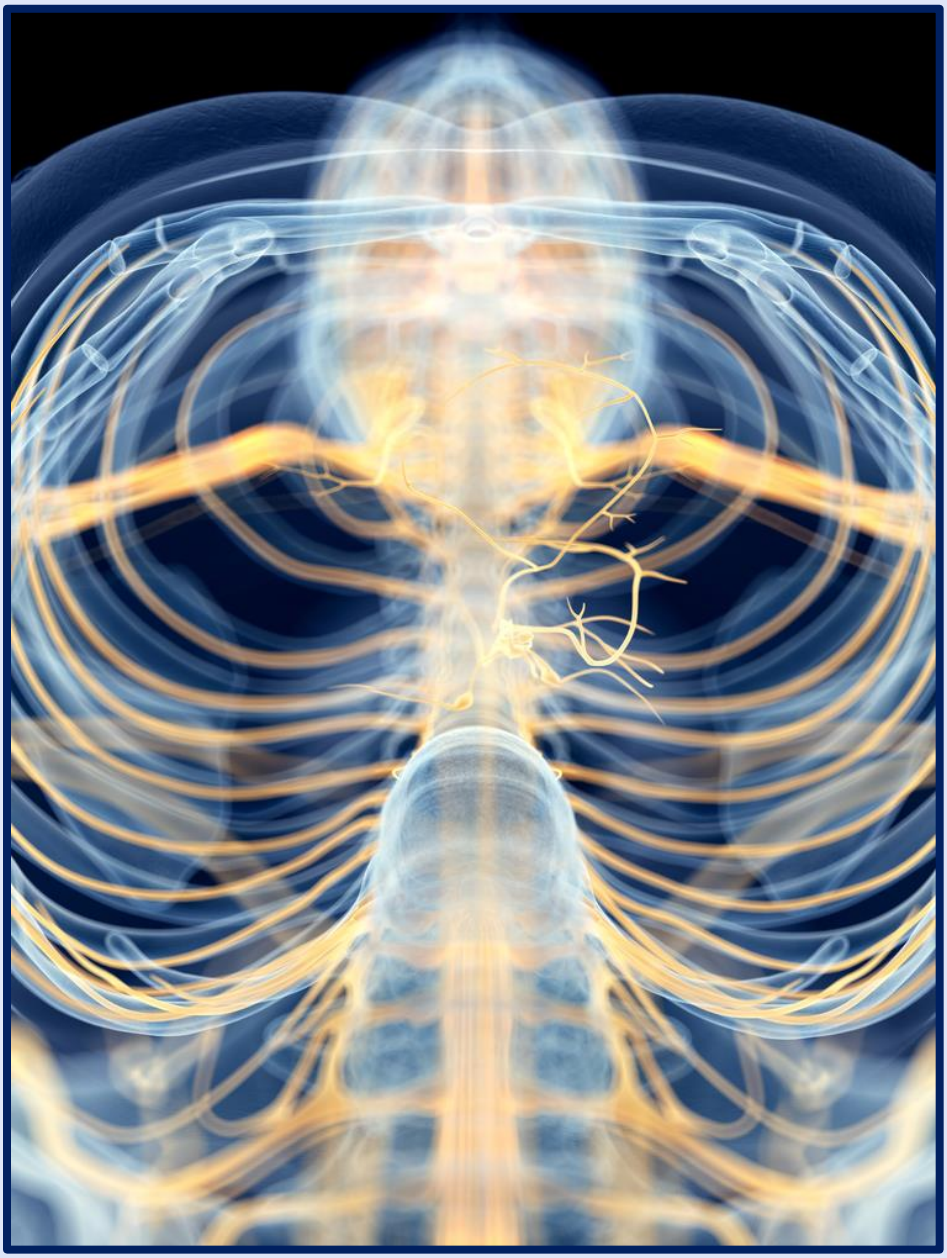
Resources:

Inflammation and its discontents: the role of cytokines in the pathophysiology of major depression. Miller et al. Biol Psychiatry. 2009 May 1; 65(9): 732–741.

Cytokines and cognition – The case for a head to toe inflammatory paradigm. Wilson et al. JAGS 50:2041–2056, 2002.

A randomized controlled trial of the tumor necrosis factor antagonist infliximab for treatment-resistant depression: the role of baseline inflammatory biomarkers. JAMA Psychiatry 70:31–41.

Counteractions: Vagal Nerve Stimulation & Stress Management Techniques



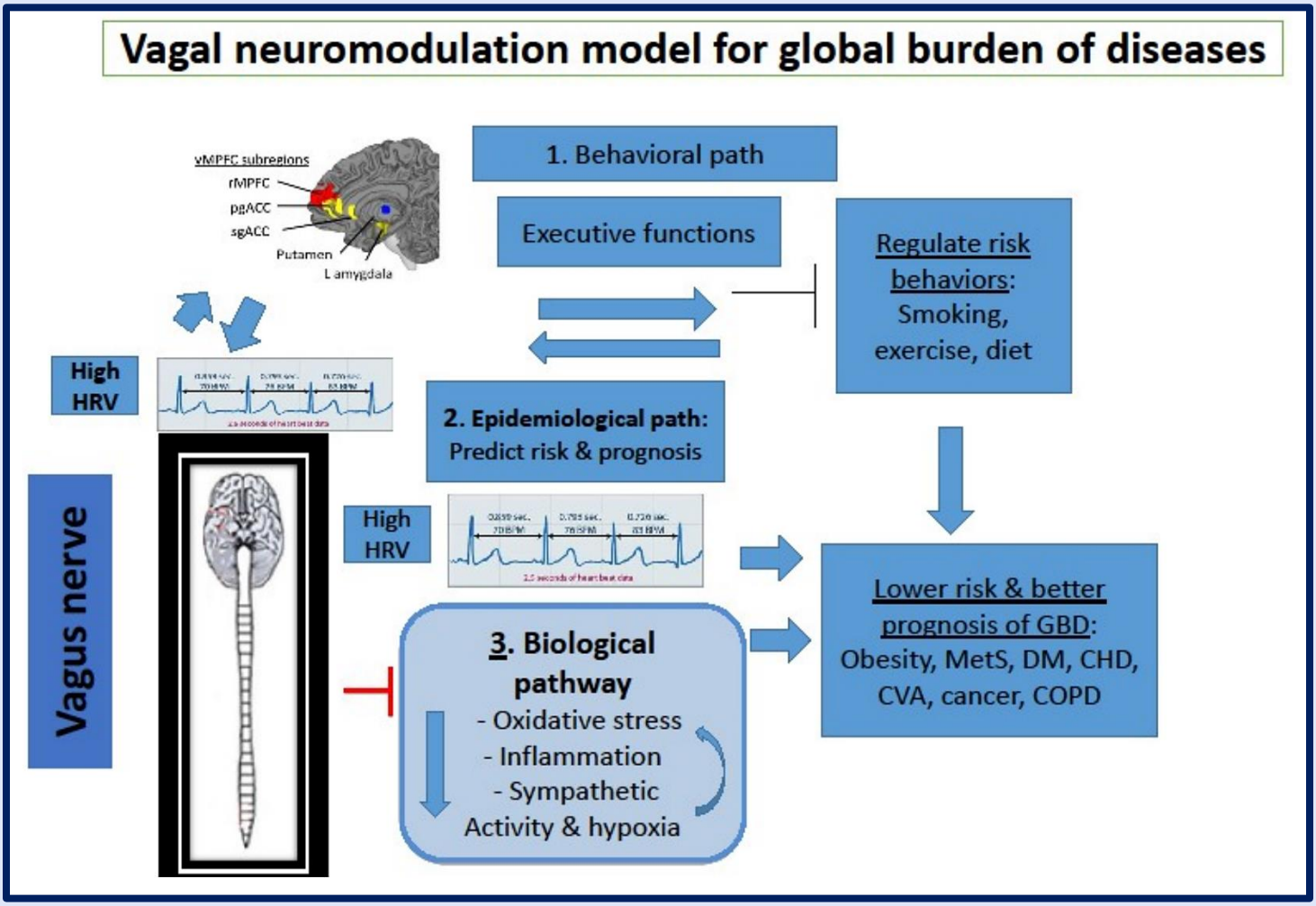
Hopefully, the numerous pieces and parts of the Fall Series are beginning to fall into place, overlapping, interconnecting, and beginning to form a pattern of more clarity. The Counteractions segment will continue to elaborate on and tie together the previous article by Dr. Kelly Brogan (Wellness Wizard) as well as the vagal nerve component of the parasympathetic nervous system.

One only has to skim through the Pew Research page on Internet and Tech for dozens of quotes from experts on the impact of digital life, how it has enriched, enhanced, enabled and connected so many in this Age of Information, through family life, work, community, social media, as a memory storehouse, travel companion, education tool, problem solver and health and wellness aid. There is an ever-growing number of individuals who are pursuing well-being in their lives by seeking to deploy smart watches and other digital devices to support their quest for improved health. Whether tracking steps, mileage, calories, sugar level, respirations, heart rate, or other body metrics, there is a quantified metric in the movement for improvement.

However, when confronting, defusing and disengaging from stress, these digital tools are much more limited in their effectiveness as they do not intervene directly at the time of the acute stress experience. Stress reduction at its root requires premeditated identification of its triggers and even more difficult behavioral changes forged through the trial and error of habitual use. Although various methods can be personalized according to personality, there is a time investment required to balance the scales that we stack on the side of stress and frequently a necessity for conscious deliberative removal to a quiet and undisturbed setting.

Luckily, the tool box is wide and varied when it comes to options if we desire to use our mind-body connections to lower our stress, cool the fires and improve our long-term health. And what is the optimal point of entry into numerous major systems, including the endocrine (hormone), cardiovascular, immune, gastrointestinal and nervous systems?

It's the autonomic nervous system (ANS), which is intertwined with and helps regulate every other system. Our mental activity has greater direct influence over the ANS than any other bodily system and if our bodies had a fire department, it would be the parasympathetic branch. When we stimulate the parasympathetic wing of the ANS, calming, soothing, healing ripples spread through the body, brain and mind. We'll now begin to explore a variety of methods to voluntarily hack into this system and reroute our bodily responses, from our mental executive functions to our biological pathways. Practiced consistently and persistently, by proactively monitoring and managing our stress, we can lower our risk and better our prognosis of development or escalation of chronic disease.



Progressive Relaxation

Relaxing engages the circuitry of the PNS and thus strengthens it. Relaxing also quiets the fight-or-flight sympathetic nervous system, since relaxed muscles send feedback to the alarm centers in the brain that all is well. When you're very relaxed, it's hard to feel stressed or upset. In fact, the relaxation response may actually alter how you're your genes are expressed and thus reduce the cellular damage of chronic stress.

You can reap the benefits of relaxation not only by initiating it in specific, stressful situations but also by training your body "offline" to relax automatically; the methods that follow can be used in either way. First, here are 5 quick ones that can be done in seconds:

- Relax your tongue, eyes and jaw muscles
- Scan your body for areas that are tense and relax them
- Feel tension draining out of your body and sinking down into the chair, floor, ground beneath you
- Run warm water over your hands (the sympathetic and parasympathetic systems fall into balance with warm water immersion)
- Touch your lips (parasympathetic fibers are spread throughout your lips; thus, touching your lips stimulates the PNS. Touching your lips can also bring up soothing associations of eating or kissing loved ones)

If you have 3 to 10 minutes, try Progressive Relaxation, in which you focus systematically on different parts of your body, working either from the feet to the head or vice versa. Depending on how much time you have, you might focus on large sections of your body—e.g., left leg, right leg—or on much smaller units, such as left foot, right foot, left ankle, right ankle and so on. You can do progressive relaxation with your eyes open or closed but learning to do it with your eyes open will help you relax more deeply if you're with other people.

In order to relax a part of your body, simply bring it into awareness; for example, take a moment right now to notice the sensations in the bottom of your left foot. Or say "relax" softly in your mind as you bring awareness to a body part. Or locate a point of a space in that part. Whatever works best.

For many people, progressive relaxation is also a great method for falling asleep.

Progressive Muscle Relaxation

First, starting with your feet, tense your muscles slowly while taking a deep slow breath through your nose.

Hold both your muscles and breath for 5 secs, and then breath slowly out through your mouth while releasing the muscle tension in your feet.

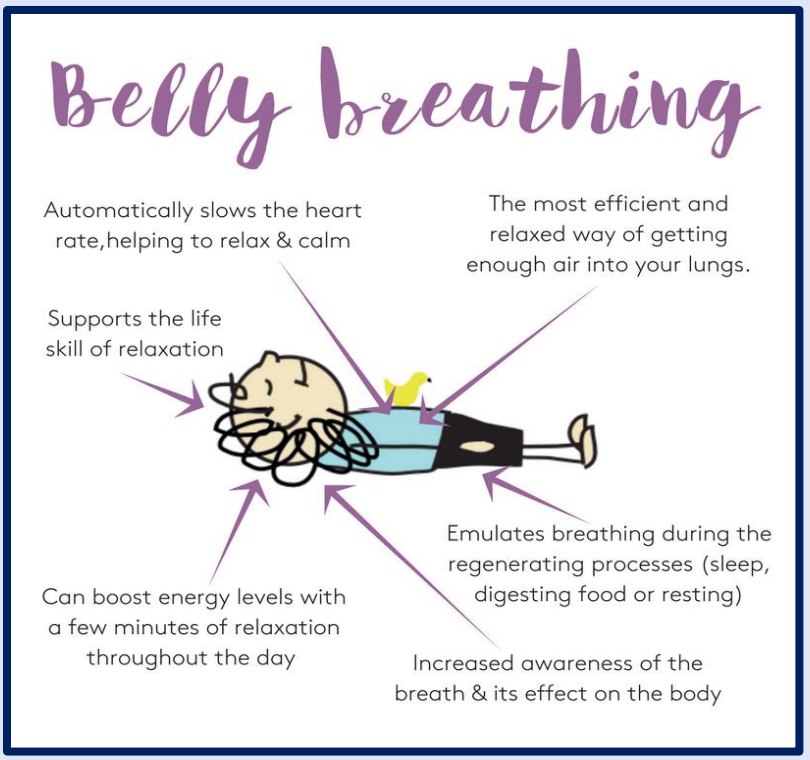
Now repeat, but with a different body part working your way up to the head.

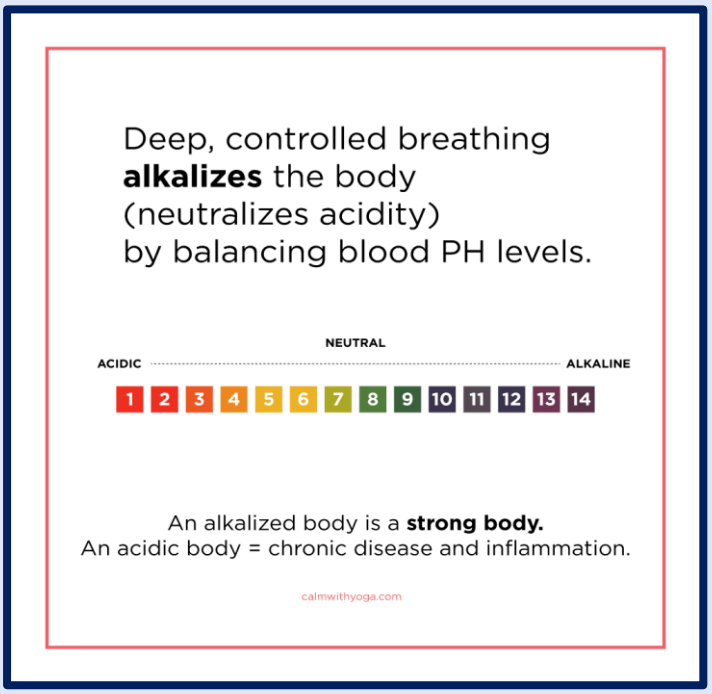
Try focusing on key spots of tension like neck, jaw and legs.

Diaphragm Breathing

"Breathing is one of the most overlooked actions; you don't need to think about it, you'll breathe anyway! It happens so unconsciously we rarely take time to stop and notice whether we are breathing effectively or not. In fact, most people do not breathe properly and only use a fraction of their lung capacity. There is a direct connection between our breath, our brains and our nervous system and when one breathes correctly, there is abundant oxygen for higher brain functions."

(Sara Piccola. Brain Health. 'Belly Breathing.')





The diaphragm is a sheet-like dome-shaped muscle beneath your lungs that helps you breathe actively and consciously working it is particularly effective for reducing anxiety. Going about our typical everyday activities, we rarely engage our full lung capacity, resulting in smaller movements of the diaphragm with tidal, or resting, breathing.

However, vital capacity breathing (or complete, full inhalations) reached by deep diaphragmatic breaths occurs through abdominal expansion with minimal chest expansion/accessory muscle engagement and exhalation a relaxed process occurring through gentle recoil of the chest wall and lungs.

Regular practice of diaphragmatic breathing draws the mental focus into what is known as the "belly brain" and has a calming effect on the mind. We are able to stimulate our vagus nerve (which runs right through the diaphragm on its way to thoracic and abdominal innervation) and expand our lungs by inhaling and exhaling larger amounts of air. When we are required to make a larger exhalation to bring the lungs back to their resting size, this stimulates the PNS, which is in charge of exhaling.

How to Do It

Place your hand on your stomach a couple of inches beneath the upside-down V at the center of your rib cage. Looking down, breathe normally and watch your hand. You'll probably see it move only a little bit and sort up and down.

Leaving your hand in place, now breathe in such a way that your hand moves out and back, perpendicular to your chest. Try to breathe into your hand with real oomph so that it travels back and forth half an inch or more with each breath. Next, try diaphragm breathing without your hand so you can use this method, if you like, in public settings.

Importance of the Breath

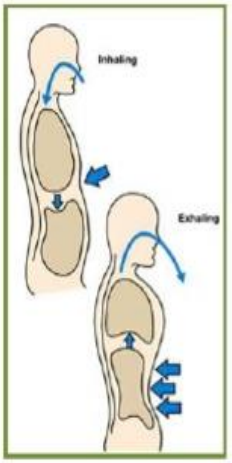
Relaxation: Relieving the body and mind from effort/work

Deep Breathing: Utilizing the diaphragm to create strong breaths which activates the parasympathetic nervous system (AKA the relaxation system of the body)

Benefits:

- Relieves physical muscle tension
- Allows the mental function to slow and relax
- Body and mind connection
- Calms and centers
- Activates parasympathetic nervous system
- Releases natural wastes, such as carbon dioxide
- Gives the internal organs a gentle massage
- Increases the oxygen to all cells
- Strengthens the lungs
- Slows your heart rate
- Lowers your blood pressure
- Increases blood flow to muscles
- Improves concentration
- Reduces anger and frustration
- Boosts confidence

(Mayo Clinic Staff, 2011.)



How Diaphragmatic Breathing Works:

Inhale: Diaphragm drops, the rib cage moves out, and air rushes into the vacuum created.

Exhale: Diaphragm pushes up, the rib cage moves in, and air pushes out.

Imagery

Although mental activity is commonly equated with verbal thought, most of the brain is actually devoted to nonverbal activities, such as processing mental pictures. Imagery activates the right hemisphere of the brain and quiets internal verbal chatter that could be stressful.

Like relaxation, you can use imagery on the spot to stimulate the PNS or do longer visualizations when you've got the time to develop imagery that will be a powerful anchor for well-being. For example, if you're feeling stressed while at work, you could bring to mind a peaceful mountain lake for a few seconds. Then, when you have more time at home, you might visualize walking around the lake and enrich your mental movie with the good smells of pine needles or the sound of children laughing.

Balance Your Heartbeat

A regular heart rate has small time differences in the intervals between each successive beat; this is called heart rate variability (HRV). For example, if your heart beat 60 times in a minute, the time between beats would average one second. But your heart is not a mechanical metronome, and the interval between beats is continually changing; it could be something like 1 sec., 1.05 sec., 1.1 sec., 1.15 sec., 1.1 sec., 1.05 sec., 1 sec., 0.95 sec., 0.90 sec., 1 sec., and so on.

HRV reflects the activity of the autonomic nervous system (ANS), which is the balance accrued between the sympathetic branch (fight or flight/SNS) and the parasympathetic branch (rest & digest/PNS). For example, your heart speeds up a little when you inhale (SNS activation) and slows down when you exhale (PNS arousal). Stress, negative emotions, physical inactivity and aging all decrease HRV. Low HRV is associated with increased coronary heart disease incidence, and people with relatively low HRV are less likely to recover after a heart attack. On the other hand, an increase in HRV represents a positive adaption or better recovery status.

An interesting question is whether heart rate variability is merely an effect of ups and downs in stress and other factors or whether changes in HRV can themselves directly cause improvements in mental and physical health. The evidence has accumulated in recent studies which support the model that chronic stress, anxiety and mood disorders lead to hypervigilance, disruptions in hormonal balances (high production of cortisol/stress hormones) and difficulty disengaging from threat detection. These in turn lead to chronic withdrawal of PNS (placing body at high alert from constantly engaged SNS) and long term reductions in HRV which place an individual at increased risk for cardiovascular disease and sudden cardiac death. Conversely, learning to increase the amount and coherence of HRV is associated with decreased stress and improved cardiovascular health, immune system function and mood.

HRV is a good indicator of parasympathetic arousal and overall well-being and we can change it directly. The HeartMath Institute has pioneered a study of HRV and developed numerous techniques, which is adapted below in a simple 3-part approach:

1) **Breathe in such a way that your inhalation and exhalation are the same duration; for example, count one ,two, three, four in your mind while inhaling and one, two, three, four while exhaling.**

2) **At the same time, imaging or sense that you're breathing in and out through the area of your heart.**

3) **As you breathe evenly through your heart, call to mind a pleasant heartfelt emotion, such as gratitude, kindness or love—perhaps by thinking about a happy time, being with your children, appreciation for the good things in your life or a pet. You can also imagine this feeling moving through your heart as part of the breath.**

Try this for a minute of longer and take note of the before/after results in your heart rate, feelings of stress/relaxation and state of mind.

Deep Pressure Stimulation

Deep tissue manipulation through stimulation of fascial mechanoreceptors (Ruffini's stretch ending) activates the PNS. Even a hug or firm handshake stimulates our pressure receptors and triggers an "all's well." Conceptually, deep pressure benefits are now recognized therapeutically and regularly prescribed as a medical treatment through massage, physical therapy, dry needling, etc. to alleviate the pain, discomfort, anxiety incurred with occupational and recreational activities; medical procedures (e.g., surgery); acute injuries and chronic conditions.

Deep pressure stimulation uses hands-on pressure to relax the nervous system to help

-relieve pain

-calm a restless body

-lessen anxiety

-improve mood

-improve sleep troubles

Recently popular on the market, weighted blankets also mimic the results of deep pressure therapy, showing positive results for several conditions, including autism, ADHD, anxiety and insomnia.

Hydrotherapy

Applying water of different temperatures to our skin can change our physiology and mood. Cold thermogenesis is the practice of exposing yourself to cold temperatures. Research has shown that it has a positive influence on health and longevity by changes to our gene expression and adipose tissue. Exposing your body to acute cold conditions, such as splashing cold water on your face, taking a cold shower or a cold dip in a body of water or ice bath will stimulate the vagus nerve. While your body adjusts to the cold, sympathetic activity declines, while parasympathetic activity increases.

Wet and cold conditions cause our more superficial blood vessels to vasoconstrict (tighten up), pushing blood away from the surface of your body and in towards the core as a means to conserve heat. As they do so, our brains and vital organs are detoxified as they are bathed with this more nutrient-rich and oxygenated blood. There is actually a physiologic change that occurs with acute cold exposure that increases testosterone, growth hormone and metabolic efficiency, providing long-lasting changes to the immune, lymphatic, circulatory and digestive systems.

Note: Jumping right into a cold tub of ice is never recommended!!!! Instead, slow adaptation by cold water face immersion and cold stimulation in the lateral neck region accrues the benefits of increasing heart rate variability and slowing overall heart rate, while leaving you more calm and refreshed. Level up slowly, graduating to cold showers for 30 seconds and incrementally increasing the duration. Regardless of your method, a cold splash can leave you feeling revitalized!

Face & Neck Vibratory Stimulation

Gargling/Singing/Humming/Chanting: Remember that the vagus nerve innervates the face and neck. Gargling, singing, humming and chanting are all activities that create vibratory stimulation that activate your vocal cords and the muscles in the back of your throat, which are connected to the vagus nerve. Incorporating these activities into your daily routine can help increase your vagal tone.

Sounds travels upward from the throat to vibrate in the brain cavity and travels downward from the throat to resonate in the chest cavity. The extended and controlled exhalations and mechanical vibrations created from these exercises increase HRV, improve memory processing of recently acquired information and furthermore are thought to provide stimulatory cues that help maintain thyroid function.

Takeaway:

Natural Techniques For Stimulating The Vagus Nerve

Exercise

Exercise is good for your brain's cognitive faculties, your mental health and your gut flow, thanks to its ability to stimulate the vagus nerve.

Deep, slow breathing

Breathing slowly and deeply activates your vagus nerve to send messages to your brain that help lower your blood pressure and heart rate.

Thoughtful meditation

You can improve your mood simply by silently repeating positive phrases about your friends and family.

Chill out

Exposure to cold dampens the fight or flight response and increases the rest and digest response, like taking a cold shower or drinking ice water.

Singing

Humming, chanting and singing are all exercises that increase heart rate variability (HRV). Higher HRV is linked with "reduced morbidity and mortality" and "improved psychological well-being and quality of life."

Singing also increases oxytocin, aka the love hormone, because it's an activity that brings people closer together.

Laughing

Laughter is a natural immune booster which, like singing, can increase HRV in a group setting.

Gargling

Gargling with water stimulates the muscles of the pallet and has been shown to improve working memory performance.

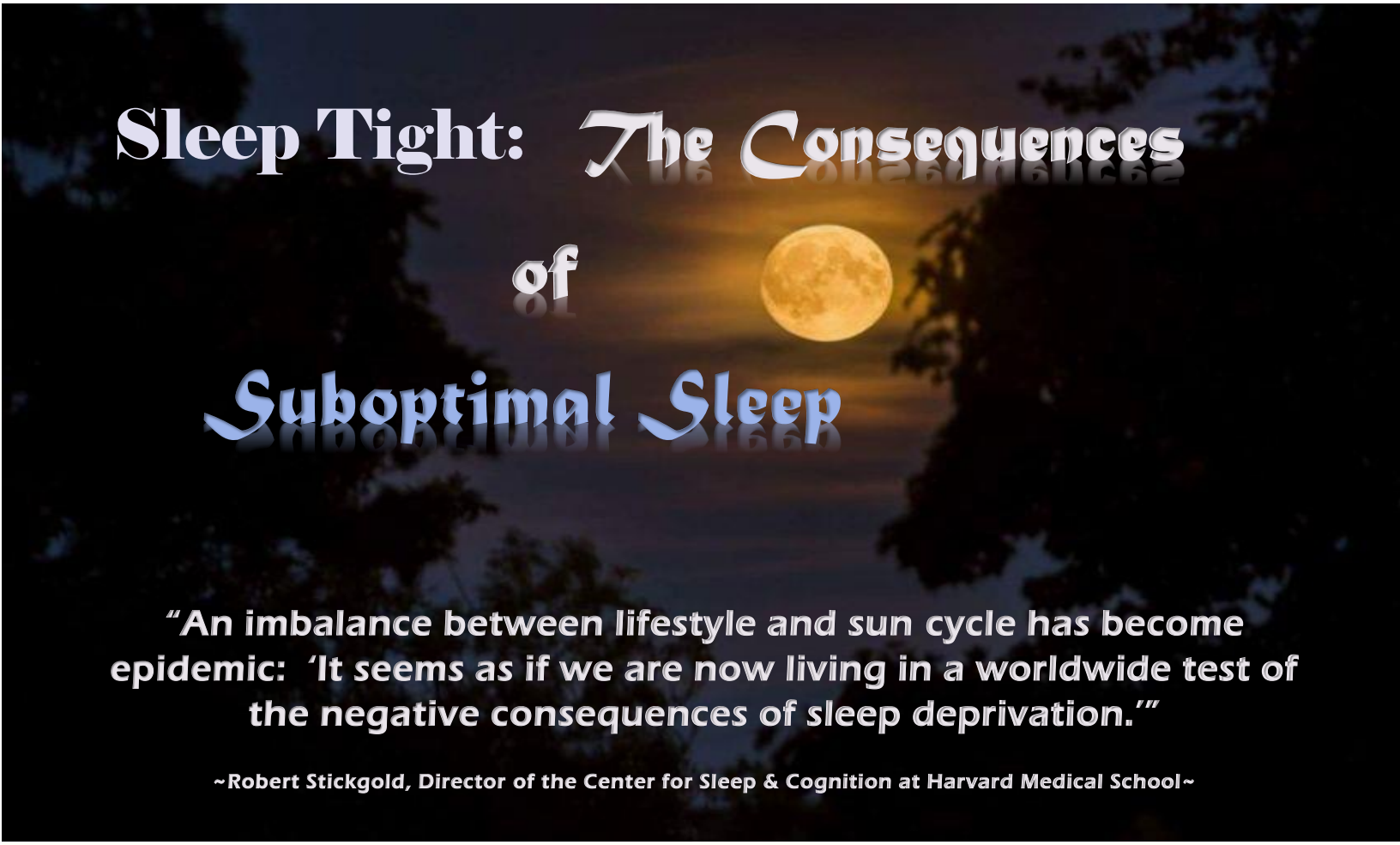
Yoga

Disciplines like yoga increase vagus nerve activity to help keep you calm and are particularly effective for people suffering from anxiety or depression.

Resources:

Sara Piccola. Brain Health. 'Belly Breathing." October 2009.

Rick Handson, Ph.D. and Richard Mendius, MD. Buddha's Brain. 2009: 79-94.



Sleep Tight: The Consequences of Suboptimal Sleep

"An imbalance between lifestyle and sun cycle has become epidemic: 'It seems as if we are now living in a worldwide test of the negative consequences of sleep deprivation.'"

~Robert Stickgold, Director of the Center for Sleep & Cognition at Harvard Medical School~

As we have previously discussed, sleeping is a basic human need, like eating, drinking and breathing and absolutely ESSENTIAL to our very survival. Like these other needs, sleeping is a vital part of the foundation for good health and well-being throughout our lifetimes. Scientists understand the value of sleep as they never have before. Laboratory and clinical studies have shown that virtually every system in the body, especially the brain, is affected by the quality and quantity of sleep we get. Yet the average American (fully one-third of us!) today sleeps less than the recommended 7 hours of sleep a night, about 2 hours less than a century ago.

In 1942 less than 8% of the population was trying to survive on 6 hours or less sleep a night; in 2017, almost 1 in 2 people is. Per an interview with leading neuroscientist Matthew Walker, "We electrified the night. Light is a profound degrader of our sleep. Second, there is the issue of work: not only the porous borders between when you start and finish but longer commuter times too. No one wants to give up time with their family or entertainment so they give up sleep instead. And anxiety plays a part. We're a lonelier, more depressed society. Alcohol and caffeine are more widely available. All these are the enemies of sleep." He also believes that we have increasingly stigmatized sleep with a label of laziness and instead hold up as a badge of honor how *little* sleep we have managed to obtain because of our busy lives.

In our restless, floodlit society, our mindset toward sleep is that of an adversary, as a state depriving us of productivity and play. We all seem to cut corners, fighting

insomnia through sleeping pills, guzzling coffee to slap away yawns, ignoring the intricate journey we're designed to take each evening. The war on sleep first began when incandescent bulbs first made it possible to voluntarily push back the dark and ever since our relentless drive to light up the night has illuminated our homes long after sunset by the glow of digital screens, as seen by the proliferation of addictive distractions in the forms of television, gaming instrumentation, home theaters, computers, IPads, Nooks/Kindles, electronic devices and smartphones.

"When it comes to motives for getting a good night's sleep we don't usually think about our body's hormones. But sleep allows many of our hormones to replenish so we have the optimal energy, immunity, appetite and coping ability to face the day's highs and lows. The activities we do during the day—from having a fight with a partner, using our iPhones at night, running in a race, to travelling overseas—also affect our hormone levels and, in turn, our quality of sleep. [Jo Abbott. The Conversation. 'Chemical messengers: how hormones help us sleep. '09-09-2015)."

Sleep is a time when several of the body's hormones are released into the bloodstream. These include growth hormone, which is essential for growth and tissue repair. Sleep helps to balance our appetite by maintaining optimal levels of the hormones ghrelin and leptin so with less sleep than normal we may feel an urge to eat more. Sleep also controls levels of the hormones insulin and cortisol so that we wake up hungry, prompting us to eat breakfast and prepared to face daytime stress.

If we get less sleep than normal our levels of prolactin may get out of balance and we can end up with a weakened immune system, difficulty concentrating and craving carbs during the day.

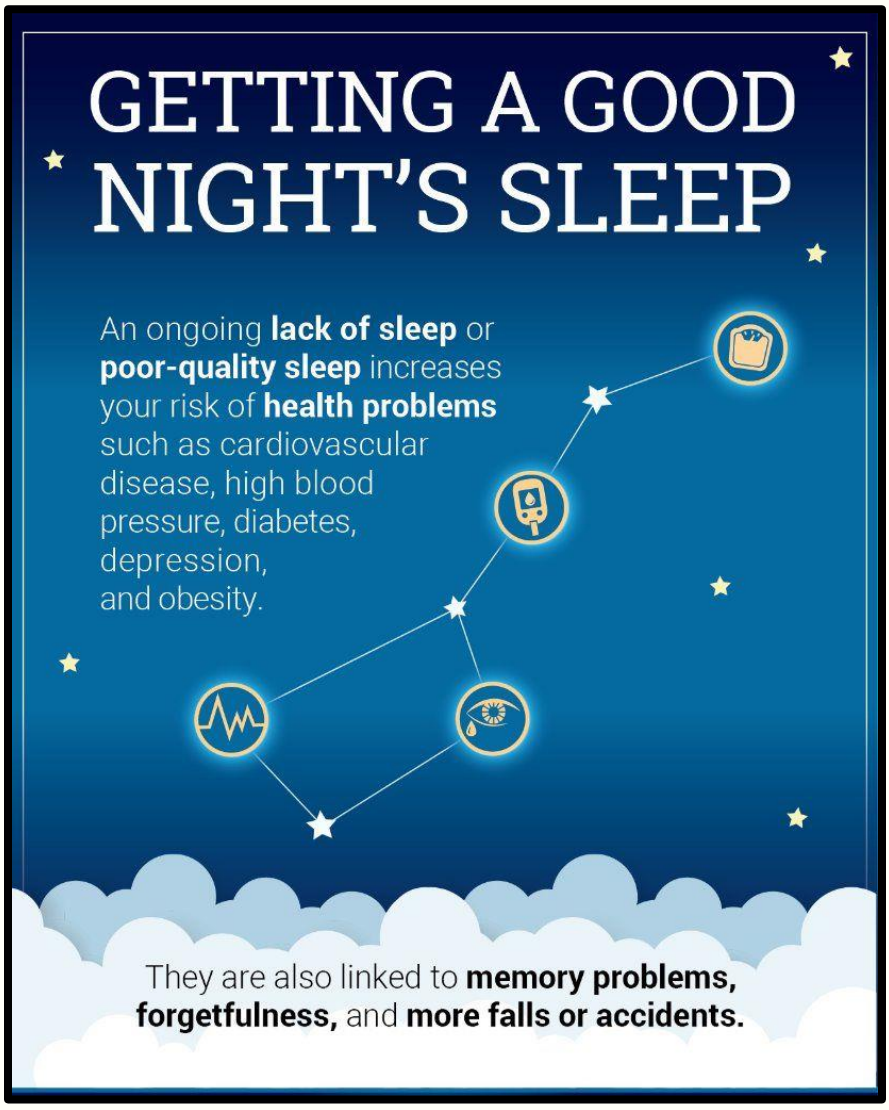
For women, fluctuating hormones accompanying menstrual cycles/pregnancy/menopause influence 1) body temperature (which can increase epinephrine & reduce REM sleep); 2) melatonin (leading to poor/interrupted sleep); and 3) estrogen/progesterone ratios (nasal swelling leading to snoring). For men, levels of testosterone are highest during sleep and require at least 3 hours to achieve its peak. Low levels of testosterone, which can occur with sleep deprivation, ageing and physical problems, have been associated with a reduction in sleep efficiency and changes to the stages of sleep men experience.

Changes in hormonal levels during sleep, including higher levels of aldosterone and antidiuretic hormone (ADH), prevent us from needing to go to the toilet. Finally, as we sleep, hormones such as oxytocin and cortisol may influence the content of our dreams. As we mentioned in the September issue, sleep is a very complicated process, impacted by dozens of moving parts and influences, and, as we shall soon see, we incur many negative consequences when we short ourselves in quality sack time.

Most people don't appreciate how much of the body's inherent rhythm is grounded in sleep habits and controlled by the brain. Our natural day-night cycle—the internal "body clock"—that controls when we're awake and when our bodies are ready for sleep follows a 24-hour repeating rhythm (aka circadian rhythm). This rhythm affects every cell, tissue and organ in our body and how they interact and work together. Two processes interact to control the rhythm: the cycling of hormonal compounds and environmental cues, such as light and darkness. The rhythm and timing of the body clock change with age as well as the patterns and types of sleep, which in turn cause changes in the needs and amounts of necessary sleep as well as length of time one is able to sleep.

Our circadian rhythms have a hand in commanding everything about us, including our hormonal releases and gut microbiome. Even our gut bacteria know whether it is day or night and influence how we sleep!! As we rest, our bodies are involved in healing/repairing our hearts and blood vessels and maintenance of a healthy balance of hormones that support healthy growth and development of cells, tissues and organ systems as well as playing a role in puberty and fertility. Without enough sleep we are unable to regulate our body temperature, our blood pressure or our moods. We are unable to recover swiftly from our injuries and our immune systems are unable to maintain their peak responses.

Sleep problems play a large role in addictive behaviors, negative emotions, poor memory and bad decision making. They diminish health and keep us from using our higher-order brains. On the other hand, good sleep is one of the most potent and undervalued tools for escaping mind and body deficiencies that interfere with work, school, driving and social functioning. It's among the easies, purest ways to reconnect with optimal health. And, it's free!



Sleep deficiency is a common public health problem in the US. Per the Centers for Disease Control and Prevention, people in all age groups report not getting enough sleep and 80 million American adults are chronically sleep deprived. Numerous research studies have demonstrated the havoc these losses wreak throughout our bodies:

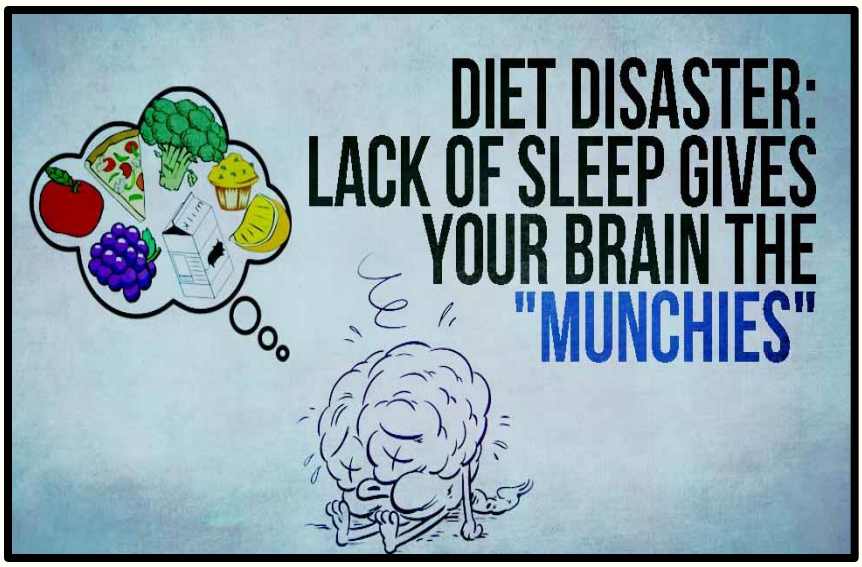
- ✓ Patients with a history of heart disease getting fewer than 6 hours of sleep a night are associated with a 29% increase in the risk of having a serious cardiac event (such as death or heart attack).
- ✓ A study of 18 thousand adults showed pre-diabetics logging fewer than 6 hours of sleep a night is associated with a 44% increase in the risk of developing full-blown diabetes, while obtaining fewer than 5 hours a night increased the risk by 68%.
- ✓ Inadequate sleep will trigger the production of inflammatory chemicals associated with depression and relatively thinner prefrontal cortex.

***Remember that coronary artery disease, prediabetes and diabetes are all inflammatory conditions. Further, these diseases are strongly associated with worsened brain function and an increased risk of developing permanent cognitive decline.

- ✓ In sleep-deprived individuals neural changes are associated with a significant increase in consumption of high-calorie foods that promote weight gain in direct relation to the amount of sleep deprivation experienced. According to the *American Journal of Clinical Nutrition*, the increased caloric intake resulting from sleep deprivation could be recorded as <u>300 extra calories a day!</u>

***There are a multitude of factors that converge to influence sleep and body composition: While pragmatically speaking lack of sleep may lead to more body fat simply because more time spent not sleeping means more time to eat and those junk food commercials start looking pretty appealing at 1 a.m., sleep deprivation causes overactivity of the amygdala and deactivation of the prefrontal cortex, increasing the chances for poor, impulsive food choices.

Combine this with hormonal deregulation resulting in lower levels of leptin and higher levels of ghrelin (creating an environment of hunger/appetite stimulation), and it's easy to see how your eyes/brain/hands reach for the *really* good snacks—the ice cream, chips, leftover pizza, baked goods—rather than throwing together a nutrient-dense power bowl in the wee hours! Moreover, consider that chronic sleep restriction results in elevated sympathetic nerve activity and a slow insulin response.



***This is the perfect storm of peripheral effects to accentuate obesity:

- Lowered glucose tolerance (GT)
- Increased sympatho-vagal balance
- Increased evening and nocturnal cortisol levels
- Lowered leptin
- Insufficient thyroid stimulating hormone (TSH)

"In case it is still unclear, the number of people who can survive on 5 hours of sleep or less without any impairment, expressed as a percent of the population and rounded to a whole number, is

Zero."

- ✓ *Sleep deprivation makes you susceptible to infection because it puts a damper on your immune system. The mechanism is 2-fold: important immune systems cells that combat infections are numerically diminished and concurrently the numbers of inflammatory molecules are increased.*

***<u>Sleeplessness undermines your whole body!</u> Anyone who regularly sleeps less than 6 hours increases their risk of ALL the following through a complex combination of biological pathways:

Excess weight and obesity

Insulin resistance, metabolic syndrome and diabetes

Memory loss, confusion and brain fog

Psychosis, depression and anxiety

Dementia and Alzheimer's disease

Lowered immune function

Cardiovascular events, including heart attacks and strokes

Cancer

Low libido and sexual dysfunction

Susceptibility to infection

Low mood and negative emotions

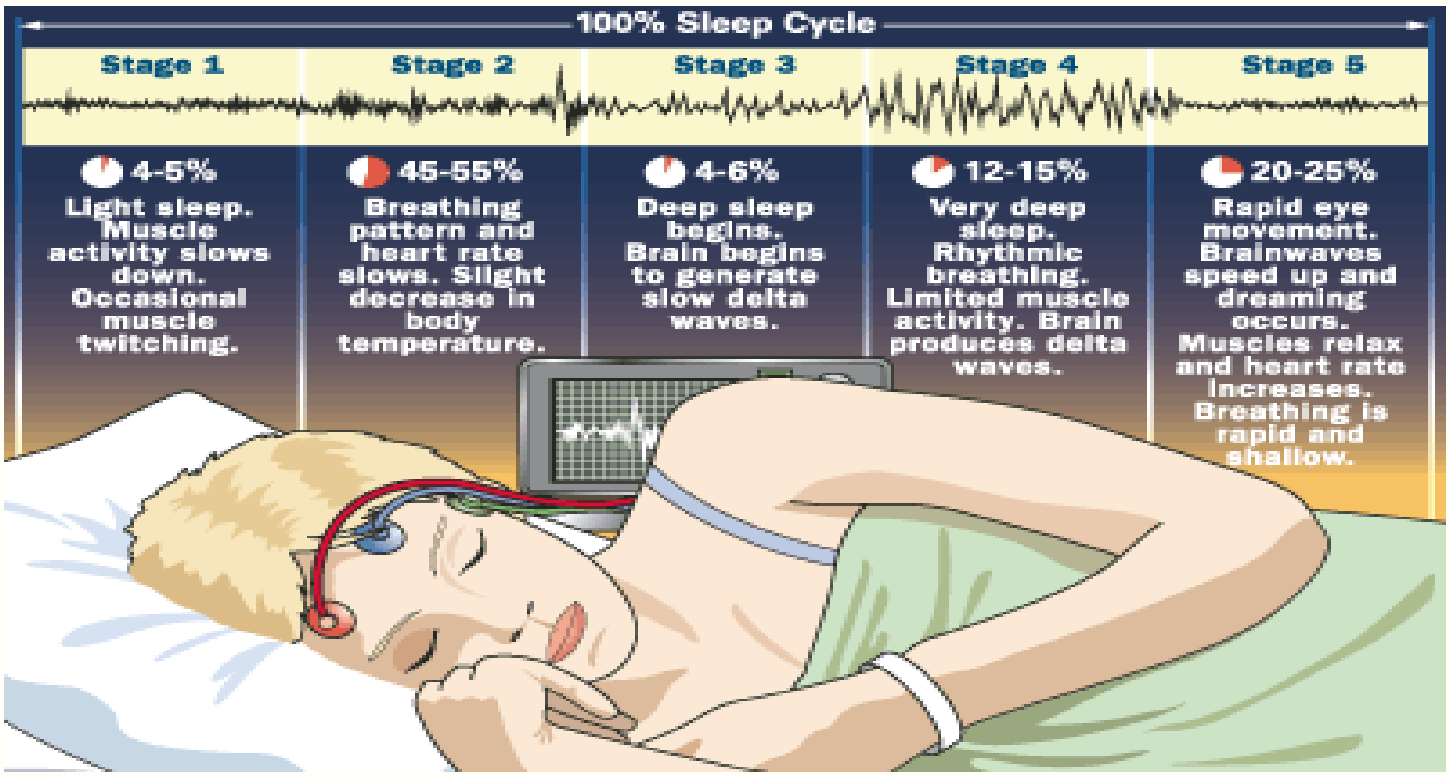
Impulsivity

Addiction

Priority of amygdala over prefrontal cortex/Disconnection Syndrome

Shortened life expectancy

Sleep by Numbers

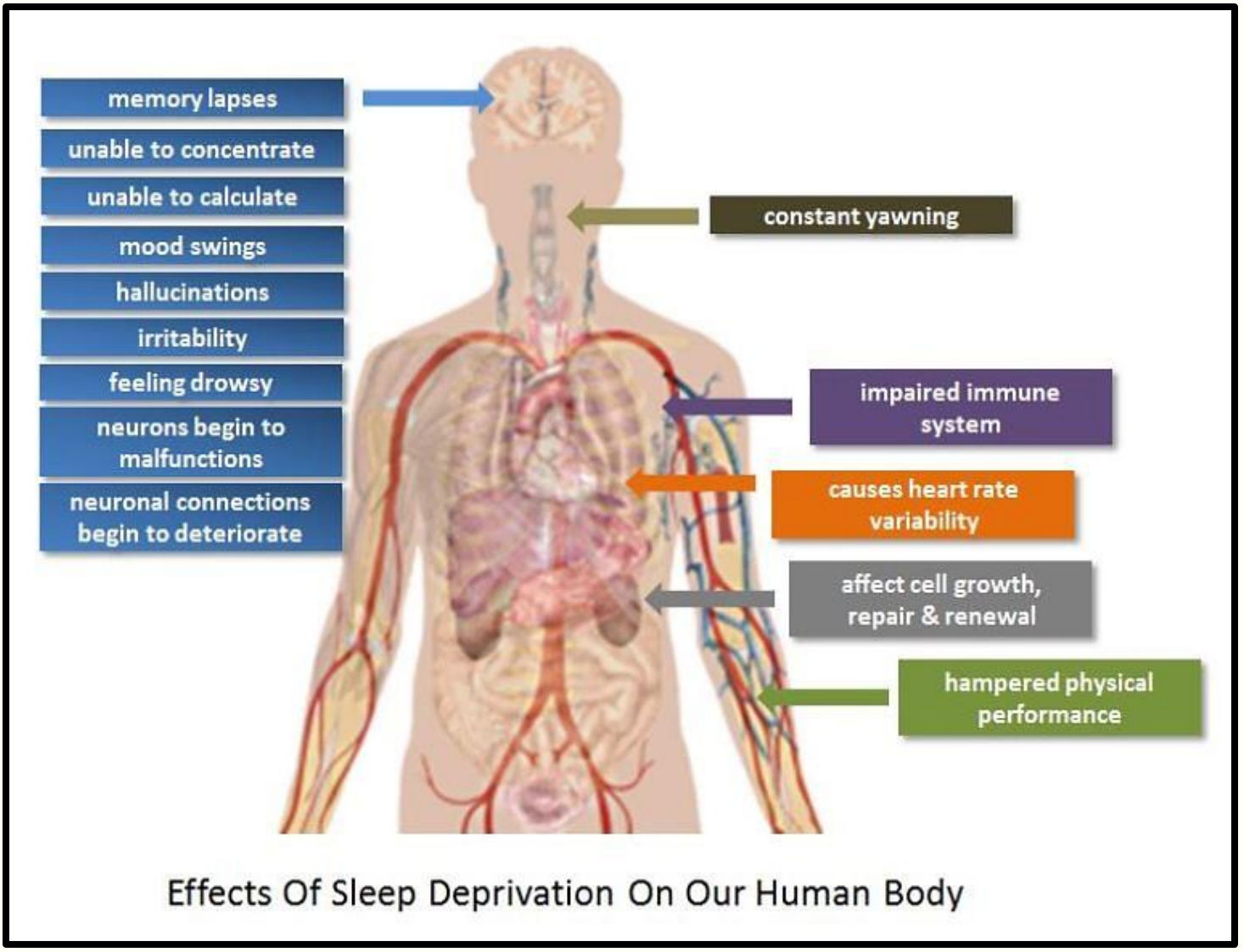


- Two-thirds of adults in developed nations fail to obtain the nightly 8 hours of sleep recommended by the World Health Organization.
- An adult sleeping only 6.75 hours a night would be predicted to live only to their early 60s without medical intervention.
- After just 1 night of only 4 or 5 hours' sleep, your natural killer cells (the ones that attack the cancer cells that appear in your body every day) drop by 70%.
- A 2013 study reported that men who slept too little had a sperm count 29% lower than those who regularly get a full and restful night's sleep.
- Brain scans reveal 60% amplification in the reactivity of the amygdala—a key spot for triggering anger and rage in our brains—in those who were sleep-deprived.

"Sleep is so vital a component to our well-being, in fact, that the World Health Organization has classed any form of night-time shift work as a probable carcinogen; lack of sleep is linked to cancer of the bowel, prostate, uterus and breast."

- Nearly 40% of adults report falling asleep during the day without meaning to at least once a month
- An estimated 50 million to 70 million Americans have chronic sleep disorders
- Adults aged 45 years or older who sleep less than 6 hours a night are 200% more likely to have a heart attack or stroke in their lifetime as compared with those sleeping 7 to 8 hours a night (part of the reason for this has to do with blood pressure: even just 1 night of modest sleep reduction will speed the rate of a person's heart, hour upon hour, and significantly increase their blood pressure).
- If you drive a car when you have had less than 5 hours' sleep, you are 4.3 times more likely to be involved in a crash. If you drive having had 4 hours, you are 11.5 times more likely to be involved in an accident.
- A hot bath aids sleep not because it makes you warm, but because your dilated blood vessels radiate inner heat and your core body temperature drops. To successfully initiate sleep, your core temperature needs to drop about 1 degree.
- The time taken to reach physical exhaustion by athletes who obtain anything less than 8 hours sleep and especially less than 6 hours drops by 10%-30%.
- There are now more than 100 diagnosed sleep disorders, of which insomnia is the most common
- Going 24 hours without sleep is similar to walking around and performing everyday functions with a blood alcohol level of 0.10%!!!

More than 20 large-scale epidemiological studies all report the same clear relationship: the *shorter* you sleep, the *shorter* your life.



Sleep and Fitness

"People will go to great length to ensure that they have a smart and well-structured exercise program, nutritional plan and supplementation regimen. Yet, they often forget about or abandon their sleep and sleep quality (Ryan Andrews, 'All About Sleep'). If you are involved in a regular fitness program, an absolute cornerstone in any physical challenge or trying to change physical appearance is sleep. Aim for 8 to 9 hours of sleep per night to optimize ability to get in shape, stay in shape and look and feel your best.

Poor-quality sleep leads to work-out woes:

- Decreased testosterone and growth hormone production, both essential for muscle growth and fat loss.
- Impaired blood sugar management so the body is less able to deal effectively with food eaten. If you are sleep-deprived your cells are hijacked, becoming less responsive to insulin, causing a prediabetic state of hyperglycemia.
- Performance declines in training, including decreased concentration/focus (leading to higher risk of clumsiness and injuries), reduced physical agility, speed, strength, stamina, recovery and slower response times.
- Decreased abilities in cognitive processes and neurobiological integration, hindering capacity for attention, assimilating information, learning and muscle memory.

Sleep on the Job

Lesser Communication:

When workers are tired, they become poor communicators. In one study, researchers noted that sleep-deprived individuals drop the intensity of their voices; pause for long intervals without apparent reason; enunciate very poorly or mumble instructions inaudibly; mispronounce, slur or run words together; and repeat themselves or lose their place in a sentence sequence.

Reduced Performance:

Performance declines frequently include increased compensatory efforts on activities, decreased vigilance and slower response time. The average functional level of any sleep-deprived individual is comparable to the 9th percentile of non-sleep deprived individuals.

Workers must notice these performance declines, right? Not quite. In fact, sleep deprived individuals have poor insight into their performance deficits. Also, the performance deficits worsen as time on task increases.

Increased Rate of Distraction: Sleep-deprived individuals have been shown to have trouble with maintaining focus on relevant cues, developing and updating strategies, keeping track of events, maintaining interest in outcomes and attending to activities judged to be non-essential. In fact, research suggests that there is a symbiotic relationship between sleep deprivation and attention-deficit hyperactivity disorder (ADHD) due to the overlap in symptoms.

Driving Impairments:

Due to federal regulations, the trucking industry is well aware of the driving impairments associated with sleep deprivation. However, plant managers are unaware of the ways in which sleep-deprived workers may be dangerously operating machinery (e.g. forklifts or dump trucks). In fact, 22 hours of sleep deprivation results in neurobehavioral performance impairments that are comparable to a 0.08 percent blood alcohol level (legally drunk in the United States).

High Amount of Errors:

The cognitive detriments of sleep deprivation increase concurrently with a worker's time on a given task, resulting in an increased number of errors. These errors include mistakes of both commission (i.e. performing an act that leads to harm) and omission (i.e. not performing an expected task), which can wreak havoc at any work facility. Errors especially are likely in subject-paced tasks in which cognitive slowing occurs, and with tasks that are time-sensitive, which cause increases in cognitive errors.

Poor Cognitive Assimilation and Memory:

Short-term and working memory declines are associated with sleep deprivation and result in a decreased ability to develop and update strategies based on new information, along with the ability to remember the temporal sequence of events.

Mood Swings:

Inappropriate mood-related behavior often occurs in outbursts, as most sleep-deprived individuals are often quiet and socially withdrawn. However, a single one of these outbursts can be enough to destroy the positive culture of a work environment and cause an HR nightmare.

These behavioral outbursts can include irritability, impatience, childish humor, lack of regard for normal social conventions, inappropriate interpersonal behaviors and unwillingness to engage in forward planning.

Greater Risk-Taking Behavior:

Brain imaging studies have shown that sleep deprivation was associated with increased activation of brain regions related for risky decision making (amygdala), while areas that control rationale and logical thinking (prefrontal cortex) show lower levels of activation. In fact, sleep deprivation increases one's expectation of gains while diminishing the implications of losses.

What does this mean for your workers? Sleep-deprived workers may be making riskier decisions, ignoring the potential negative implications, and taking gambles in scenarios in which the losses outweigh the benefits.

Inability to Make Necessary Adjustments:

Flexible thinking, preservation on thoughts and actions, updating strategies based on new information, ability to think divergently and innovation are all negatively impacted by sleep deprivation. A worker may be unable to fill a leadership role on request when sleep deprived, resulting in a frustrated management team.

Sleep in the Bedroom

Lack of Sleep Kills Sex Drive:

Sleep specialists say that sleep-deprived men and women report lower libidos and less interest in sex. Depleted energy, sleepiness, and increased tension not to mention hormonal dysfunction may be largely to blame.

For men with sleep apnea, a respiratory problem that interrupts sleep, there may be another factor in the sexual slump. A study published in the Journal of Clinical Endocrinology & Metabolism in 2002 suggests that many men with sleep apnea also have low testosterone levels. In the study, nearly half of the men who suffered from severe sleep apnea also secreted abnormally low levels of testosterone during the night.

Sleep and Danger

Lack of Sleep Causes Accidents:

Sleep deprivation has played a role in human errors linked to some of the largest and most tragic disasters in recent history: the 1979 nuclear accident at Three Mile Island, the massive Exxon Valdez oil spill, the 1986 nuclear meltdown at Chernobyl, as well as grounding of large ships, aviation accidents and others.

More prosaically, sleep loss is also a big public safety hazard every day on the road. Drowsiness can slow reaction time as much as driving drunk, leading to car crash injuries and death. The National Highway Traffic Safety Administration estimates that fatigue is a cause in 100,000 auto crashes and 1,550 crash-related deaths a year in the U.S. The problem is greatest among people under 25 years old.

Studies show that sleep loss and poor-quality sleep also lead to accidents and injuries on the job. In one study, workers who complained about excessive daytime sleepiness had significantly more work accidents, particularly repeated work accidents. They also had more sick days per accident.

It is also associated with an increased risk of injury in adults, teens and children. In the elderly, sleep deficiency might be linked to an increased risk of falls and broken bones.

Simply Put, Sleep Loss Makes You Sick & Dumb

Serious Health Problems

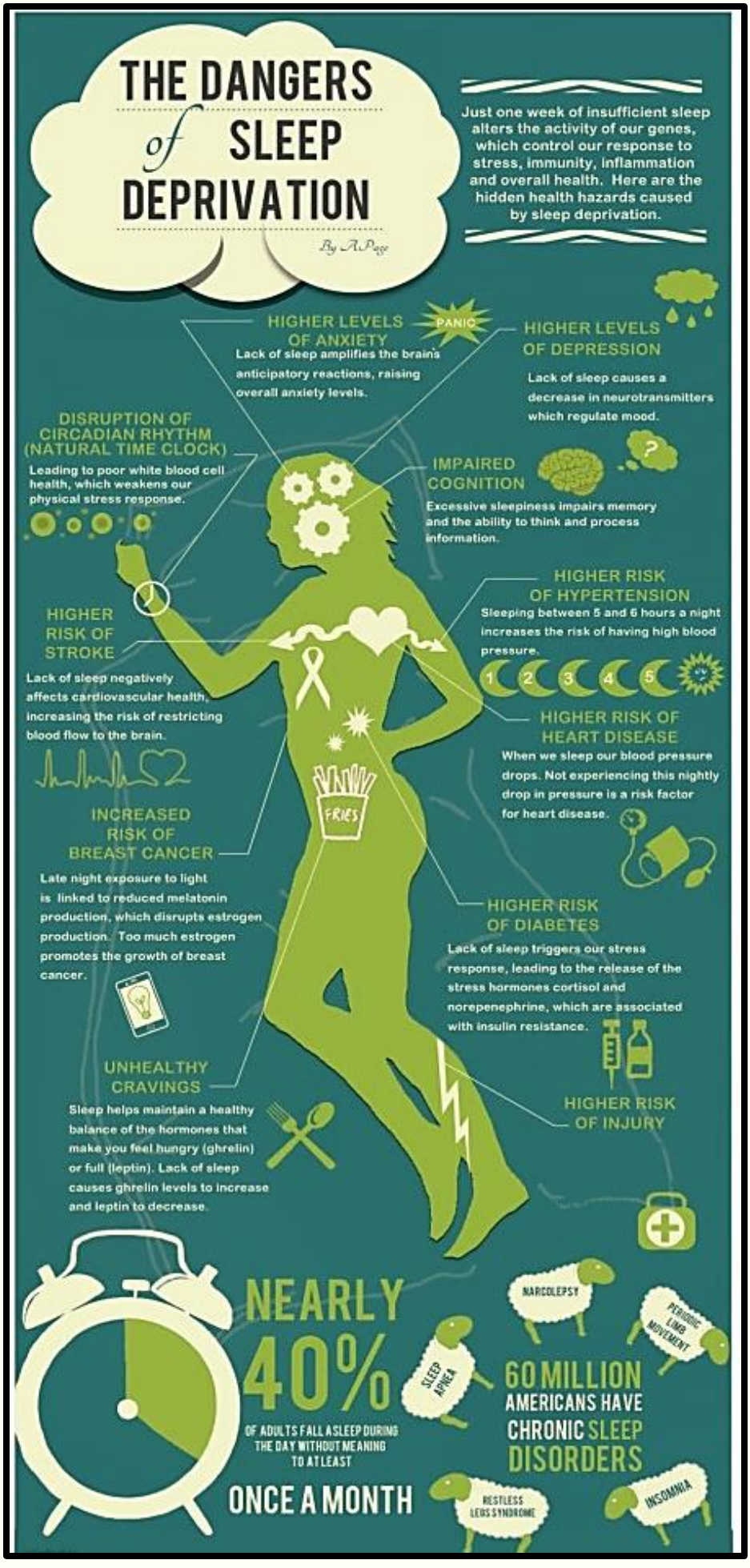
Sleep deprivation is increasing our risk of cancer, heart attack, Alzheimer's and other costly chronic diseases. Sleep loss, whether behavioral or sleep disorder related, is linked to many chronic health problems, including heart disease, kidney disease, high blood pressure, diabetes, stroke, obesity, depression, suicide and risk-taking behavior. According to some estimates, 90% of people with insomnia — a sleep disorder characterized by trouble falling and staying asleep — also have another chronic health condition.

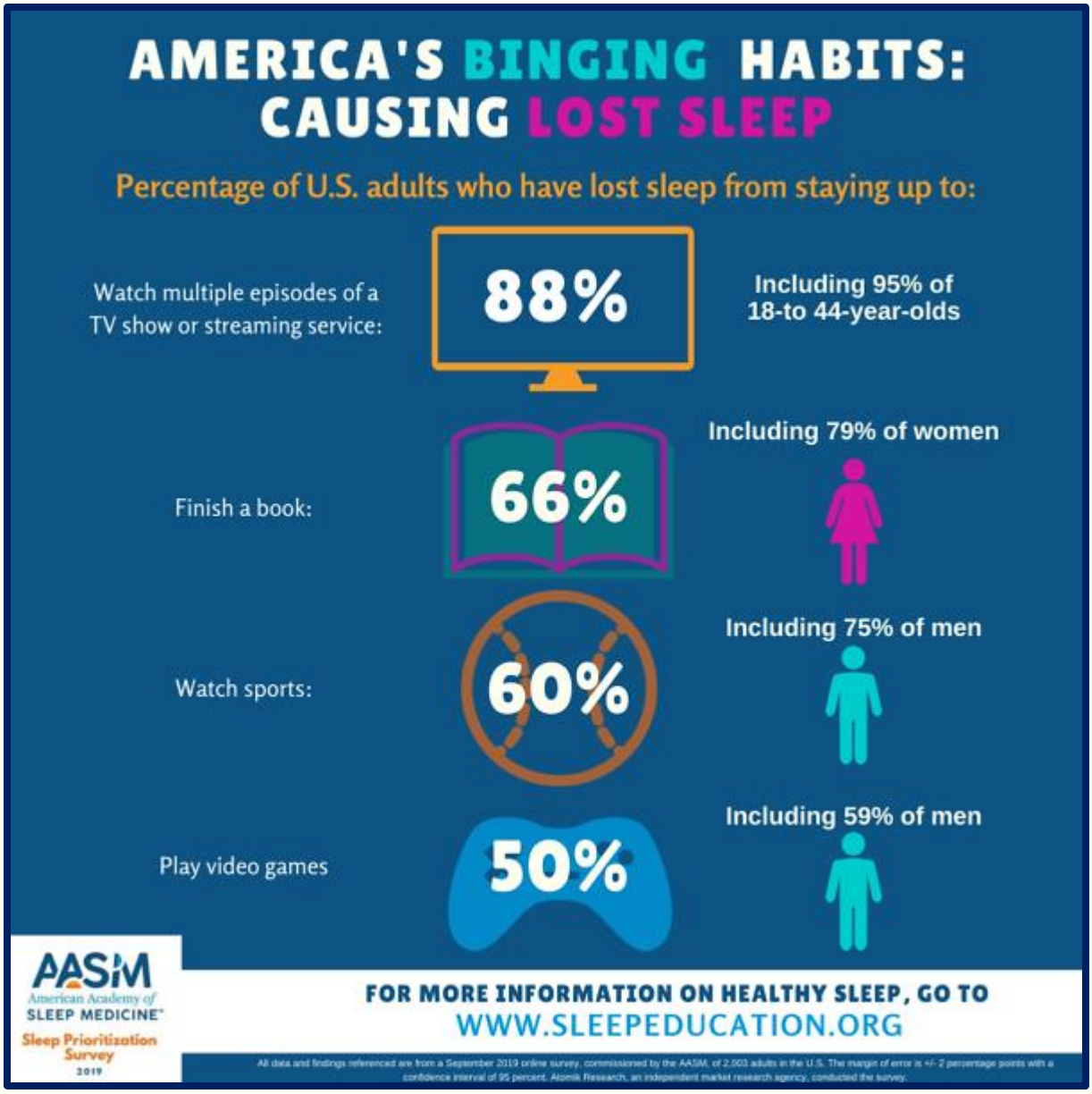
Mental Deficiencies

Sleep plays a critical role in thinking and learning. Lack of sleep hurts these cognitive processes in many ways. First, it impairs attention, alertness, concentration, reasoning, and problem solving. This makes it more difficult to learn efficiently. Second, during the night, various sleep cycles play a role in "consolidating" memories in the mind. If you don't get enough sleep, you won't be able to remember what you learned and experienced during the day.

If you're sleep deficient you may have trouble making decisions, solving problems, remembering things, controlling your emotions or behavior and coping with change. You might have trouble learning, focusing and reacting. Also, you might find it hard to judge other people's emotions and reactions. Sleep deficiency also can make you feel frustrated, cranky or worried in social situations. You may take longer to finish tasks, have a slower reaction time and make more mistakes.

Takeaway: Sleep loss due to voluntary bedtime curtailment has become so ubiquitous in modern society that it has actually been coined a "public health epidemic" by the CDC. Meanwhile, research shows in study after study that getting enough quality sleep at the right times is vital for mental health, physical health, quality of life, safety and prevention of shortened lifespans.


THE DANGERS of SLEEP DEPRIVATION
By A.Page
Just one week of insufficient sleep alters the activity of our genes, which control our response to stress, immunity, inflammation and overall health. Here are the hidden health hazards caused by sleep deprivation.
HIGHER LEVELS OF ANXIETY
PANIC
Lack of sleep amplifies the brains anticipatory reactions, raising overall anxiety levels.
HIGHER LEVELS OF DEPRESSION
Lack of sleep causes a decrease in neurotransmitters which regulate mood.
DISRUPTION OF CIRCADIAN RHYTHM (NATURAL TIME CLOCK)
Leading to poor white blood cell health, which weakens our physical stress response.
IMPAIRED COGNITION
Excessive sleepiness impairs memory and the ability to think and process information.
HIGHER RISK OF HYPERTENSION
Sleeping between 5 and 6 hours a night increases the risk of having high blood pressure.
1 2 3 4 5
HIGHER RISK OF STROKE
Lack of sleep negatively affects cardiovascular health, increasing the risk of restricting blood flow to the brain.
HIGHER RISK OF HEART DISEASE
When we sleep our blood pressure drops. Not experiencing this nightly drop in pressure is a risk factor for heart disease.
FRIES
INCREASED RISK OF BREAST CANCER
Late night exposure to light is linked to reduced melatonin production, which disrupts estrogen production. Too much estrogen promotes the growth of breast cancer.
HIGHER RISK OF DIABETES
Lack of sleep triggers our stress response, leading to the release of the stress hormones cortisol and norepenephrine, which are associated with insulin resistance.
UNHEALTHY CRAVINGS
Sleep helps maintain a healthy balance of the hormones that make you feel hungry (ghrelin) or full (leptin). Lack of sleep causes ghrelin levels to increase and leptin to decrease.
HIGHER RISK OF INJURY
NEARLY 40%
OF ADULTS FALL ASLEEP DURING THE DAY WITHOUT MEANING TO AT LEAST
ONCE A MONTH
NARCOLEPSY
PERIODIC LIMB MOVEMENT
SLEEP APNEA
60 MILLION AMERICANS HAVE CHRONIC SLEEP DISORDERS
RESTLESS LEGS SYNDROME
INSOMNIA



Resources:

*Excerpts within this article taken from the following texts:

Jo Abbott. Chemical Messengers: How hormones help us sleep (on-line article). The Conversation. September 09, 2015.

Ryan Andrews. 'All About Sleep.' https://www.precisionnutrition.com/all-about-sleep

Michael Finkel. The Science of Sleep. National Geographic. August 2018, pp. 40-77.

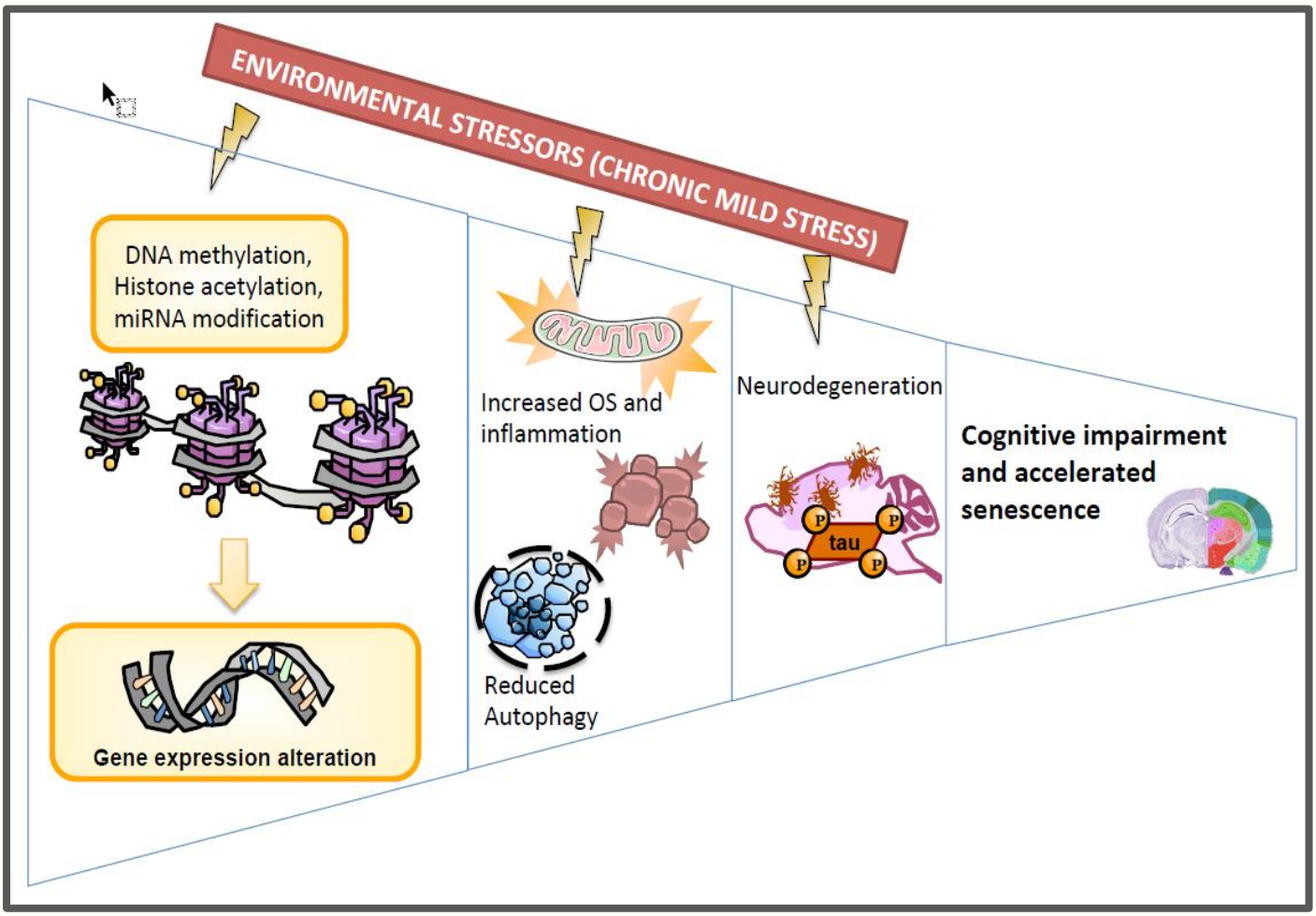
Camille Peri. '10 Things to Hate about Sleep Loss.' https://www.webmd.com/sleep-disorders/features/10-results-sleep-loss

Matthew Walker, Sleep Deprivation and Deficiency. 'The shorter your sleep, the shorter your life: the new science of sleep.' https://www.nhlbi.nih.gov

Ten Dangers of a Sleep-Deprived Workforce. https://www.circadian.com/blog/item/19-10-dangers-of-a-sleep-deprived-workforce.html?tmpl=component&print=1

Wellness Challenge: Identifying Stress Triggers

As we have seen throughout the October newsletter, there is not 1 corner of our body that stress leaves unaffected; from the genetic material encapsulated in our cells to the structure and function of our brain itself, stress hits us where it hurts.



It is quite evident, then, how important it is to engage in a mindful survey to identify triggers of stress in your life every once in a while. Our stressors change through events in our life, ages of our life and by the choices we make big and small throughout a day, week, month or year. Whether extrinsic (derived from illness/death, family, job, money concerns), intrinsic (resulting from lifestyle choices in diet/nutrition, sleep habits, social interaction, time management, activity, work/relaxation behaviors) or manufactured drama, it behooves us all to pay attention and notice when our stress waxes and wanes, what is triggering extra stress and make an effort to eliminate, modify or learn ways to deal with our stress. Before our stress deals with us.

In upcoming weeks, either during meditation or in a time you typically are able to sit in a quiet place to mull over your thoughts, take the opportunity to become mindful of possible stressors in your life or daily routines. With a clear and calm mind, attempt to remember the last few times you became aware that you were under a great deal of stress. This may have been an intense and short-lived flare or a long slow buildup of intensity or any combination in between. Now take a moment to identify those situations, events, people and/or combinations of factors that make you anxious, scared, angry, overwhelmed, frustrated and/or have built feelings of rising interior pressure.

After mentally isolating moments of your stress response, take a few moments to think on the following: Do you have a default response in negativity to a given stressor? Do you have a specific trigger that evokes a predictable reaction? Is there a particular pattern in your life that you continue to play out which evokes a predictable cyclical stress response? Can you pinpoint the physical sensations which mark the onset of your stress response?

Continue to be mindful of your responses and behaviors over the course of your usual daily rhythms and routines. Practice answering these questions without judging, interfering or trying to repress any of the thoughts, behaviors or responses you have. Although this is certainly more difficult done in the heat of the moment, by becoming a dedicated witness and consistently observing from our own personal sideline, we can consciously create objective awareness of our own patterns of repetition and negative spirals.

When we begin to catalog our triggers and the cascades of subsequent emotional and physical reactions that form each stress response, we are able to form alternative endings, interrupt our automatic fight-or-flight responses and divert our energies to healthier outcomes. Once our triggers and stress responses are recognized, we can capitalize on various mechanisms that present themselves to "cool our fires from stress." These may take various forms:

We may begin a practice of deep breathing to invoke our parasympathetic network and bring more oxygen in to calm when we feel ourselves reaching a more frenzied state.

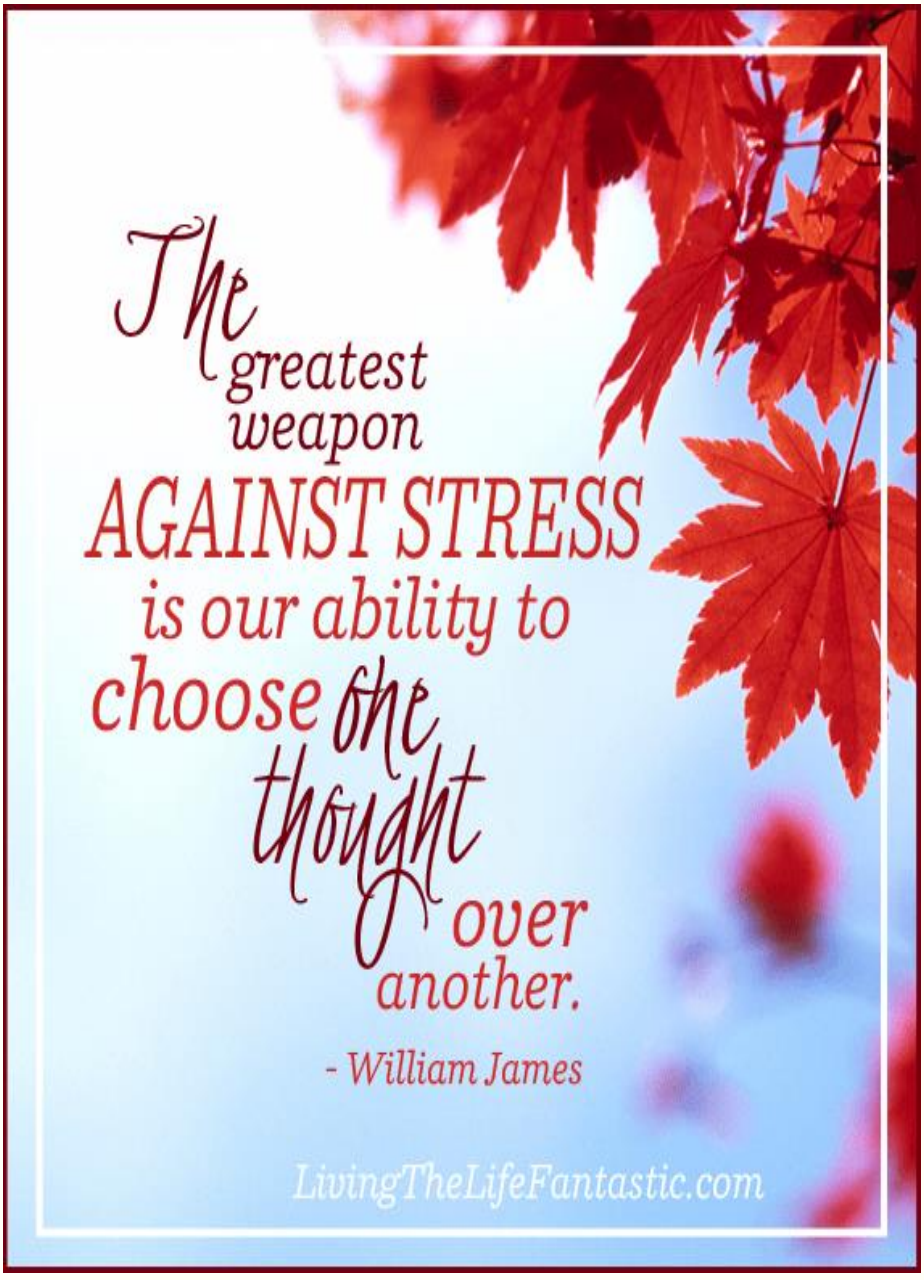
We may make the effort to enhance our proactive skills in time management by preplanning, thinning our schedules and/or reprioritizing our To-Do list necessities. In doing so, we may avoid situations where we are simply reacting to given stressors created by last-minute scenarios; e.g., by pressure to make impossibly tight deadlines or by attempting to squeeze in too much in too short of time.

We may consciously begin to differentiate our stressors as only an inconvenience of daily living in the grand scheme or as a real problem with ramifications that carry weight, thus mitigating the amount of our emotional energy investment and expenditure. Or we may choose to address our triggers head on, releasing negativity by repeating such phrases as…

"No, I refuse to give in to this today."
"No, I am not jumping down this rabbit hole again."
"No, I don't choose to invest in the time it takes to spin out and then resettle before moving on."

We may decide upon various forms of meditating, utilization of imagery and visualization, designation of more time to spend on nature walks and sun exposure, prioritization of more quality time designated for sleep, expansion of our physical activities or a combination of any or all of these.

Ultimately, regardless of which method(s) we employ to diffuse our situation, it is up to us to recognize the toll stress takes on our mood, our physical bodies, our emotional output, our energy expenditure, our psychological outlook and our loved ones that share space around us.



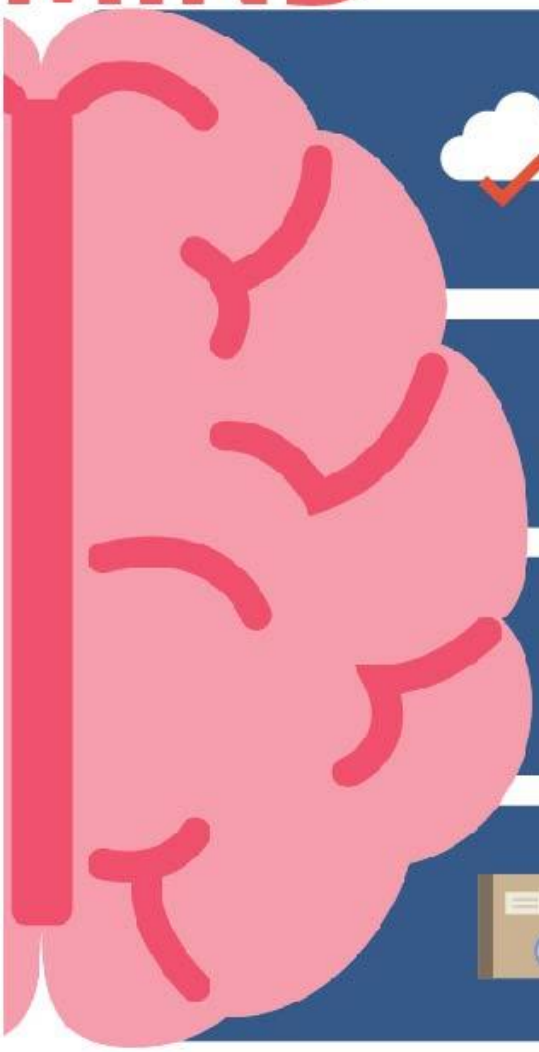
It is up to us to recognize that the price we pay for sustaining our 'fight or flight'-inducing lifestyles may be higher than we expect: costly in monetary terms, quality of life and in health risks, which in the end may simply not be worth it.

It is up to us to seek an alternate lifestyle; to find steps to modify and mitigate our behaviors; to choose another path that supports and serves us better.

It is up to us to carry our intentions forward so that our daily choices reflect a healthier and happier us.

HOW TO DEAL WITH STRESS AND ANXIETY

MIND



Accept that you cannot control everything.

Put your stress in perspective: is it really as bad as you think?

Do your best.

Instead of aiming for perfection, which isn't possible, be proud of however close you get.

Maintain a positive attitude.

Make an effort to replace negative thoughts with positive ones

Learn what triggers your anxiety.

Is it work, family, school, or something else you can identify? Write in a journal when you're feeling stressed or anxious, and look for a pattern.

For mental health information and resources visit:
www.mentalhealthamerica.net

MHA Mental Health America

ADAA

HOW TO DEAL WITH STRESS AND ANXIETY

BODY

Limit alcohol and caffeine.

Alcohol and caffeine can aggravate anxiety and trigger panic attacks. Instead, drink water.

Eat well-balanced meals.

Do not skip any meals and always keep healthy, energy-boosting snacks on hand.

Get enough sleep.

When stressed, your body needs additional sleep and rest. It's important to get 8 hours of sleep per night!

Exercise daily.

Exercising can help you feel good and maintain your health

For more mental health information and resources visit:
www.mentalhealthamerica.net

MHA Mental Health America

ADAA

HOW TO DEAL WITH STRESS AND ANXIETY

ACTION

Take deep breaths.

Inhale and exhale slowly throughout the day when you are feeling stressed.

10

Slowly count to 10.

Repeat, and count to 20 if necessary.

Give back to your community.

Volunteer or find another way to be active in your community, which creates a support network and gives you a break from everyday stress.

Take a time out.

Practice yoga, listen to music, meditate, get a massage, or learn relaxation techniques. Stepping back from problems helps clear your head.

Get help online.

If you are struggling with stress and anxiety in your life, consider taking a mental health screen. Screening is an anonymous, free, and private way to learn about your mental health. www. mhascreening.org

Talk to someone.

Tell friends and family you're feeling overwhelmed, and let them know how they can help you. Talk to a physician or therapist for professional help.

For mental health information and resources visit:
www.mentalhealthamerica.net

MHA Mental Health America

ADAA

Editor's Note:

Wishing all of our Readers a Safe,

Festive and very Happy Halloween!!