

Power of I Wellness News

Newsletter 9  September 01, 2020

Wellness Word — Welcoming the Light

Through the spring and summer months we have examined how the elements of diet/nutrition work as one of the cornerstones that can either trigger inflammation or bolster wellness. We have introduced contributing factors that feed the flames of our inflammatory responses and emphasized the significance inflammation holds when prioritizing disease prevention. For the remainder of the year we will expand our focus to other aspects of wellness that provide vital input to our overall health picture:

Sunlight, Stress & Sleep.

As always, these topics can be read as stand-alone articles month-to-month but we will be building onto the concepts previously covered in 2020 and the Sept-Oct-Nov-Dec newsletters will be interlinked as a series quartet.

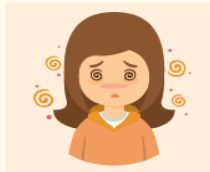
As usual, we will present a comprehensive sweep, with close-up reviews into hormonal, neural and physiological components and their subsequent integration into systemic function; discuss consequences of imbalances and resulting symptomatology of dysfunction; as well as

providing suggestions for development of methods and habits to assist in acquiring a more balanced wellness picture.

ROOT CAUSES OF INFLAMMATION

STRESS

To reduce stress, it's important to focus on getting at least 10 minutes of stress reduction into your day every day. This can include meditation, a brisk walk, or yoga.



BEING OVERWEIGHT

Being overweight or obese can be a major trigger of inflammation. Obesity puts your body into an inflammatory state which then puts you at an increased risk of developing depression.



VITAMIN DEFICIENCIES

Vitamin D helps with reducing certain inflammatory markers in the body which have been linked to depression.



LACK OF SLEEP

Strive to get at least eight hours of uninterrupted sleep per night and try to get into bed before 10 PM.



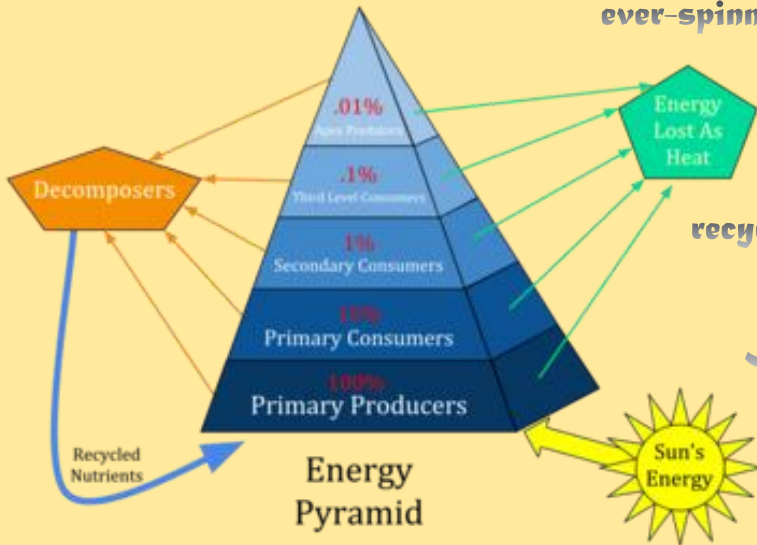


Let the Sunshine In

Sun worship was incorporated into almost all ancient

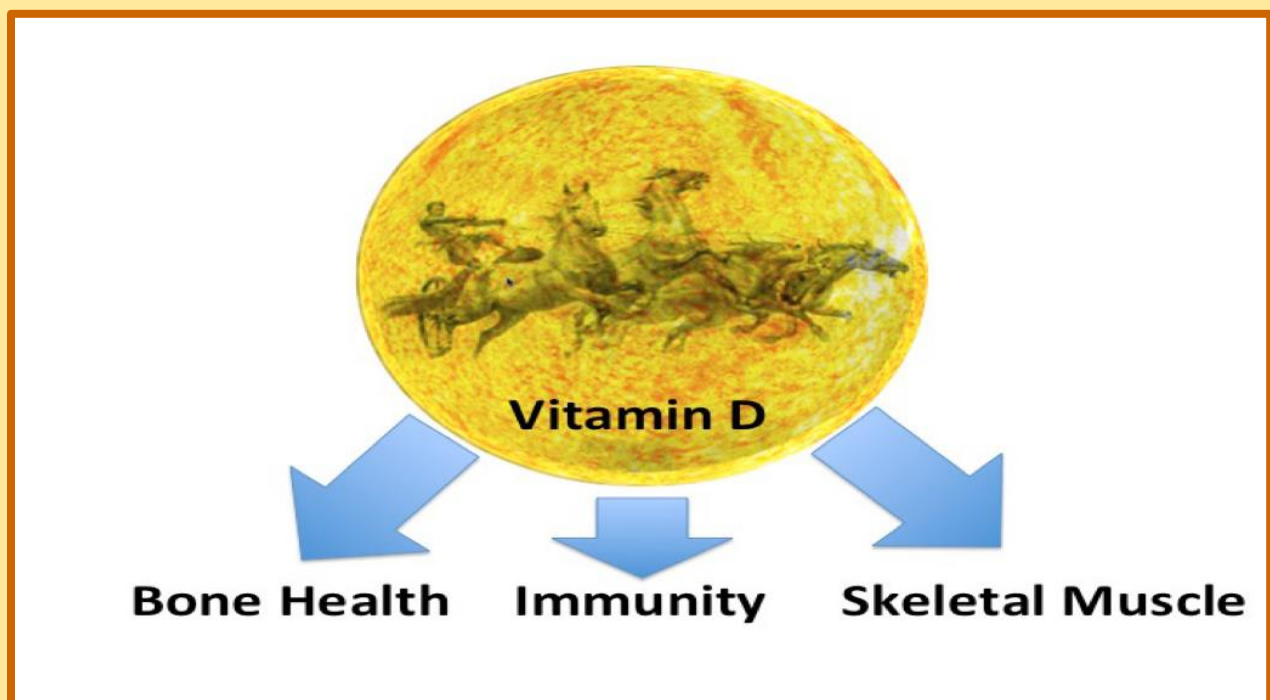
civilizations (Egyptian, Middle Eastern, Indian, European) from the Neolithic Age through the Roman Empire and such is its importance to our very existence that deities of *every* religion have comparative links to the Sun and its all-encompassing Light. Due to Earth's location in the Habitable Zone, we receive ample quantities of the sun's abundant energy, which include the light and heat that are essential for chemical reactions that drive life on our planet, while being protected from the intensity of its immense power.

We depend upon solar rays to energize the pyramidal biomass upholding interdependent food webs, to sustain diversified niches of countless ecosystems and to perpetuate ever-spinning life cycles, from plant photosynthetic conversions of oxygen necessary for animal cellular respiration to saprophytic microorganism conversions that decompose, recycle and revitalize the earth.



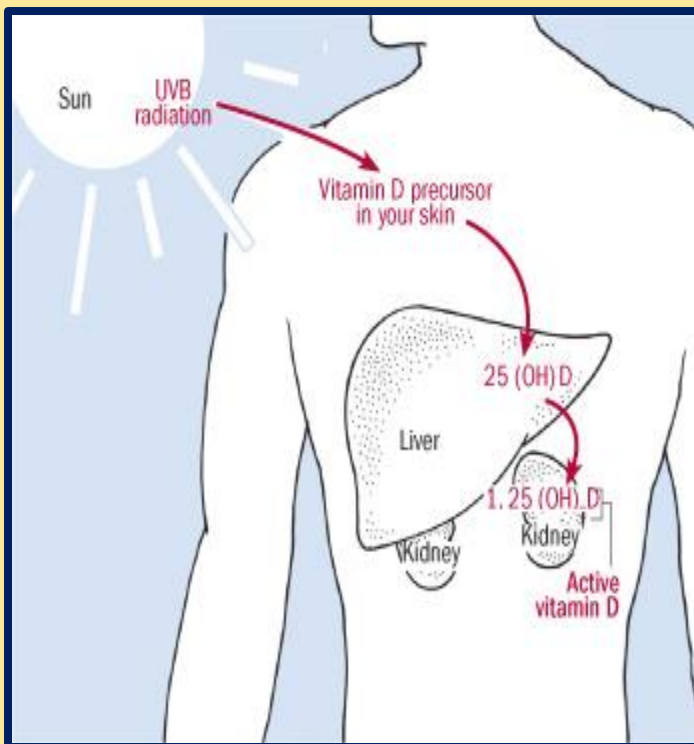
For our own species, the sun is our primary source of vitamin D, an essential vitamin necessary for both our mental and physical well-being.

It is unfortunate that the beneficial effects of sunlight and vitamin D are so often eclipsed by the dangers of unmoderated sun exposure. We are all very familiar with the harmful effects of sunburn, eye damage, skin aging, heat stroke, skin cancer and their long-reaching consequences, but our continued good health is dependent upon essential systemic functions that vitamin D performs for us. Widespread prevalence of vitamin D deficiencies are yet another layer contributing to the tidal wave of chronic diseases washing up in current diagnoses around the globe.



There's a good reason why vitamin D is called "the sunshine vitamin."

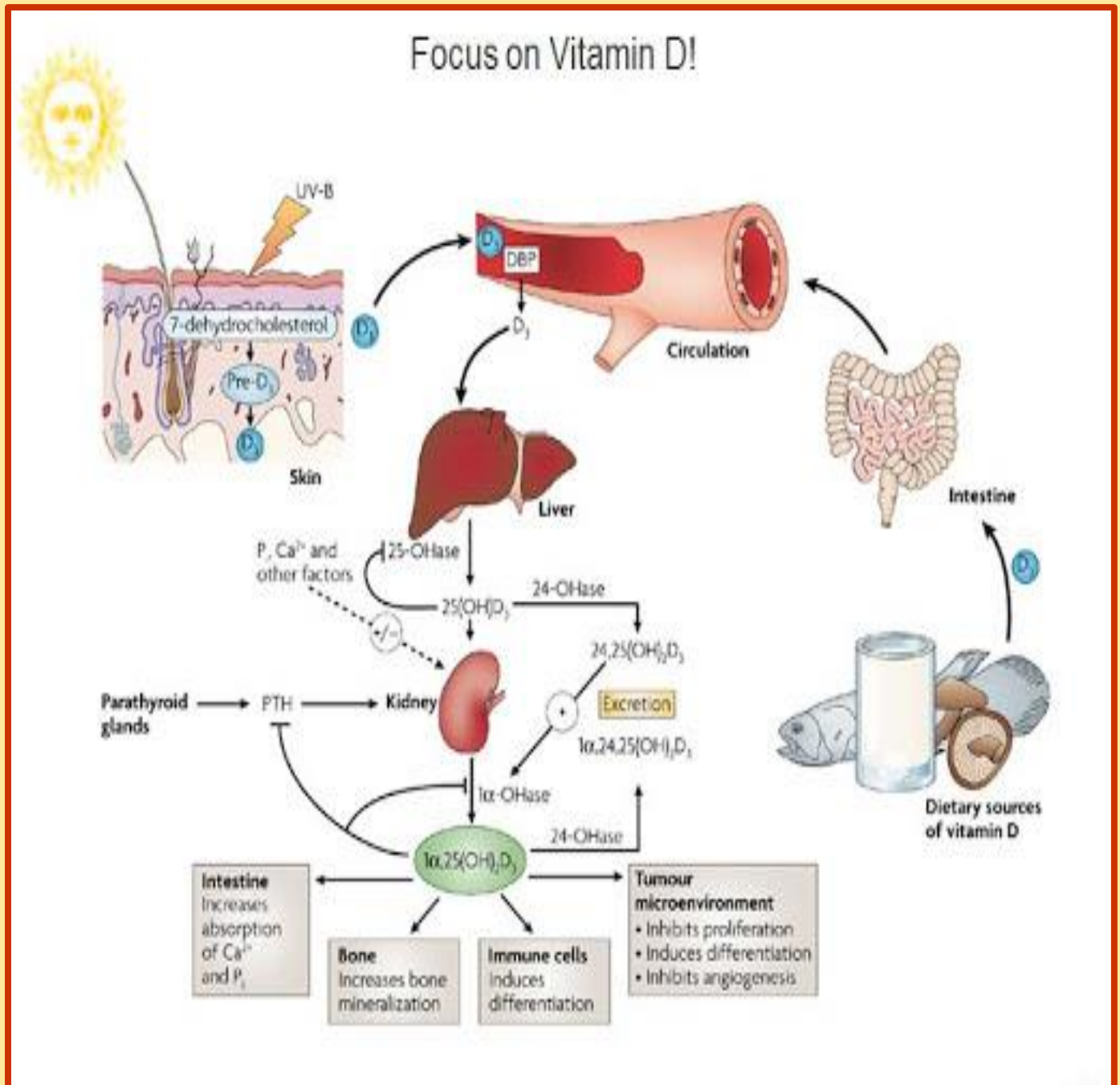
When your skin is exposed to sunlight, it makes vitamin D from cholesterol found in our cells: the sun's ultraviolet B (UVB) rays hit cholesterol in skin cells and provide energy for vitamin D synthesis to occur. It's important to note that these UVB rays cannot penetrate through windows; therefore, driving or working near sunny windows do not guarantee escape from vitamin D deficiency. More than 90% of our systemic Vitamin D production originates from sunlight-skin interaction and only around 10% is absorbed through the small intestine from food intake, particularly because very few foods contain significant enough amounts.



Vitamin D's Unique Duality. In fact, vitamin D is not strictly a vitamin. Vitamins are defined as vital nutrients primarily derived from the food we eat that our bodies need in small amounts, all of which are essential to our health. Vitamin D is categorized as a fat-soluble vitamin, which means it is stored in our fatty tissues for reserve in case our recommended intake is not met. Fat-soluble vitamins are best consumed with healthy fats to ensure absorption.

And while it is true that vitamin D is found in oily fish, cod liver oil, eggs and butter, our principal source of acquisition is through sunlight and subsequent transformations which occur under the skin.

Many studies have demonstrated that **Vitamin D** has multiple effects on biological processes regulating calcium and phosphorus metabolism as well as effects on cell proliferation, differentiation, apoptosis (cell death), immune regulation, genome stability and neurogenesis. Recent studies have also found that **Vitamin D** is closely associated with cardiovascular diseases, diabetes, cancers, autoimmune diseases, infectious diseases, depression and other disorders. Many experts now believe that with such a range of biological activities **Vitamin D** should be considered a hormone rather than one of the conventional nutritional vitamins.



What is it's role in the body?

Vitamin D's role...

- Enhancing calcium absorption: Strong bones
- Regulates mineral concentrations of calcium and phosphorus
- Helps support a healthy immune system: fighting infection
- Muscle/Neuromuscular function
- Cardiovascular function: healthy heart and circulation
- Respiratory system: healthy lungs and airways
- Brain development
- Anti-cancer effects
- Intercellular communication

The best way to get vitamin \mathcal{D} is outside in sunshine: just 30 minutes exposure can manufacture 10,000 international units (IUs). **Midday**, especially during summer, is the best time to get sunlight. **At noon**, the sun is at its highest point and its UVB rays are most intense. **That means you need less time in the sun to make sufficient vitamin \mathcal{D} .** **Vitamin \mathcal{D} synthesis and absorption can be blocked by sunscreen products, winter, high pollution and smog cover.** **Darker skin color, northern latitudes and older age also impede the amount of vitamin \mathcal{D} produced.**

Magnesium is a crucial cofactor for the enzymes that convert vitamin \mathcal{D} to its active form (calcitriol): **If you are low in magnesium, then the vitamin \mathcal{D} you consume cannot be effectively used by your cells.** **Your vitamin \mathcal{D} deficiency will remain unchanged and the metabolic work from incomplete reactions will drain magnesium from muscles, often resulting in symptoms such as leg cramps, restless legs and twitching.**

Vitamin D - Inadequacy

Drug interactions

- Drugs that impair vitamin D absorption
 - Mineral oil laxatives
 - Obesity management medication – Orlistat
 - Bile acid sequestrants – Cholestyramine and Colestipol
- Drugs that may increase vitamin D catabolism
 - Anticonvulsants, cimetidine, thiazides
- Fat substitutes may also decrease vitamin D absorption
 - Olestra

Dietary Sources: Mushrooms, fortified cereals, tofu, fortified dairy products (milk, yogurt, cheese), eggs, liver and oily fish (salmon, swordfish, trout, mackerel, tuna, herring, sardine, rockfish, tilapia, sole and flounder)

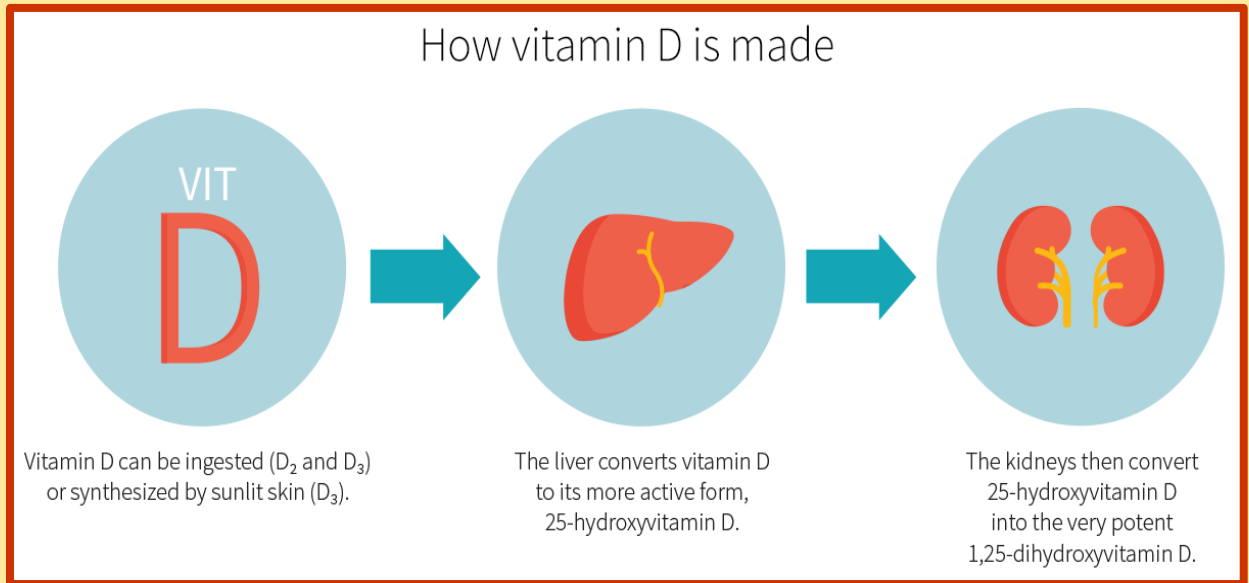
Supplements:



D₂ (ergocalciferol) is the cheapest and easiest to make, from irradiated yeasts and mushrooms.

D₃ (cholecalciferol) is derived from fish and carnivorous/omnivorous mammals. Although more expensive to make, it has a higher affinity for carrier proteins and thus is capable of stabilizing deficiencies 5x-10x more quickly.

Takeaway:



VITAMIN D

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Vitamin D is critical for many functions in the body. Having adequate amounts is crucial for healthy bones, and the active form of vitamin D interacts with more than 30 different tissues and affects more than 1,000 genes! It has a significant impact on muscle strength as well as the immune system, and there is some evidence that vitamin D may help protect us against colorectal cancer.



Food Sources:



The majority of dietary vitamin D in the United States comes from the artificial fortification of milk or nondairy milk products, breakfast cereals, and orange juice. Herring, salmon (wild), sardines, and fish liver oils are good natural sources of vitamin D₃. You can also get small amounts in eggs, beef, and butter.

How Much Should I Take?

RDA/AI: Men under 70: 600 IU
After 70: 800 IU

Women under 70: 600 IU
After 70: 800 IU
Pregnancy: 600 IU
Breastfeeding: 600 IU

DV: 400 IU
UL: 4,000 IU (ages 9 and up)



Signs of Deficiency:

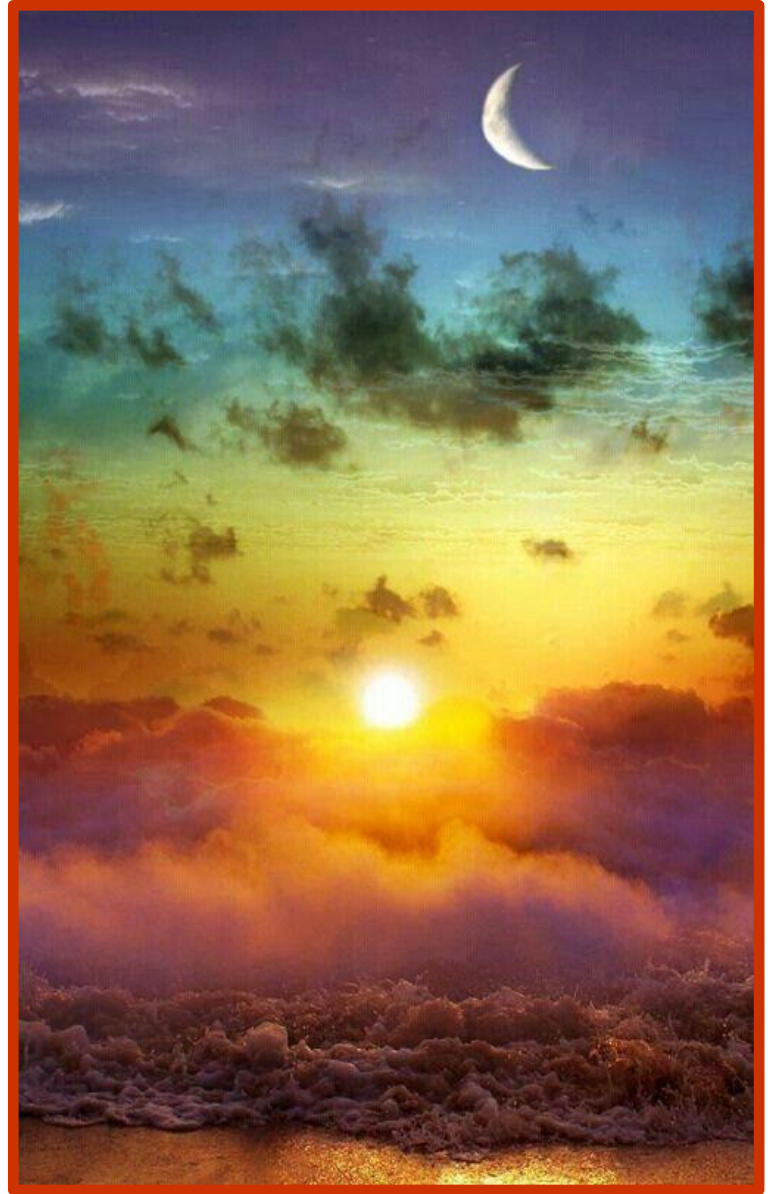
Severe vitamin D deficiency during infancy or childhood leads to rickets and seizures caused by very low levels of blood calcium. For the vast majority of people, mild deficiencies do not produce any overt signs but may increase our risk for heart disease, infections, and certain cancers.

Wellness Wizard — *Let there be Light*

~Luz, Luce, Lumiere, Light, Licht, Lijus, Lett, Lys, Solas~

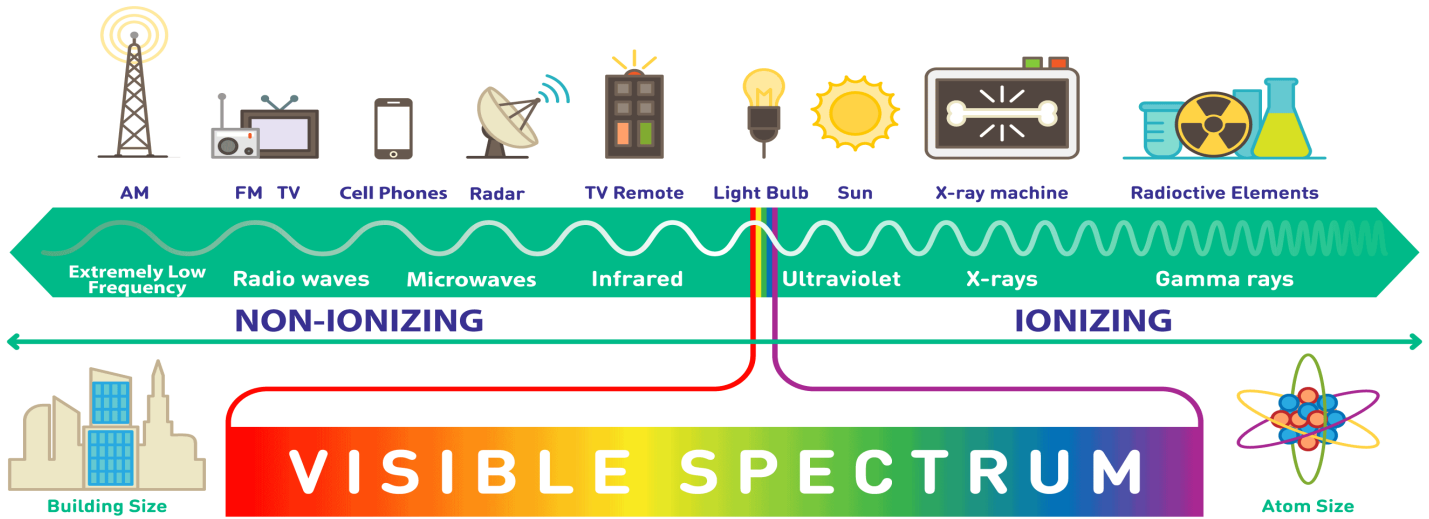
... **From sunlight** to firelight to candlelight to electric lights to electronic devices... the visible light spectrum from natural and manmade sources has long provided illumination for how we view ourselves, each other and the world around us.

As we will find, the extent of its energy does so much more: as we delve into sunlight/vitamin **D** production, stress, and sleep, we must also consider other properties of light and the beneficial ways they factor into various cascades and reactions to direct our hormones, our biorhythms, our moods and behaviors.



When we consider the light that shines the brightest for our species, we must turn our attention towards the electromagnetic spectrum. Electromagnetic energy travels in waves and spans a broad spectrum from very long, low-energy radio waves to very short, high-energy gamma rays. The human eye can detect only a small portion of this spectrum: that of **visible light**.

Electromagnetic Spectrum



The visible light spectrum is the segment of the electromagnetic spectrum that the human eye can view. More simply, this range of wavelengths is called visible light. Typically, the human eye can detect wavelengths from 380 nm to 700 nm.

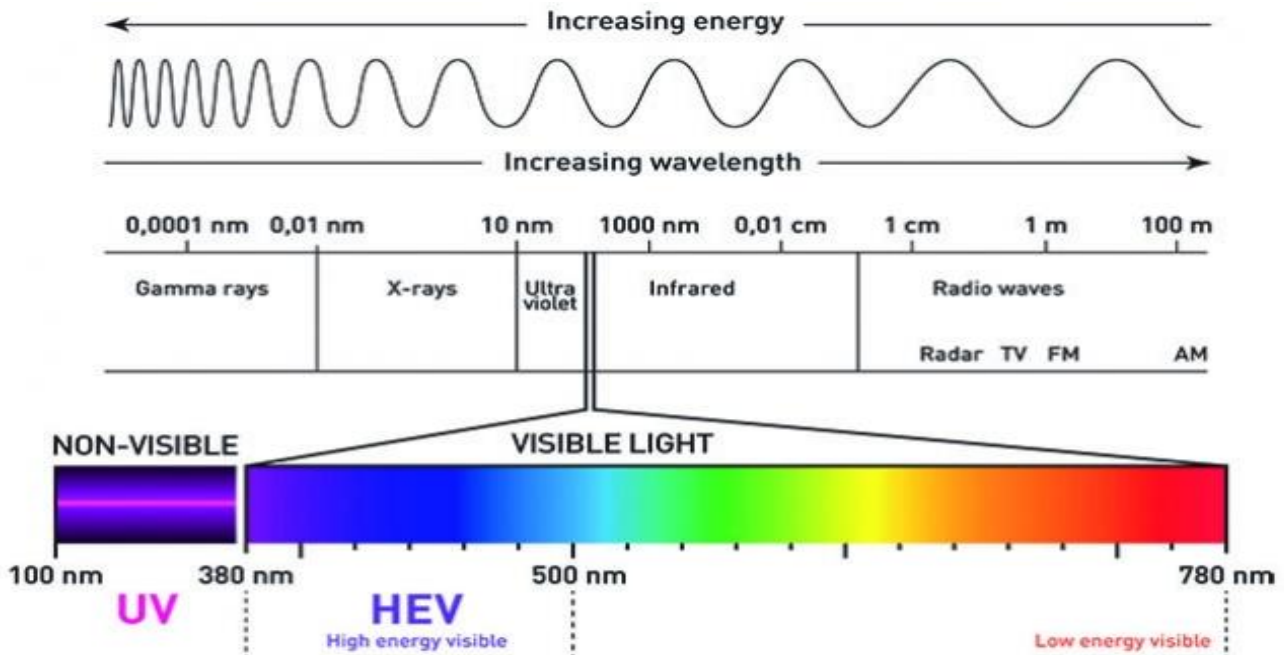
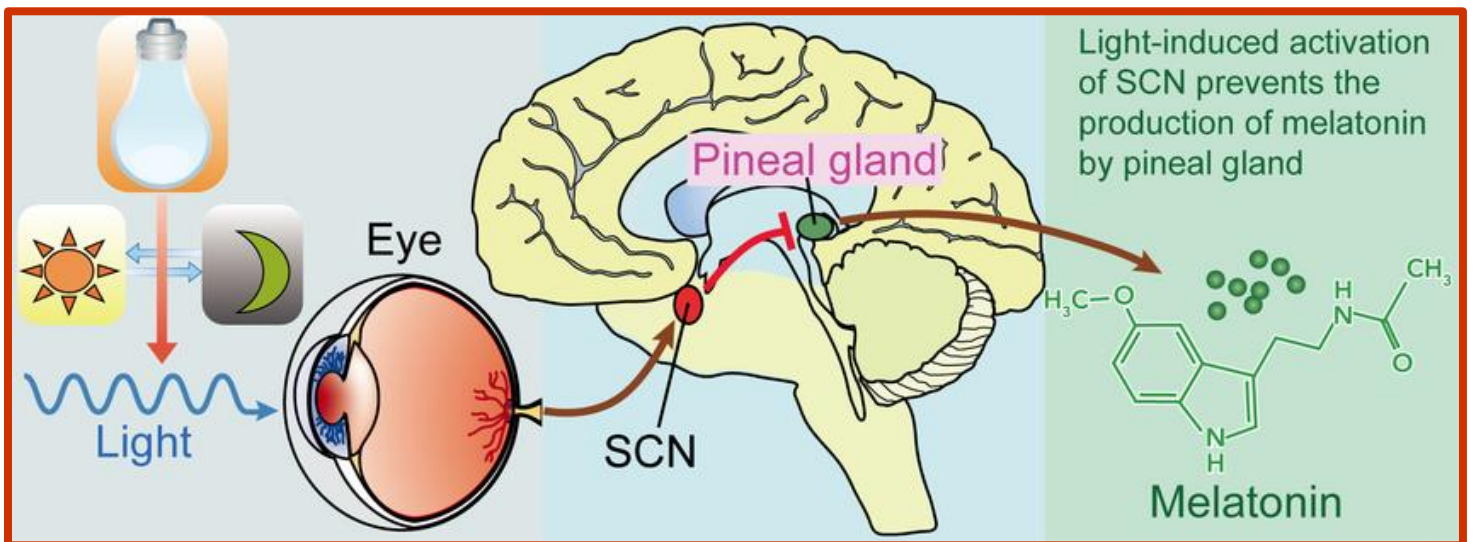


FIGURE 1 - Electromagnetic spectrum and zoom on visible and blue light

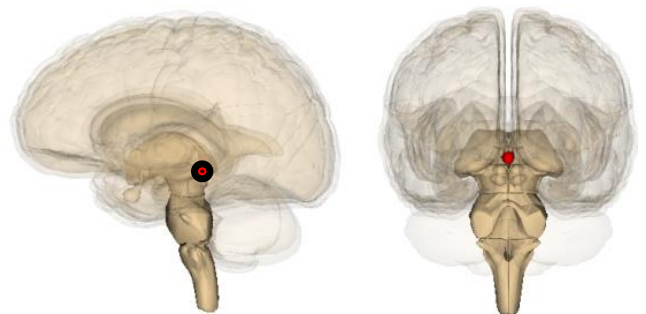
Sunlight contains red, orange, yellow, green and blue light rays and many shades of each of these colors, depending on the energy and wavelength of the individual rays. Combined, this spectrum of colored light rays creates what we call "white light" or sunlight.

Following the Pathway of Light

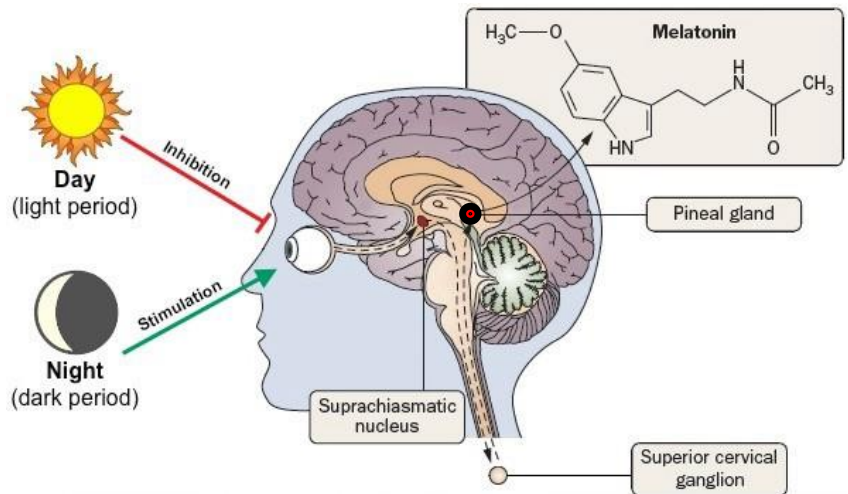
How we see depends upon the transfer of light. The cells in the retina at the back of the eye convert light to electrochemical impulses which are transferred along the optic nerve and then into the brain. Once there, impulses activate 1) the suprachiasmatic nuclei (SCN), the central pacemaker regulating circadian rhythms in the body. These rhythms are simply the physical, mental and behavioral changes that follow a daily cycle.



It also activates 2) the pineal gland (PG), a neuroendocrine gland located between the right and left hemispheres near the center of the brain. The PG is a pinecone-shaped structure measuring only 5mm -8 mm that contains a complete map of the visual field of the eye and connects the brain and nervous system through a complex network of bidirectional links. In various contexts it has been described as both the "seat of the soul" and the "third eye."



The pineal gland (PG) is unique in that its activity is controlled by an environmental variable, namely the state of the light-dark cycle. Lacking photoreceptors itself, the PG relies upon periodic signals from the SCN and conveys this information by synthesizing and secreting the hormone melatonin to the internal physiological systems of the body.



Melatonin is produced according to the amount of light a person is exposed to, being released in greater amounts when it is dark. As a result, melatonin helps regulate the circadian rhythm and synchronizes our sleep-wake cycle with night and day.

Circadian Rhythm



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Tryptophan



Serotonin



Melatonin



Sun and vitamin D



Darkness

The precursor to melatonin is serotonin, a neurotransmitter that itself is derived from the amino acid tryptophan. Within the pineal gland, serotonin undergoes several chemical additions (via an acetyl group and a methyl group) to yield the hormone melatonin.

Melatonin plays a crucial role in helping our bodies prepare for a night of sleep, telling the body it's time to shut down for the night and so is often referred to as the sleep hormone. Darkness prompts the pineal gland to start producing melatonin and subsequently releases it into the bloodstream, where it facilitates a transition into sleep and promotes consistent, quality rest.

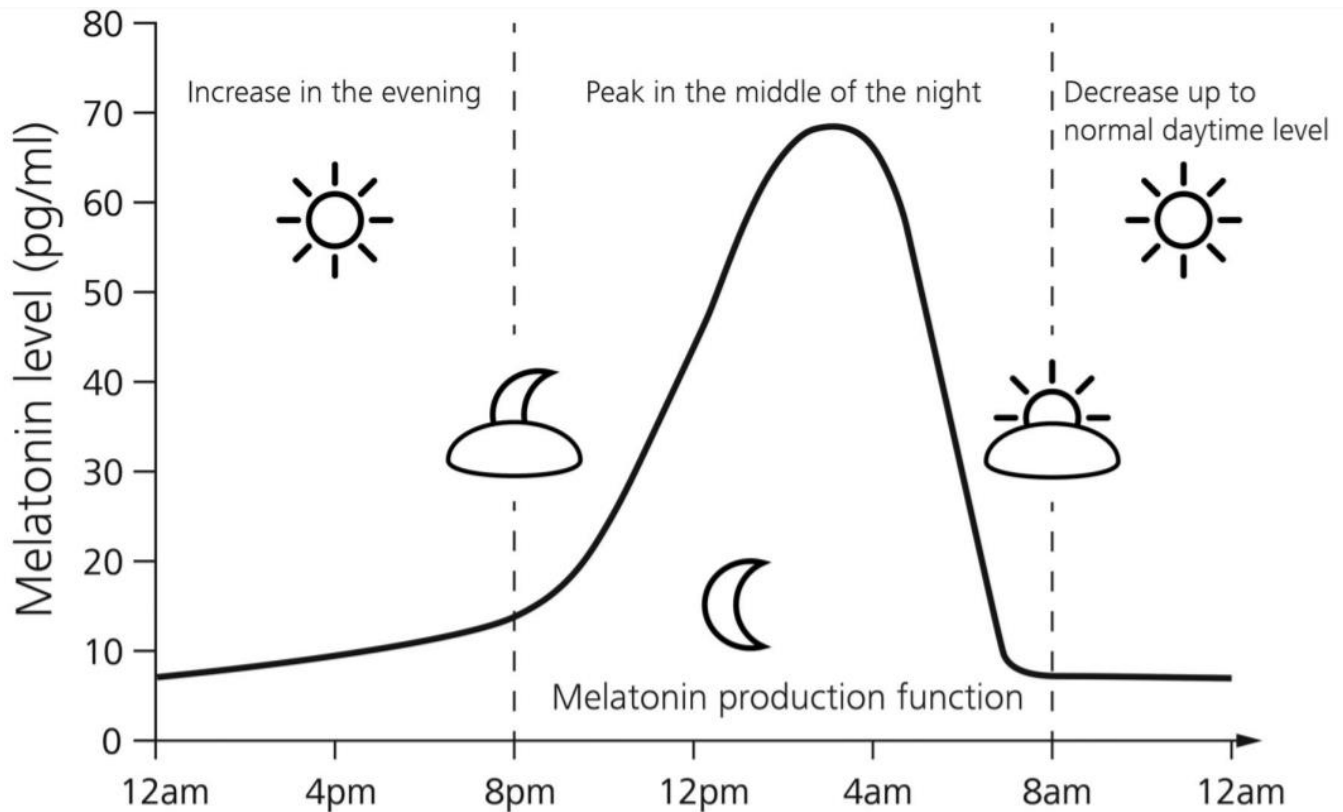
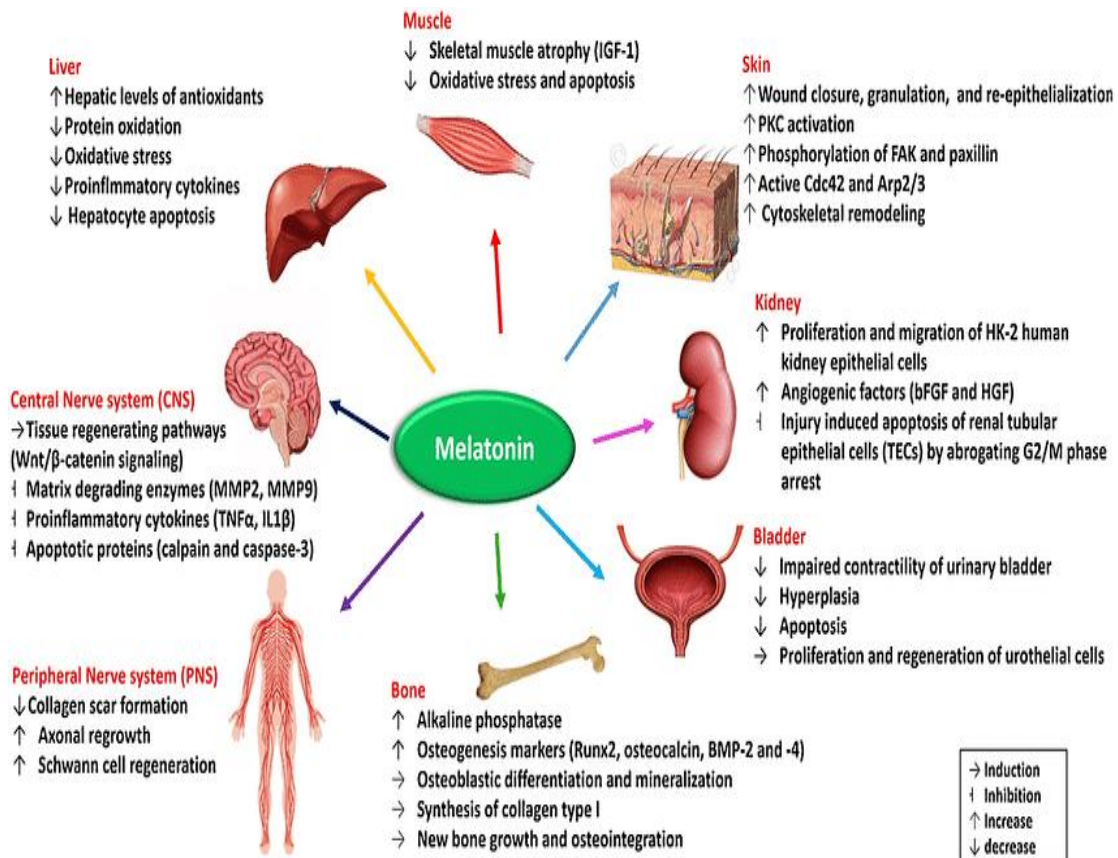
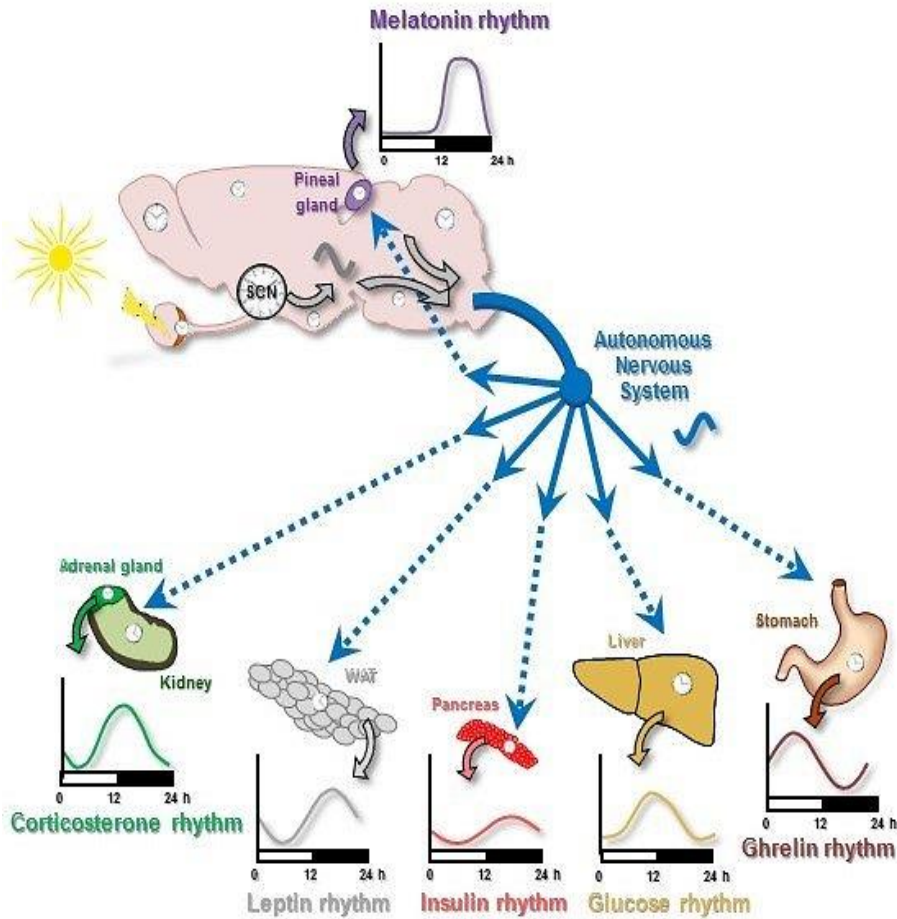


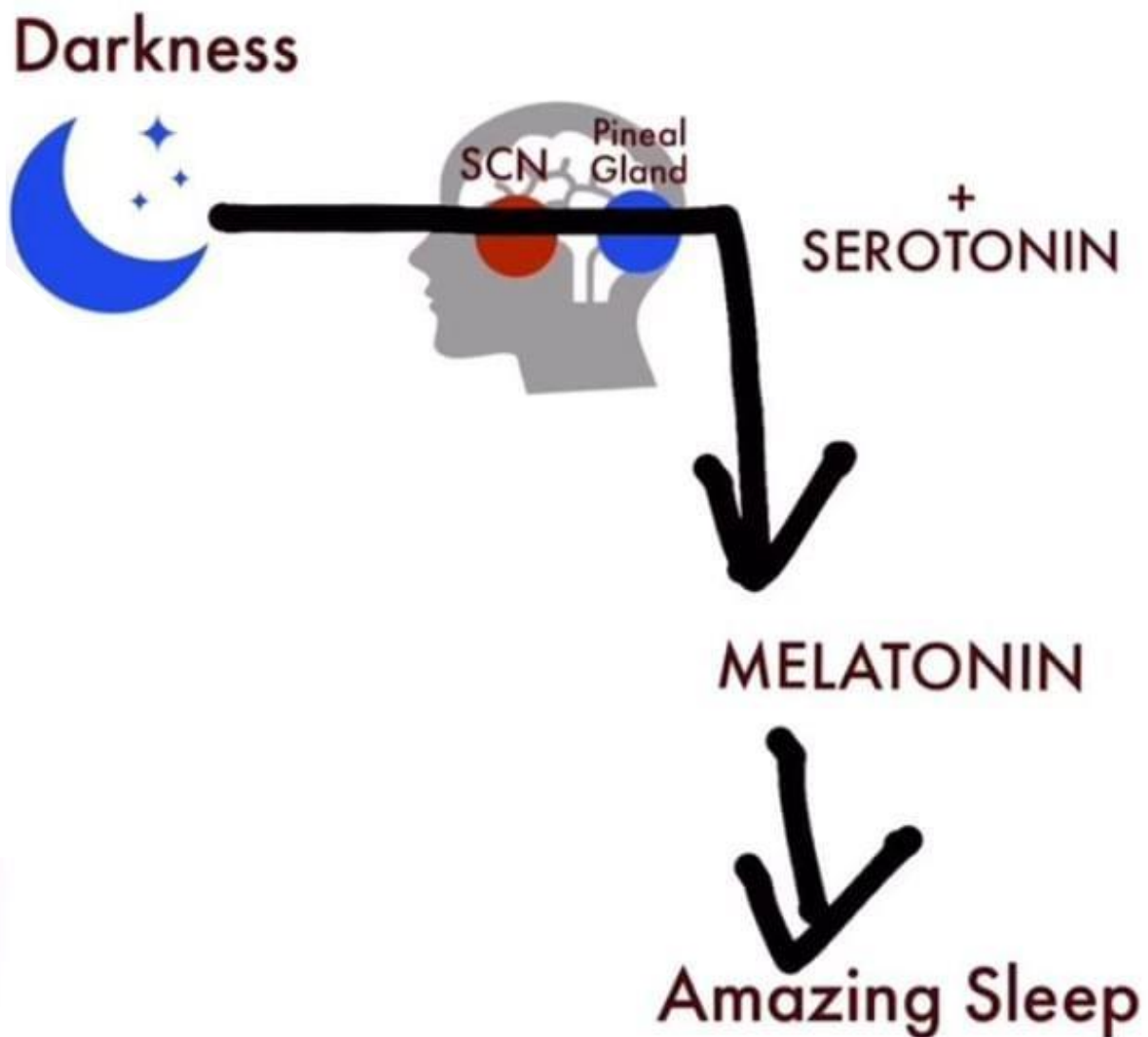
Figure: Physiological melatonin levels of a 24-hour day. Declining light exposure in the evening results in an increased melatonin production by the pineal gland with peak levels in the middle of the night almost 10-fold higher than regular day levels.

[courtesy of Journal of BioPhotonics. 'The inner clock—Blue light sets the human rhythm (Review). Wahl et.al].


Although our focus in this series will remain specifically on the interconnections between light, melatonin and restful sleep, keep in mind that the pineal gland is responsible for a range of broader functions as well: it regulates daily body rhythms, most notably the day/night cycle; prevents jet lag; is implicated in seasonal affective disorder (depression); coordinates fertility; and allows for deep restful sleep patterns. Through its production of melatonin, it is prevalent systemically, interacting with a number of old friends who should be recognizable from past issues:





Takeaway: Synthesis and secretion of melatonin is dramatically affected by light exposure to the eyes. The fundamental pattern observed is that serum concentrations of melatonin are low during the daylight hours and increase to a peak during the dark.





Wellness Bites: MUSHROOMS, the Unexpected Fruits of Summer


 Mushrooms date historically to ancient times and have long been valued for their dietary, medicinal and psychedelic properties. Edible mushrooms are the fleshy and edible fruit bodies of several species of macrofungi (fungus seen with the naked eye). They can appear either below or above the ground and are consumed for their nutritional and culinary values. There are over 20 species of commercially cultivated mushrooms in over 60 countries & around 2000 edible varieties of mushrooms but only a handful are available on the American market: white or "button," brown cremini, portobello, shiitake, oyster, wood ear, enoki, beech, maitake, morel, chanterelle, truffles.

 Protein, Vitamin D, vitamin C, fiber, beta glucans, thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), folate (B9), magnesium, calcium, potassium, selenium, copper, iron, phosphorus, zinc, choline.

 The vitamins, minerals and antioxidants within mushrooms have various health benefits, including diabetes and cancer prevention, heart health, brain support, maintenance of cellular membrane structure and proficiency with muscle movement, learning, memory and transmission of nerve impulses.

 Toxins in some mushrooms can trigger fatal health issues. Some wild mushrooms also contain high levels of heavy metals and other harmful chemicals. To avoid these dangers, only consume mushrooms from a reliable source.

 To incorporate more mushrooms into the diet try sauteing your favorite mushroom variety alone or with onions for a tasty side dish; adding to omelets, breakfast scrambles, pizza, quiches, stir-fries, sandwiches or wraps; topping a salad or baked potato; marinating and grilling; stuffing and baking portobello mushrooms. To prepare dried mushrooms, leave them in water for several hours until they are soft.

 **INEXPENSIVE! NUTRIENT-DENSE!** The Environmental Working Group, which assesses foods for their pesticide contents, placed mushrooms that grow in the US in its 2019 list of the 15 cleanest foods, referring to relatively low traces of pesticides. Available fresh, canned or dried. When buying fresh mushrooms, choose ones that are firm, dry and unbruised, avoiding those that appear slimy or withered. Store mushrooms in the refrigerator until time to cook with them. To prepare, wash and clean to avoid any remaining soil or grit and if necessary trim the ends of the stalks. You can use mushrooms whole, sliced or diced.

Wellness Focus: *Cooling the Fires of Stress*



Stress can be defined as how our brains and bodies respond to any demand. Any type of challenge—such as performance at work or school, a significant life change or a traumatic event—can be stressful. A stressor can present as a one-time interval or short-term occurrence or it can happen repeatedly over a long period of time.

Examples of stress include:

- Routine stress related to the pressures of school, work, family, and other daily responsibilities.
- Stress brought about by a sudden negative change, such as losing a job, divorce or illness.
- Traumatic stress experienced during an event, such as a major accident, war, assault or natural disaster, where people may be in danger of being seriously hurt or killed.

Not All Stress is Bad.

In a dangerous situation, stress signals the body to prepare to face a threat or flee to safety. In these situations, your pulse quickens, you breathe faster, your muscles tense and your brain uses more oxygen and increases activity—all functions aimed at survival and in response to stress. In non-life-threatening situations, stress can motivate people, such as when they need to take a test or interview for a new job. So, in small doses stress is actually useful, assisting us in staying focused, alert, on our toes and with increased energy.

But Long-Term Stress Can Harm Your Health.

More frequently, we may find ourselves overwhelmed with everything we have on our

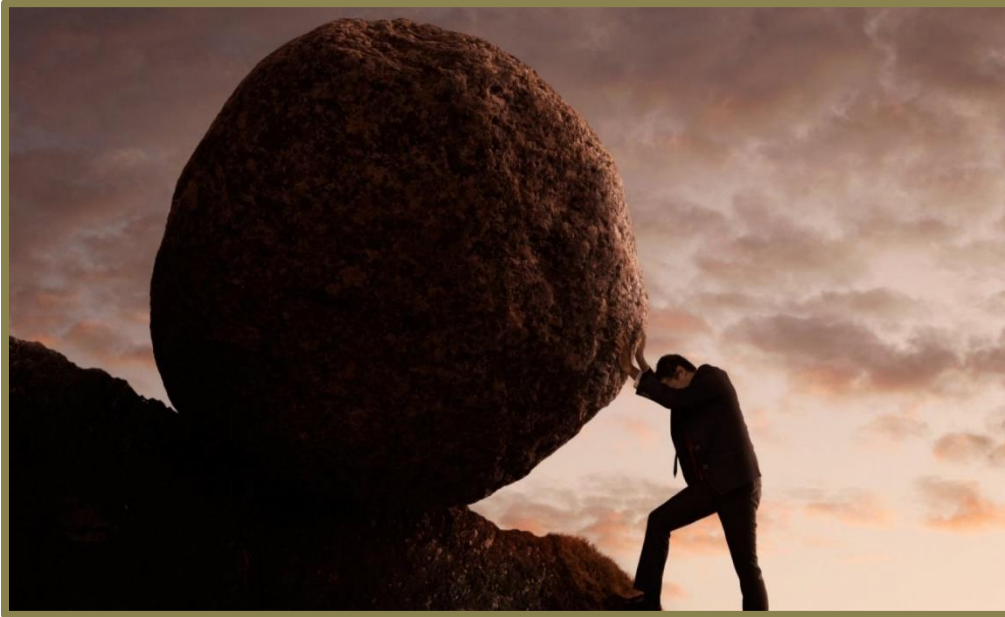
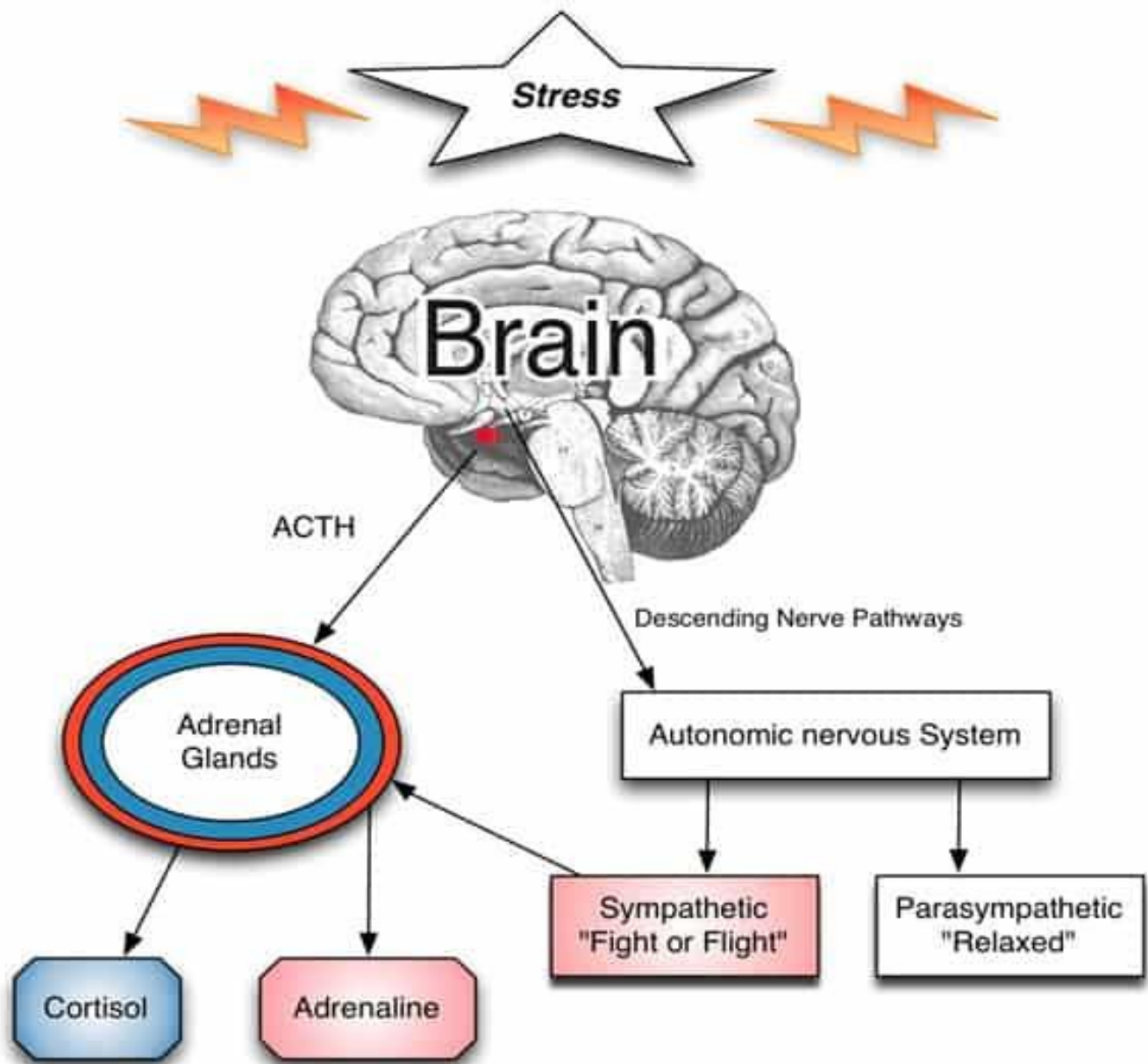


plate to handle and frazzled by the lack of time to accomplish our tasks. When we begin to walk around with the weight of the world on our shoulders day-in and day-out & live that as situation-normal, then we have edged over into long-term or chronic stress.

Because the source of long-term stress is more constant than acute stress, the body never receives a clear signal to return to normal functioning, remaining stuck in overdrive. Together, we will explore how with chronic stress these same lifesaving reactions in the body can instead create an extensive array of symptoms that continually strain the body, interfere with our quality of life and interact systemically, contributing to chronic diseases and mental disorders.

During our quartet series we will define how various tools of stress management reduce the risk of these negative health effects and provide steps and tools to develop into a practice of coping with stress.

Effects of Stress	
Brain Effects	Mood Effects
<ul style="list-style-type: none">• Memory problems• Inability to concentrate• Poor judgment• Seeing the negative rather than positive• Constant worrying• Anxious or racing thoughts	<ul style="list-style-type: none">• Moodiness• Irritability or short fuse• Agitation, inability to relax• Feeling overwhelmed• Depression or general unhappiness• Sense of loneliness and isolation
Physical Effects	Behavioral Effects
<ul style="list-style-type: none">• Aches and pains• Frequent illnesses• Diarrhea or constipation• Nausea, dizziness• Chest pain, racing heartbeat• Loss of sex drive	<ul style="list-style-type: none">• Changes in eating habit (more or less)• Changes in sleep habits (too much or too little)• Isolating yourself from others• Procrastinating or neglecting responsibilities• Nervous habits (e.g. nail biting, pacing)• Using alcohol, cigarettes or drugs to relax

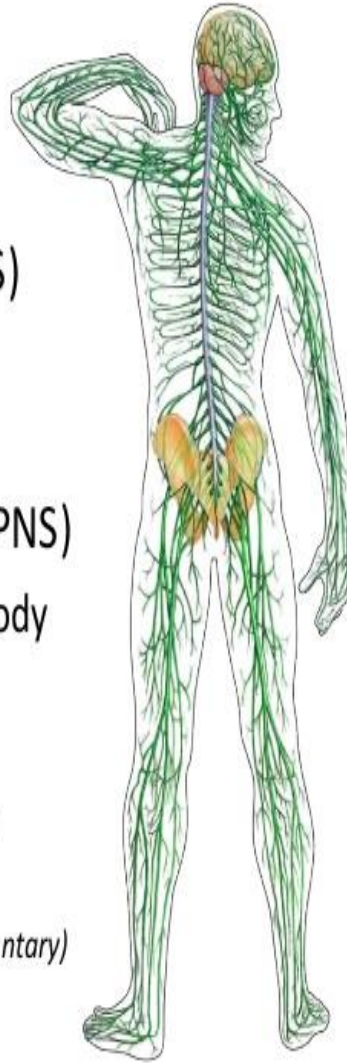


Autonomic Nervous System (ANS)—Introduction

The organs of our body (viscera), such as the heart, intestines and stomach, are regulated by a branch of the nervous system known as the autonomic nervous system. We are usually quite unaware of the functioning of our autonomic system because it functions in a reflexive manner without our conscious control. For example, we are not aware when our blood vessels change size, and we are (usually) unaware when our hearts beat with variability, speeding up or slowing down.

The Nervous System

- **Central Nervous System (CNS)**
 - Brain
 - Spinal Cord
- **Peripheral Nervous System (PNS)**
 - Nerves that connect all your body parts to the spinal cord
 - Somatic nerves (*voluntary*)
 - Motor (muscle) & sensory (senses)
 - Autonomic nerves
 - heart, respiration, digestion (*involuntary*)



The Autonomic Nervous System (ANS) is therefore referred to as the Involuntary division of the nervous system. It consists of autonomic neurons that conduct impulses from the central nervous system (brain and/or spinal cord) to glands, smooth muscle and cardiac muscle. ANS neurons are responsible for regulating the secretions of certain glands (i.e., salivary glands) and the regulation of heart rate and peristalsis (contraction of smooth muscle in the digestive tract), among other functions

The role of the ANS is to constantly fine-tune the functioning of organs and organ systems according to both internal and external stimuli. The ANS helps to maintain homeostasis (internal stability and balance) through the coordination of various activities such as hormone secretion, circulation, respiration, digestion and excretion. The ANS is always "on" and functioning unconsciously, so we are unaware of the important tasks it is performing every waking (and sleeping) minute of every day.

The autonomic nervous system functions to sustain life by exerting control over the following functions/systems:

- **Heart** (control of heart rate via contractility, refractory states, cardiac conduction)
- **Blood vessels** (constriction and dilation of arteries/veins)
- **Lungs** (relaxation of smooth muscles of the bronchioles)
- **Digestive system** (gastrointestinal motility, saliva production, sphincter control, insulin production in the pancreas, etcetera)

- **Immune system** (inhibition of mast cells)
- **Fluid balance** (constriction of renal artery, rennin secretion)
- **Pupil diameter** (constriction and dilation of the pupil and ciliary muscle)
- **Sweating** (stimulates sweat gland secretion)
- **Reproductive system** (in males, erection and ejaculation; in females, contraction and relaxation of the uterus)
- **Urinary system** (relaxation and contraction of bladder and detrusor muscles, urethral sphincter)

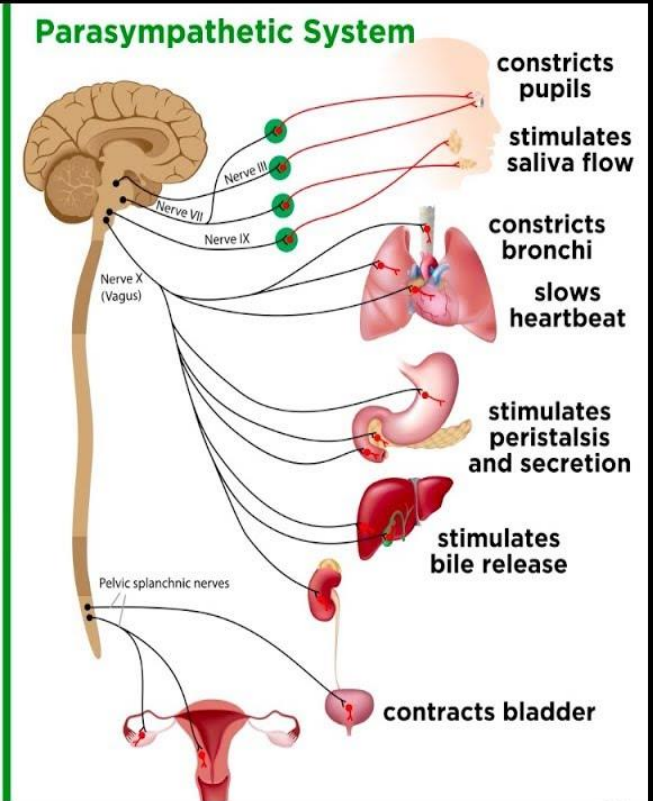
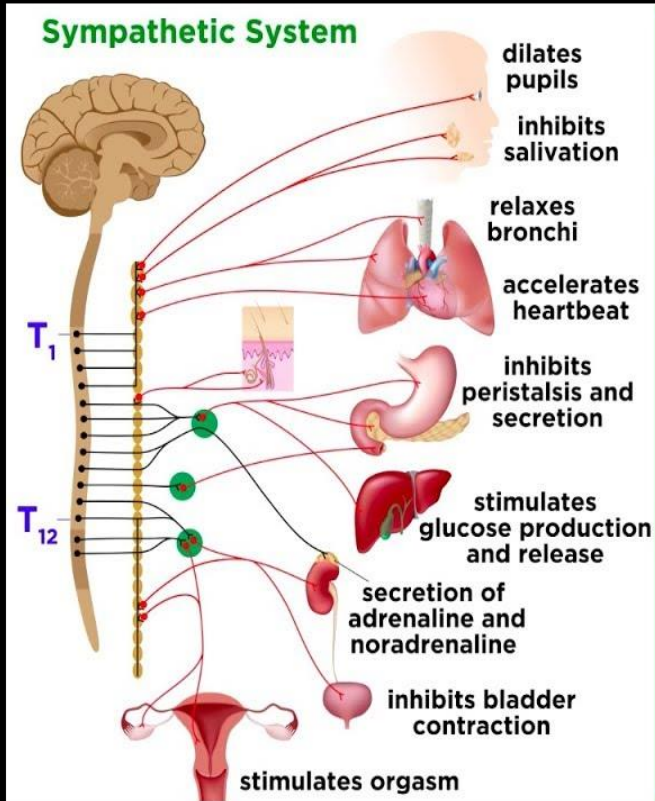
The autonomic nervous system is subdivided into two separate divisions: the **Sympathetic nervous system (SNS)** and the **Parasympathetic nervous system (PNS)**. It is important to understand how these two systems function in order to determine how they each affect the body, keeping in mind that both systems work in synergy to maintain homeostasis within the body.

Sympathetic nervous system (SNS) - the SNS triggers what is commonly known as the "fight or flight" response:

- increased sweating
- decreased peristalsis
- increased heart rate (increased conduction speed, decreased refractory period)
pupil dilation
- increased blood pressure (increased contractility, increased ability of the heart to relax and fill)

Parasympathetic nervous system (PNS) - the PNS is sometimes referred to as the "rest and digest" or "feed and breed" system. In general, the PNS acts in the opposite way to the SNS, reversing the effects of the fight-or-flight response. However, it may be more correct to say that the SNS and the PNS have a complementary relationship, rather than one of opposition.

- decreased sweating
- increased peristalsis
- decreased heart rate (decreased conduction speed, increased refractory period)
pupil constriction
- decreased blood pressure (decreased contractility, decreased ability of the heart to relax and fill)



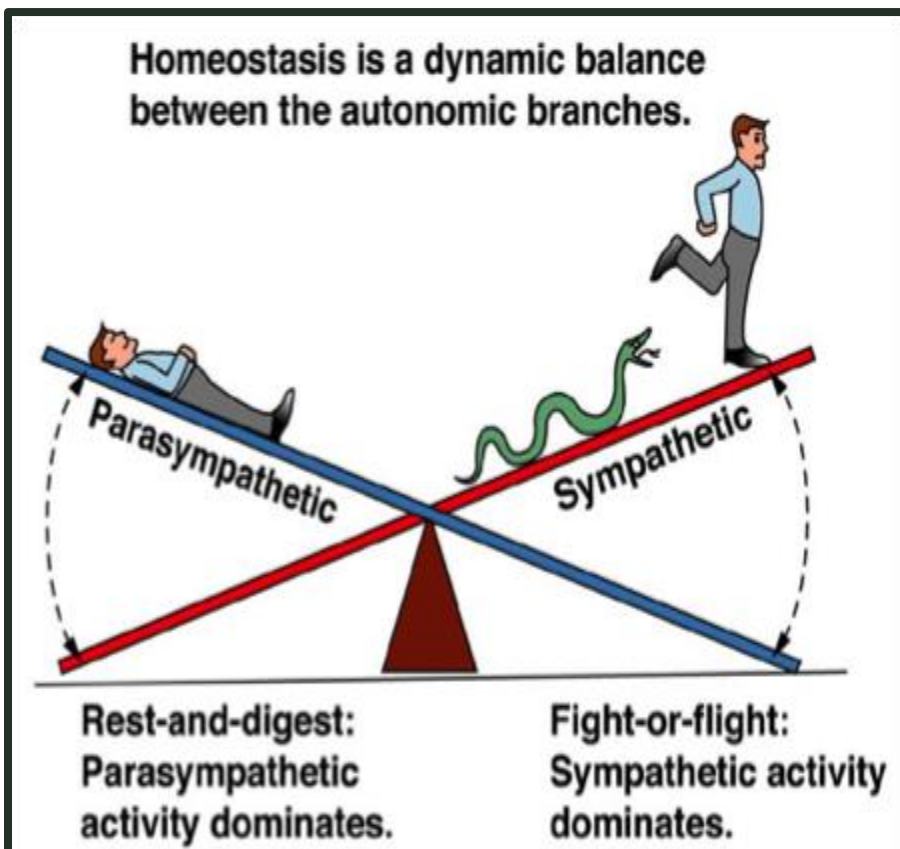
	Sympathetic	Parasympathetic
Function	To defend the body against attack	Healing, regeneration and nourishing the body
Overall Effect	Catabolic (breaks down the body)	Anabolic (builds up the body)
Organs and Glands It Activates	The brain, muscles, the insulin pancreas, and the thyroid and adrenal glands	The liver, kidneys, enzyme pancreas, spleen, stomach, small intestines and colon
Hormones and Substances It Increases	Insulin, 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
Factors That Activate This System	Stress, fears, anger, worry, excessive thinking and too much exercise	Rest, sleep, meditation, relaxation therapies and feelings of being loved

The ANS, through its two branches (sympathetic and parasympathetic), controls energy expenditure. The sympathetic branch mediates this expenditure while the parasympathetic branch serves a restorative function. In general:

- The sympathetic nervous system causes a speeding up of bodily functions (i.e. heart and respiratory rates) and protect the core by shunting blood from the extremities to the core
- The parasympathetic nervous system causes a slowing of bodily functions (i.e. heart and respiratory rates) and favors healing, rest and restoration, as well as coordinating immune responses

Health can be adversely affected when effects to one of these systems are unchecked by the other, resulting in a disturbance of homeostasis. The ANS affects changes in the body that are meant to be temporary; in other words, the body should return to its baseline

state. It is natural that there should be brief excursions from the homeostatic baseline, but the return to baseline should occur in a timely manner. When one system is persistently activated (increased overall tone), health may be adversely affected.



The branches of the autonomic system are designed to oppose (and thus balance) each other.

For example, as the sympathetic nervous system begins to work, the

parasympathetic nervous system goes into action to return the sympathetic nervous system back to its baseline. Therefore, it is not difficult to understand that persistent action by one branch may cause a persistently decreased tone in the other, which can lead to ill health. A balance between the two is both necessary and healthy.

There are several centers which play a role in control of the ANS. Not to overload on details here, but for our purposes of understanding check out the following overview that displays the variety of sources from which our nervous system receives input!!! These sources are constantly providing information that is calibrated and which our bodies utilize when weighting incoming messages, fine-tuning their effects, and then responding appropriately to a combination of internal and external stimuli.

- ❖ **Cerebral cortex**- the cerebral cortex areas control homeostasis by regulating the SNS, the PNS and the hypothalamus.
- ❖ **Limbic system**- the limbic system is composed of the hypothalamus, the amygdala, the hippocampus and other nearby areas. It plays a predominant role in sensing danger and translating our emotions, impulses and desires which are tempered by our cerebral cortex while awake. During sleep this system is given full reign over our dreaming minds while our cerebral cortex is off-line.
- ❖ **Hypothalamus**- the cells that drive the ANS are located in the lateral medulla, an area which the hypothalamus projects into. By interacting with these systems, the hypothalamus controls digestion, heart rate, sweating and other functions.
- ❖ **Brain stem**- the brainstem acts as the link between the spinal cord and the cerebrum. Sensory and motor neurons travel through the brainstem, conveying messages between the brain and spinal cord. The brainstem controls many autonomic functions of the PNS, including respiration, heart rate and blood pressure.
- ❖ **Spinal cord**- two chains of ganglia are located on either side of the spinal cord. The outer chains form the parasympathetic nervous system, while the chains closest to the spinal cord form the sympathetic element.
- ❖ **Sensory neuron dendrites** are sensory receptors that are highly specialized, receiving specific types of stimuli. We do not consciously sense impulses from these receptors (except perhaps pain). There are numerous sensory receptors:
 - **Photoreceptors**- respond to light
 - **Thermoreceptors**- respond to alterations in temperature
 - **Mechanoreceptors**- respond to stretch and pressure (blood pressure or touch)
 - **Chemoreceptors**- respond to changes in internal body chemistry (i.e., O₂, CO₂) and dissolved chemicals during sensations of taste and smell
 - **Nociceptors**- respond to various stimuli associated with damage to tissues (brain interprets the pain)

The Sympathetic System

The "3 F's" mnemonic (fear, fight or flight) makes it easy to predict the workings of the sympathetic nervous system. When faced with situations of intense fear, anxiety or stress, the body reacts by speeding up the heart rate, increasing blood flow to vital organs and muscles, slowing digestion, making changes to our vision to allow us to see better and numerous other changes that allow us to react quickly in dangerous or stressful situations. These reactions have allowed us to survive as a species for thousands of years and they are so important we have a number of built-in layers by which we face and overcome these adversities.

The autonomic nervous system releases chemical messengers (neurotransmitters) to influence its target organs. In the sympathetic nervous system, epinephrine (originating from the adrenal medulla) and norepinephrine (originating from sympathetic nerves & the adrenal medulla) are the messengers secreted to act on specific receptors on the cell surface of the target organs. Release of these messengers happen quickly, affect organs all through the body and create the "fight or flight" responses.

❖ **"Fight or Flight" sympathetic response:**

- Stimulation of the sweat glands
- Constriction of peripheral blood vessels to shunt blood to the core, where it is needed
- Increased in supply of blood to skeletal muscles that may be needed for activity
- Dilation of the bronchioles under conditions of low oxygen in the blood
- Reduction in blood flow to the abdomen; decreased peristalsis and digestive activities
- Release of glucose stores from the liver to increase glucose in the bloodstream

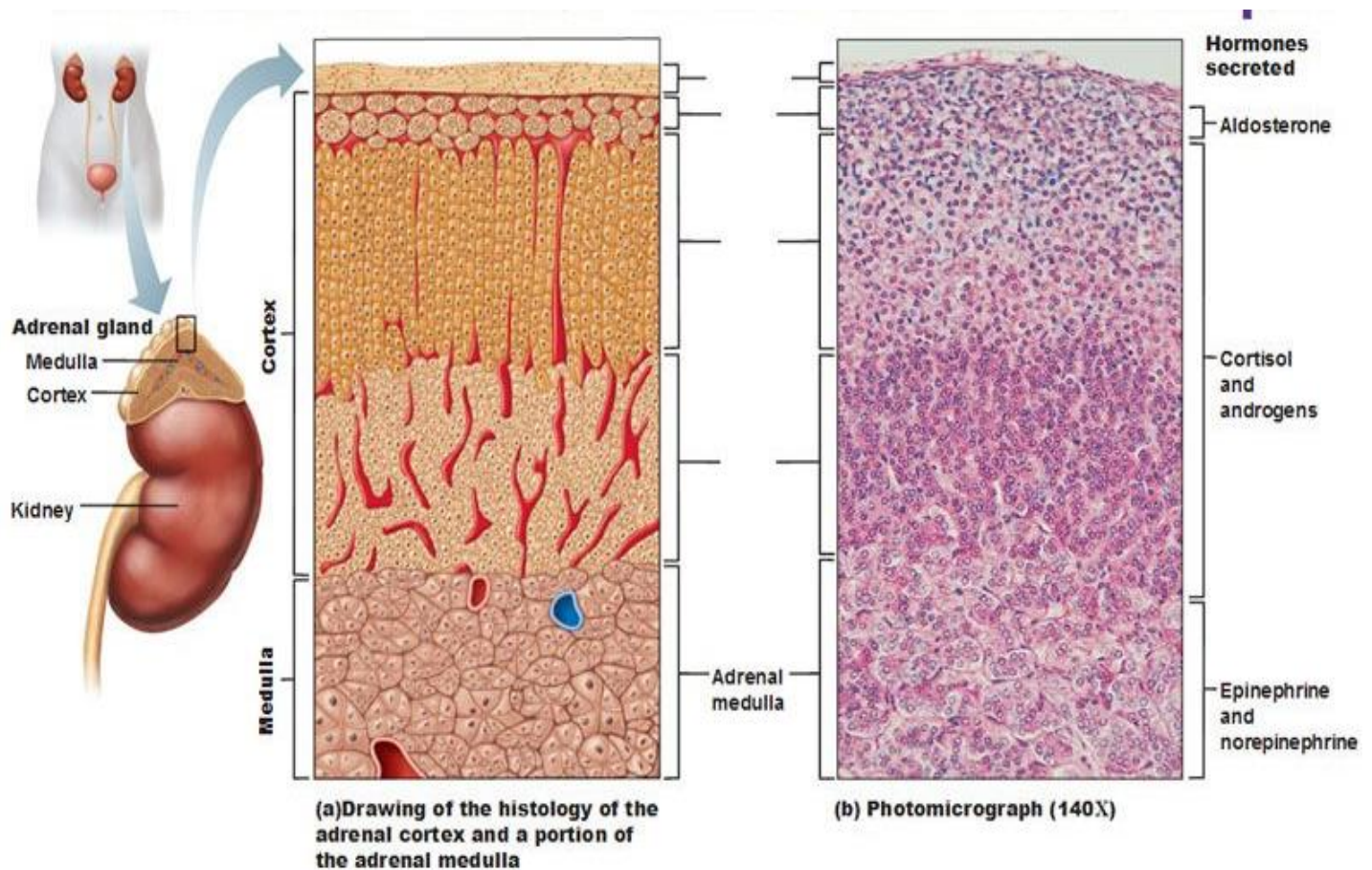
Although we have thus far focused solely on our nervous system component, it is now time to introduce the endocrine component which is distinctly integrated with our stress reactions.

To paraphrase Yoda... "There is Another...."

❖ Adrenal Sympathetic Response: Small but Mighty

Another contributor to our sympathetic nervous system is our adrenal glands, a paired duo capping each kidney, thus also known as “suprarenal” (supra=above/atop; renal=kidneys). These organs have a multi-functional role in regulating and maintaining many internal processes, including metabolism and fight-or-flight response, through the actions of about 50 different hormones!!

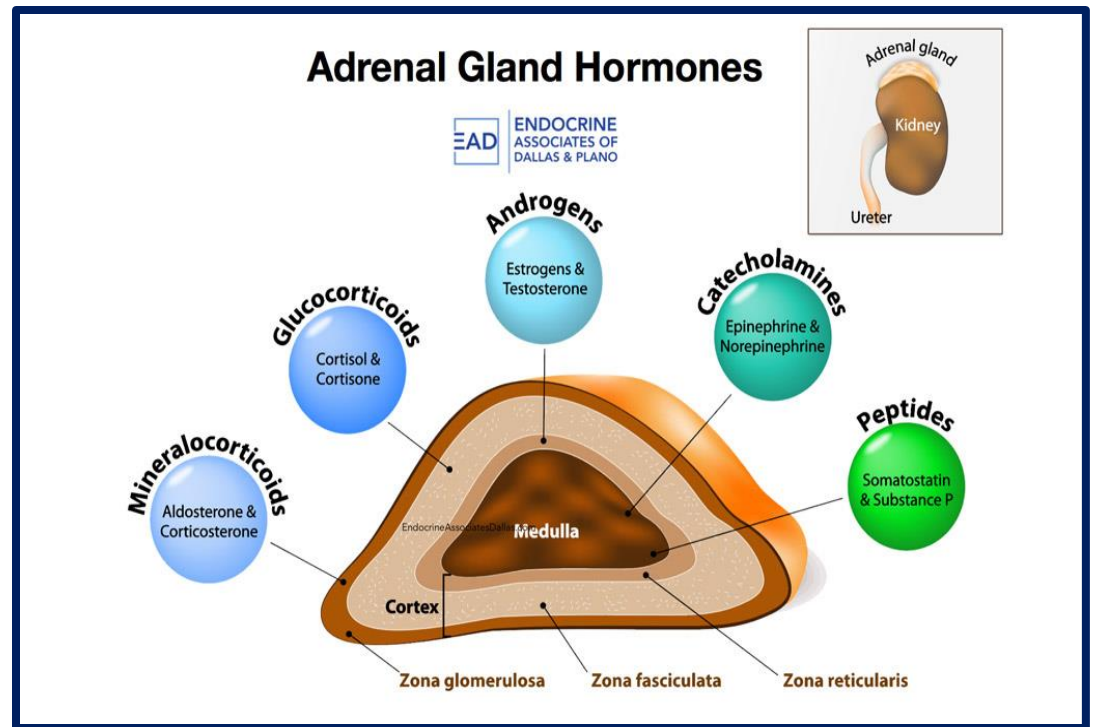
The adrenal glands are triangular-shaped organs and their name directly relates to their location (ad=near or at; renes=kidneys). Each adrenal gland consists of 2 distinctive structures:



Adrenal Cortex: the outermost region of the gland that produces *1) corticosteroids, which help regulate metabolism and helps your body respond to stress; 2) aldosterone, which helps control blood pressure; and 3) small amounts of sex hormones, which are generally overshadowed by greater amounts released by ovaries/testes.

Adrenal Medulla:

The cells of this inner region are derived from the same embryonic tissue as sympathetic neurons; therefore, the medulla is akin to a modified sympathetic nerve cell.



The Adrenal Medulla produces *1) adrenaline (epinephrine), which rapidly prepares your body to spring into action in a stressful situation by increasing your heart rate and rushing blood and oxygen to the muscles and the brain. It also spikes your blood sugar level by helping convert glycogen to glucose in the liver for release to the blood (remember, glycogen is the liver's storage form of glucose). And 2) norepinephrine (aka noradrenaline), which works with epinephrine in responding to stress. However, it can

cause vasoconstriction (narrowing of the blood vessels). This results in high blood pressure.

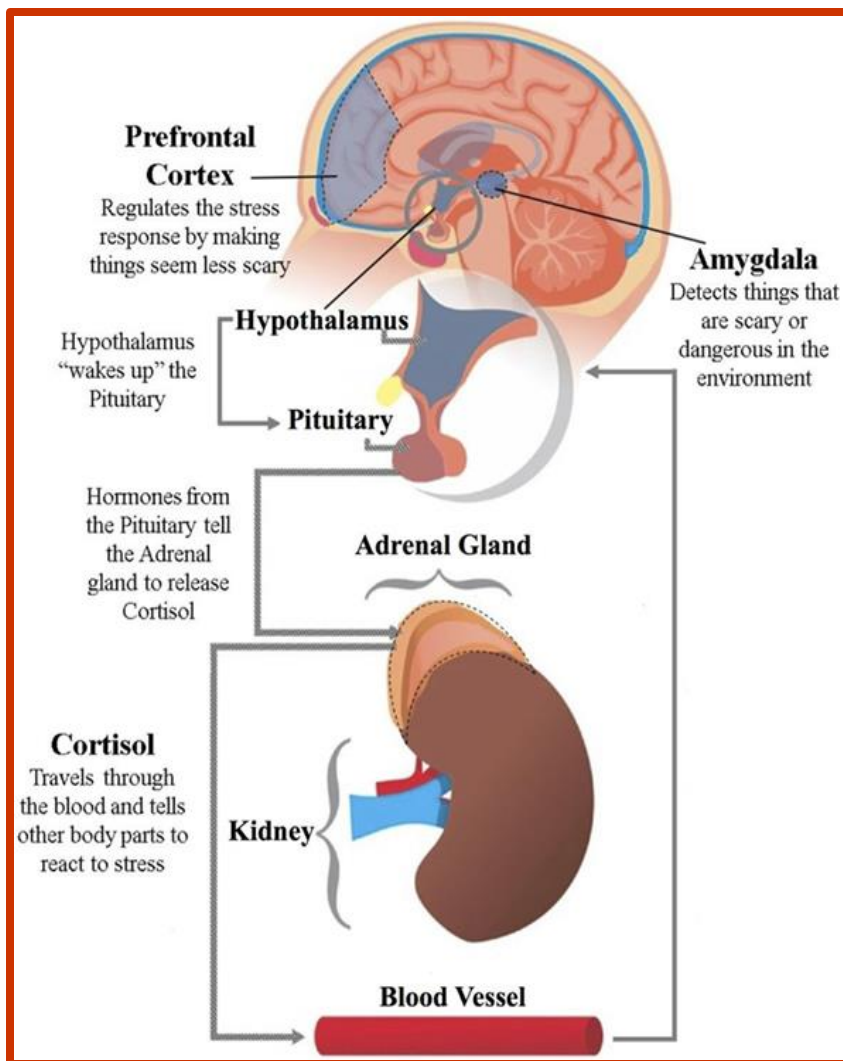
Cortisol (cor-ti-sol)

Stressed out? This hormone is released during times of stress, increasing heart rate, blood pressure, blood glucose, respiration and muscle tension in response. It also temporarily shuts down the body's systems that aren't needed in the face of crisis, such as digestion and reproduction.



* For the purposes of this Stress discussion, we will focus on Cortex corticosteroid and Medulla adrenaline production and interactions.

Although both of these hormones are crucial to normal healthy functioning of the body, we will see (like Inflammation) there is a difference between our short- and long-term responses.

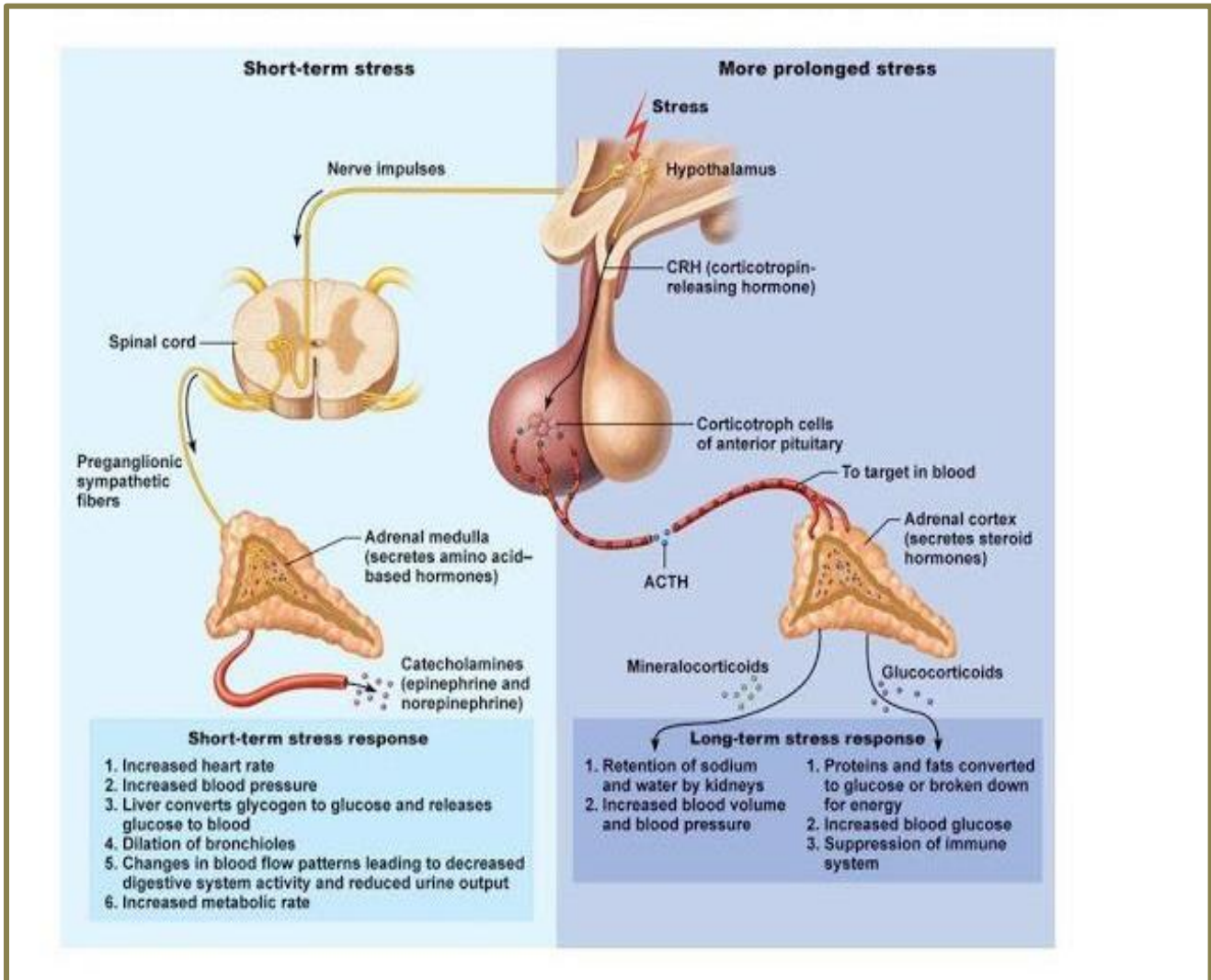


When a person is placed in a threatening situation, messages from the sensory nerves are carried to the cerebral cortex and limbic system (the "emotional" brain) and also to the hypothalamus. The anterior portion of the hypothalamus excites the sympathetic nervous system. The medulla oblongata (brain stem) contains centers that control many functions of the digestive, cardiovascular, respiratory, reproductive and urinary systems. The medulla oblongata is itself regulated by the hypothalamus, the cerebral cortex and the limbic system. Thus, there are several areas involved in the body's response to stress.

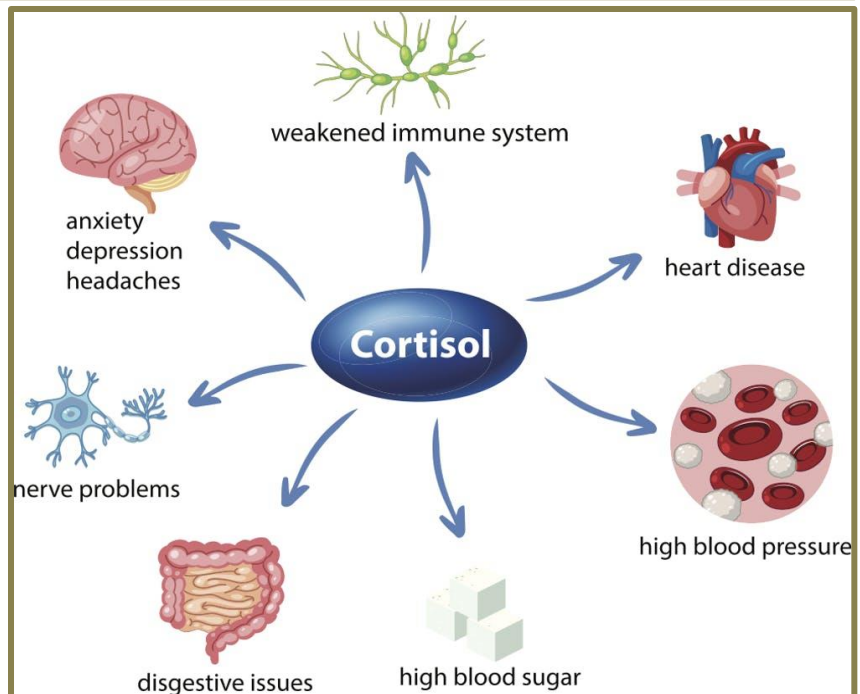
When a person is exposed to extreme stress (picture a terrifying situation that occurs without warning, such as a wild animal poised to attack you), the sympathetic nervous system may become completely paralyzed so that its functions cease completely. The person may be frozen in place, unable to move. They may lose control of their bladder. This is due to an overwhelming number of signals that the brain must "sort" and a corresponding tremendous surge of adrenalin. Thankfully, most of the time we are not exposed to stress of this magnitude and our autonomic nervous system functions as it should.

Much more frequently in our modern-day lifestyles, we are exposed instead to constant daily stressors stemming from overwhelming numbers of things to get done, responsibilities to fulfill well and deadlines to meet in our personal, business and social lives. As we well know, when stress becomes chronic it can damage our health, mood, and relationships. Basically, our overall quality of life!

What happens when we are never able to turn our stress response off???



Cortisol released as a response to chronic stress (or increased sympathetic tone) can be damaging to the body (i.e., hypertension, altered immune function). If the body is stressed for a prolonged period of time, cortisol levels may become insufficient (adrenal fatigue), causing low blood sugar, excessive tiredness and muscle pain.



Hormone Interplay

Sara Gottfried, MD, former OB-GYN and owner of her own functional medicine clinic, explained in an interview with *Experience Living* magazine that the hormonal imbalances that she most frequently sees in women are those of cortisol, thyroid and estrogen.

"These are the most important hormones for women, with cortisol being the control system. When cortisol is off it also throws off your estrogen and thyroid. Based on the quantitative surveys I've done in my practice, 91 percent of women struggle with their cortisol levels. There are very few who don't. Most of them simply have too much stress: They're running task to task. They feel tired but wired."

"As long as your perceived stress is not out of control then cortisol is doing what it's supposed to do: raising your blood pressure and blood sugar when you need it and modulating your immune system. However, if you're running around with this sense of emotional and psychological threat, then cortisol works against you. It makes your body feel like it's in survival mode: It gives you sugar cravings, slows down your thyroid so that you store more fat, makes you puffy and more likely to retain fluid. It doesn't allow you to use progesterone to help you calm down and leads to all sorts of other downstream problems."

"You have to find ways of hitting your stress-reset button and that's a very individualized prescription. What works for me may not work for you. There are lots of different lifestyle tweaks and it's



important that you be invested enough to explore and develop a list of things that are effective for you. Incremental steps can add up to big transformations."

"You have to experiment and pay attention to the result you get from doing a little more or a little less of a particular thing and what effect it has on your stress level. Ask yourself, 'Am I getting at least a partial response here? And if so, would a larger dose generate a better response' and then adjust accordingly. There's the direct benefit of figuring out the right dose over time but there's also the value of observing yourself in an objective way. That alone is part of the practice. There's something about that objective observation of one's own experience that is hugely valuable when it comes to resetting your hormones."

"Cortisol causes hormonal problems for men too. It's a big part of the epidemic of andropause and low testosterone we're seeing now in men starting in their 30s. When you manage your cortisol, it helps you make more testosterone. If you're hyperproducing cortisol, whether you're male or female, you're going to make less of the sex hormones. It's just the way biochemistry works." For men, one of the most balancing things is to be around women. There's a lot of data showing that married men have the best longevity and health. Interestingly, from a hormonal perspective, it doesn't necessarily help women to be around men. It helps women to 'tend and befriend' and to be around another woman who is taking care of herself."

"I think the main thing is people need to manage their hormones the way they manage their retirement plans

because they're intimately linked.

You're not going to be around to enjoy your retirement unless you are actively managing your hormones today."

Resource: Excerpts taken from an interview, "Stress Buster" in Experience Life magazine.

Symptoms of 'Adrenal Fatigue'

- fatigue
- insomnia, sleep disturbances
- poor digestion
- poor immunity, frequent colds, flu, infections
- low blood pressure
- sensitivity to cold
- poor recovery from exercise
- anxiety, depression
- irritability
- poor memory, brain fog
- loss of appetite or excessive appetite, cravings
- reproductive hormone dysfunction

Foods The Help Adrenal Fatigue

PROTEINS

Meat, Fish, Poultry, Kefir, Eggs, Soy & Legumes

VEGGIES & FRUIT

A variety of organic vegetables (Green Leafy Types are Best) and fruit because they are high in Antioxidants/Vitamin C
Best Fruits: Papaya, Mango, Plums, Pears, Kiwi, Apples and Cherries

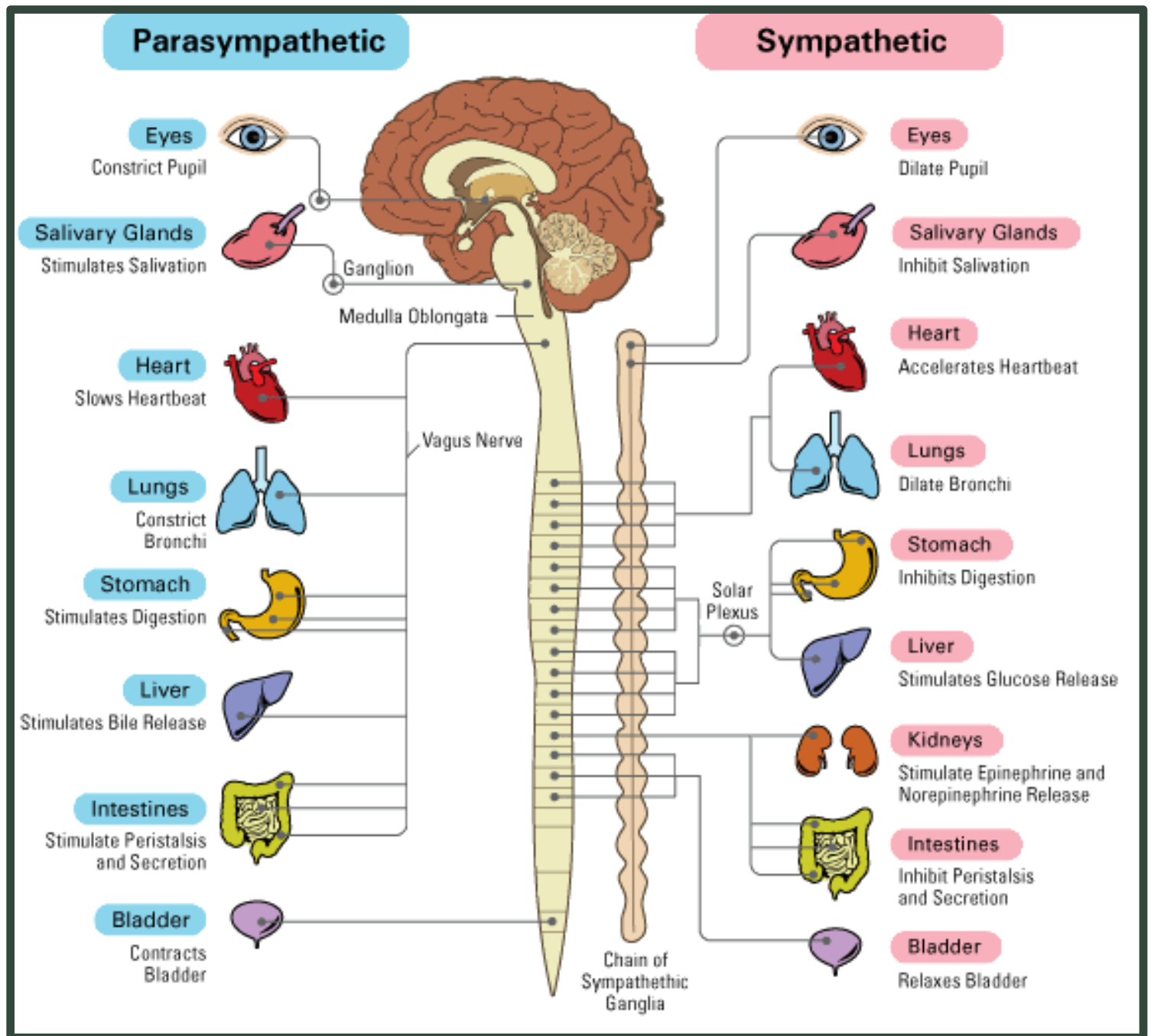
COMPLEX CARBS

High Fiber Versions like Whole Quinoa, Brown Rice & Oats

OMEGA-3s

Fish Oils, Nuts & Seeds (Hazelnuts, Walnuts, Cashews, Almonds & Chia, Hemp, Sunflower, Sesame & Pumpkin)

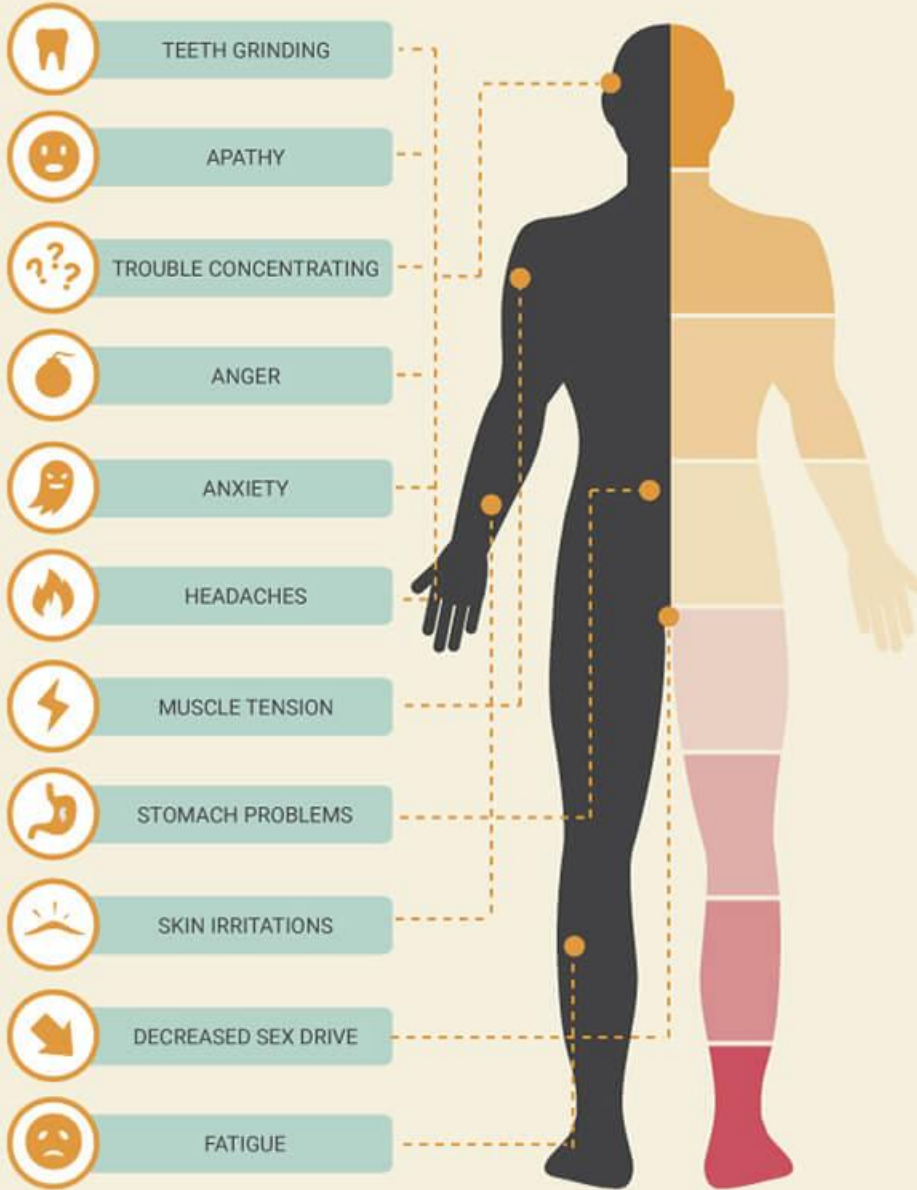
Takeaway 1:



Takeaway 2:

RECOGNIZING THE SYMPTOMS OF STRESS

THE EFFECTS OF STRESS ON THE BODY



Mood issues including anger, depression, irritability, Lack of energy, concentration problems, sleeping issues, headaches. Mental issues including anxiety disorders and panic attacks



Increased blood pressure, increased heart rate, higher cholesterol and risk of heart attack.



In the immune system, there is reduced ability to fight and recover from illness.



Stomach cramps, reflux, and nausea



Loss of libido, lower sperm production for men, and increased period pain women



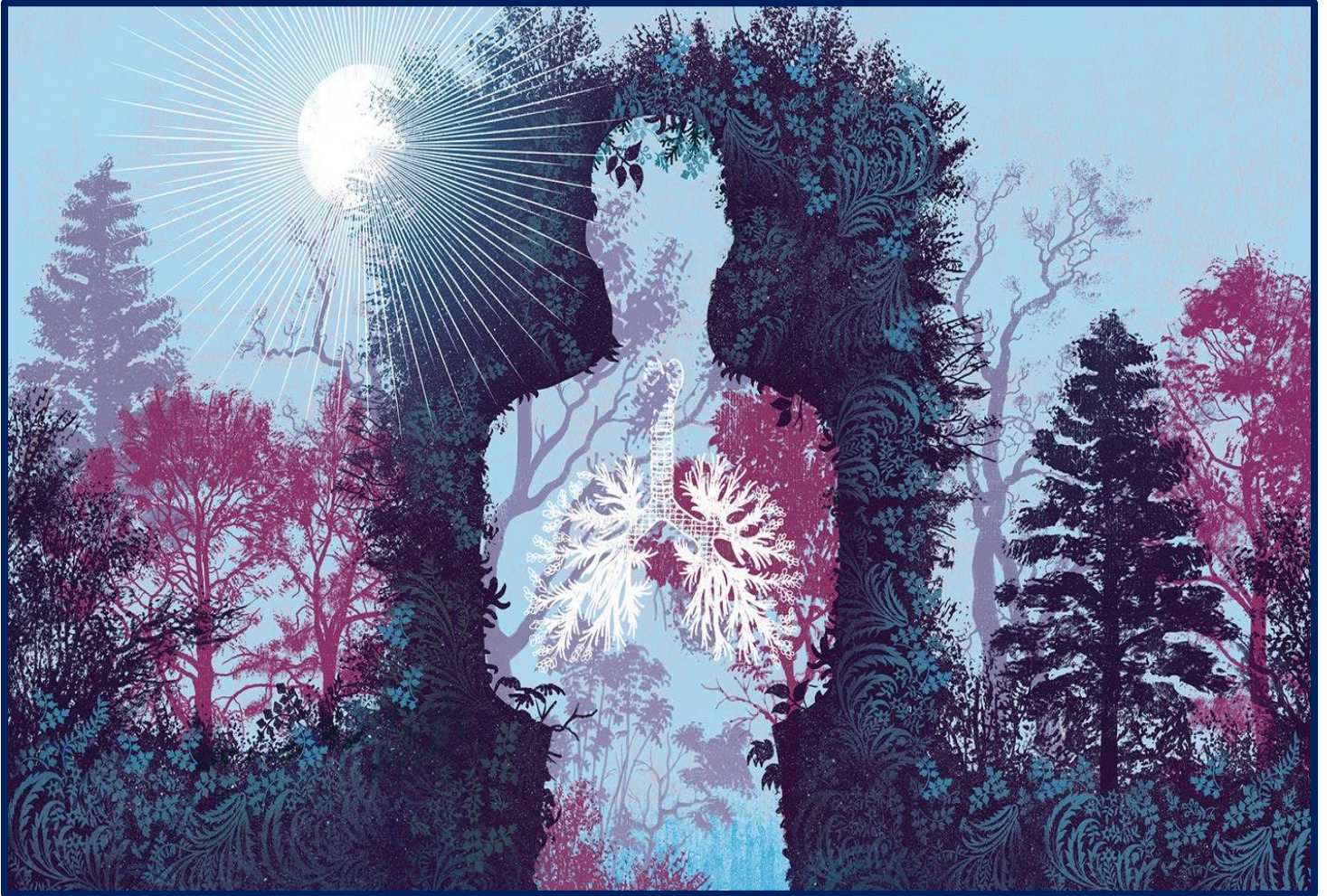
Aches and pains in the joint and muscles



Lower bone density



Counteractions: *Benefits of Mindfulness*



Stress in and of itself is not a bad state or condition: it can provide both a challenge and an incentive to formulate creative solutions to overcome it as well as opportunities to learn. It makes us tougher and more resilient to adversity, helping us grow stronger. This is true for psychological (mental) stress as well as physiological (physical) stress.

However, stress needs to be handled properly: when external stressors become internalized for prolonged periods of time or transition to a lifestyle, the body's compensatory mechanisms begin to develop negative feedback. Uninterrupted exposure to stress gradually erodes the immune system, inhibits the body's detoxification processes and makes hormonal, neural and physical effects on the body. As a consequence of our fast-paced, super-stimulated modern lifestyles, epitomized by jam-packed schedules, constant updates from social media, sedentary lifestyles, nutrient-empty diets and lack of quality sleep, most of the population have bodies constantly bombarded with uninterrupted stressors.

We've all experienced the racing heart, sweaty palms, more shallow and accelerated respirations that accompany moments of intense stress. Our bodies react via the fight-or-flight response, with increases in blood pressure, muscle tension, dilated pupils and hyperawareness to our surroundings. Although these survival mechanisms are advantageous at times of risk and danger, constant stress can push the fight-or-flight response to be activated all the time, which in turn can negatively affect our physical health and lead to increased incidence of chronic diseases.

One way of dealing with anxiety and stress, especially outside stressors, relies on some form of mindfulness to become consciously aware of our physical signs and symptoms of distress so we can manage and control it. This tool focuses on taking a step back and becoming an observer, trying to identify the active stressor (especially if it is a frequent trigger) and our subsequent reactive thought patterns and physical responses. Without judging, interfering or trying to repress the thoughts, behaviors or responses, try to remove yourself to the side and become a witness, consciously creating awareness of and cataloging both the catalyst and cascade of subsequent reactions. By simply forming the separation and focusing our awareness mentally, we can begin to consciously override and interrupt the automatic fight-or-flight response.



On a daily basis and at an even more basic level, we are often on automatic pilot throughout our day when working, juggling or engaged with our electronic devices, even to the extent of not paying attention to how we are feeling and going hours feeling hungry or thirsty. One of the most important things we can do for ourselves is to hit the pause button and climb out of the rabbit hole. Check in and refocus on our internal bodies—if you're hungry, eat something; if you're thirsty, get some water. Maybe you've been sitting for hours and your body is stiff and sore from a compromised alignment: get up, stretch, move around and loosen up your joints. If needed, consider setting an alarm to interrupt your process incrementally so you can take mindful check-ins periodically.

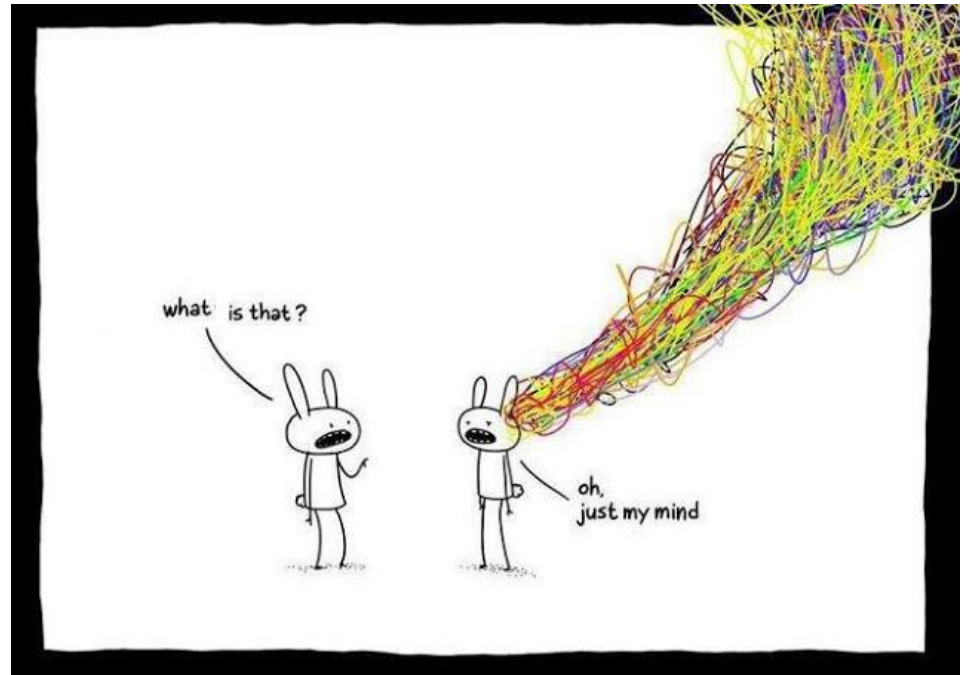


So what does being "mindful" or "mindfully" making a decision even mean? Why is it so important and what can it do for me? In essence, mindfulness means being in the moment, focused on the present and appreciating where you are, what you are experiencing and who you are sharing it with moment-to-moment. Practicing this type of mental focus requires putting down electronic devices, cameras, videos and

relishing the small moments as they occur. It also inherently means inhabiting the present and actively being present, not reliving the past, worrying about the future or otherwise being mentally occupied, distracted and just going through the motions.

Consider this: Have you ever felt stuck in your head, at the mercy of ongoing monologues criticizing, analyzing or trying to intellectualize things? Have you ever felt controlled by the drives and desires of your body, succumbing to impulses and cravings you know don't serve you? These are common disconnects which most of us experience to one degree or another.

These types of dissociations represent imbalances that ultimately prevent us from accessing the combined strength and wisdom of a mind-body connection. Worse, they can trigger self-judgement, insecurity, ambivalence, frustration and anger—reactive emotions that affect us and everyone around us. By engaging in mindfulness, we are able to recognize the importance of each piece of ourselves, break destructive cycles and habits in order to reintegrate those pieces together and restore the balance.



Mindfulness is a habit like anything else. It can be practiced and can be a powerful tool when exercised regularly. It can be applied to virtually everything you do in a day and be taken everywhere you go. By drawing our thoughts to our present reality and focusing on what we are doing, we take ourselves out of executing tasks or drifting by on autopilot. One way to think of it is to wake ourselves up and feel grounded with our surroundings, focusing only on the present moment of time, letting all the tasks and lists for later go. As we withdraw our focus from random and automatic to centered and conscious, we slowly become aware of our own bodily processes: our own breathing, sore muscles, fatigue, appetite. Likewise, our senses register and heighten the sights, sounds, tastes and textures around us. The ability to pull up and out of routine and fully appreciate and experience any given moment requires awareness, attention and practice.

Most importantly, becoming mindful of our habits, our feelings, our responses, our environment helps us to redirect the tendency of inevitably drifting through the days, weeks, months and years on autopilot. We gain appreciation for our capabilities and accomplishments and are able to analyze those parts of our lives that need improvement, adjustment and transformation from negative to positive. Being mindful and aware helps us become proactive in our own lives and move towards change to better.

Consider as well, it is not necessary to have an active spiritual practice or even to be a practicing Buddhist to use mindfulness. Mindfulness is much like yoga. Yoga has roots in Buddhism and Eastern meditation and teaches that our primary relationship is between the mind and body, and this forms the foundation of every other relationship. However, it is not necessarily a spiritual practice. Mindfulness and yoga utilize breathing exercises to calm and soothe the body. This is a technique not limited to just yoga studios but that is an appropriate facilitator when undergoing any physical exertion, emotionally charged situation or stressful transition. To be more mindful, you can adhere to any kind of spiritual background or religion—or none at all. You may notice, however, that you become more relaxed and in tune with yourself through mindfulness. This, in turn, can enhance your spirituality in general, whatever that may be.



Furthermore, when we emphasize bringing the body and mind together through yoga, meditation, mindfulness or other intervention, it empowers us to see more clearly and accept ourselves with compassion, which in turn allows our capacity to love others—boldly and unconditionally—grows. When our bodies and minds are joined, our personal relationships become stronger; when they're disconnected, our personal relationships suffer—and so do we.

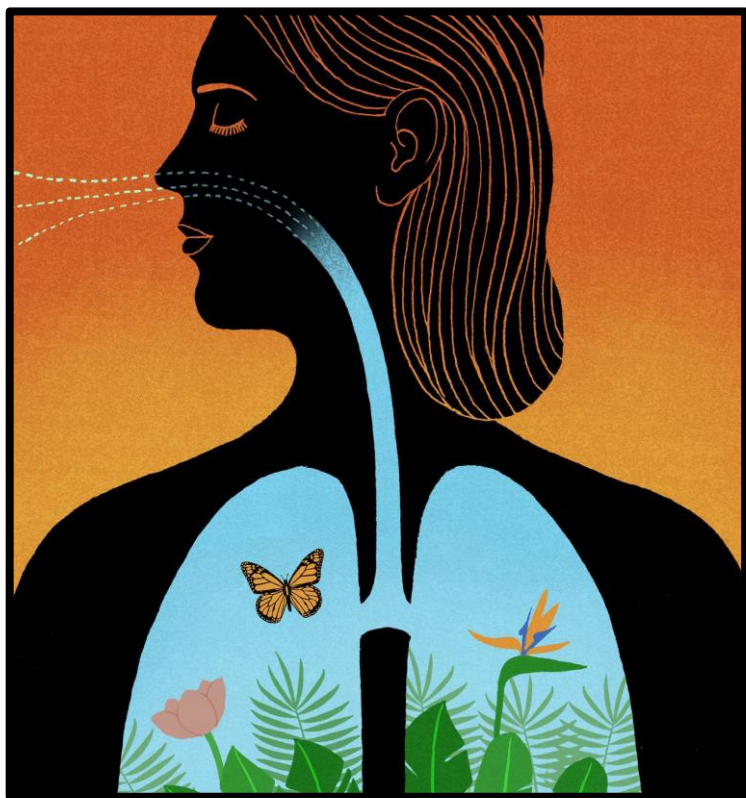
One tool batted around more regularly these days to achieve a more habitual mindful state is the act of meditation.

You may consider this as deliberately conducting a system-wide diagnostic scan within your own system: slow your pace, take yourself offline and unplug from all your screens and devices, disengage from the tasks awaiting your attention. By relaxing and taking a few moments to escape reality and



let our brains rest, we allow ourselves to become refreshed and better able to focus. Consciously dropping our technology, racing thoughts and focusing on just breathing and stilling our minds and bodies is easier said than done, especially in times of high stress or in the midst of concentrated distraction, and does require some practice.

However, physiologic research has discovered that by simply taking a number of deep breaths there is a calming influence on our minds and bodies through activation of our vagus nerve and parasympathetic nervous system. When we are harried, anxious or angry, by simply taking a number of slow, deep breaths through the nose that fill the lungs and slowly letting them out through the mouth we are able to halt our stressors right in their tracks: we lower our heart rates, reduce blood pressure, release tension, deepen relaxation, increase clarity of mind, increase emotional control. It only takes about 30 seconds for a 10-breath time-out that can ease our way forward with an entirely new resolve.



The next time—

...you are in the grip of
overwhelming urgency.

... prior to making a big
decision.

...you need to alleviate a bad
case of nerves.

...you are gathering your
resources for a large energy
expenditure or complex
mental/physical tasks.

5-2-7

- Inhale, count to five
- Hold your breath after inhaling, count to two
- Exhale, count to seven
- Repeat

Taking 2 minutes to practice
this 5-2-7 pattern breathing
exercise can improve your
decision-making performance
and prevent stress under
overwhelming psychological
pressure.

Breathing Exercises Benefits



Active meditation does not alleviate the physical, social and mental stressors that are byproducts of our busy lives. Instead, when practiced consistently, it improves our reactivity to distressing thoughts and feelings, it bolsters our self-awareness physically and emotionally, and it allows us to consciously make adjustments to buffer our stress responses by enhancement of our parasympathetic responses. In other words, meditation offers an escape valve to our daily pressures, a chance to tune inwards and hit our Reset button. Additionally, it has been proven that meditation offers many sustained health benefits, including reduced blood pressure, better posture, improved cardiovascular health, reduced feelings of stress and anxiety and enhanced mindfulness, to name a few.



HOW TO MEDITATE

Getting started with meditation is easy. One of the best features of meditation is that you don't need to buy anything. It is eminently portable; as long as you're conscious and willing, you can begin. Concentration meditation is a great technique to start with and you can perform it at home, the office or even parked in your car.

1. Pick Your Location

Find a peaceful spot. Although absolute silence is not required, a quiet setting will help with your concentration, especially if you are beginning.

2. Strike a Pose

You will need to stay in 1 pose for the duration of the exercise so make sure you are comfortable and relaxed. The more popular poses involve either a seated position with a straight back, cross-legged & with your hands resting on your knees (modified Lotus pose) or lying on your back with your arms at your side with palms facing up (Savasana or corpse pose). Once you've found a position that is most comfortable for you, try to attain stillness and calm the need to scratch or fidget. Take a moment to shift weight, adjust position and then allow your eyes to close. Focus on grounding, noting the parts of your body in contact with and fully supported by the surface beneath you. Allow a sinking in to occur, with your body completely melting downwards, either into your hips, pelvis and Sitz bones (lotus) or throughout the entirety of your posterior body surface (Savasana).



3. Breathe Easy

Don't force an irregular breathing pattern. Begin by exhaling completely, then inhaling slowly and deeply (about 5 counts) through the nose, allowing your chest, ribs and back to fully expand and contract with the movement of your lungs. Hold this breath (about 2 counts) and slowly but forcefully exhale through the mouth, squeezing out all the stale air (about 7 counts). Repeat this deep breath twice.

After these few initial deep breaths, Relax. Quiet your breathing, taking full but softened breaths, inhaling and exhaling only through the nose. Allow the abdomen to rise and fall as you pull air in and push air out in a soft rhythm comfortable for you.

Begin your meditation continuing to concentrate on the physical process of your body breathing...what it sounds like and feels like to move cool air in through the nose, downwards as it brushes along the throat and accumulating to fill the lungs. Note the natural rising and falling of your chest and abdomen as you pull air in and then release it back out again. If desired, you can place one hand over your heart and the other over your belly button to monitor these movements.

4. Stay Focused

Choose a physical sensation on which to focus. For many, just finding a comfortable position and remaining still to concentrate on the breathing is sufficient.



Don't be discouraged if you find your mind wandering to the future, the past or to all the to-do's awaiting; that's natural. Proceed without judging any thoughts or feelings that arise; instead, observe & acknowledge them without attachment, allowing them to drift by.

Simply bring your mind back and refocus on the breath. Especially when starting out, if you are continually having to redirect wandering thoughts, some find it helpful to refocus in an organized fashion; for example, by counting breaths or heart beats (1 through

10). Some prefer to repeat a simple mantra, silently repeating to yourself "Let" on every inhale and "Go" with every exhale. Regardless, the more you practice the easier it will be to remain focused but relaxed.

Once you've centered on the rhythm of the breath, expand your focus. Invoke your sense of hearing and listen to what is around you in the room, then shift to what's filtering in from outside of the room. Without moving or opening your eyes, shift your gaze internally to your seat (are you still grounded? Do you need to release a contracture in your hip flexors?), then the top of your head (are you slouching? Do you need to grow your crown upwards toward the ceiling again to extend through the spine?). Continue to focus your internal sight on your physical body and register your heart beating, perhaps even registering your pulse distally at your wrists or centrally in your abdomen. Can you soften any areas that may be unknowingly tight, such as the space between your eyebrows or the muscles of your jaw? Allow your tongue to drop away from the roof of the mouth. Allow the arms to drape naturally, releasing any tension in the muscles of your shoulders, elbows, wrists and fingers.

Be still, settle in and continue to breathe for the remainder of your allotted time.

5. Repeat

Perform this exercise every day. It does take consistent practice to become easier and notice the accruing benefits. Try to incorporate a daily habit, preferably at the same time of day which brings you the best results. Many choose either just before beginning the day to gather and prepare or right before bedtime to rejuvenate and relax.

You may begin with 1 or 2 minutes and increase the duration as you become more accustomed to the practice. With time, you will gain proficiency at remaining focused and also at refocusing when the mind wanders. Feeling rushed is a big distraction for many beginners so if your allotted time is short, then setting an alarm may be helpful.



Sleep Tight: *The Necessity of Sleep*

"Sleep is the golden chain that ties health and our bodies together."

~Thomas Dekker, Elizabethan dramatist~

S

leeping is a basic human need, like eating, drinking and breathing.

Like these other needs, sleeping is a vital part of the foundation for good health and well-being throughout our lifetimes, linking our bodies to lasting health. Every animal, without exception, exhibits at least a primitive form of sleep and virtually every system is affected by the quality and amount of sleep we get.

As we sleep, our bodies are involved in a multitude of intricate processes:

- ***healing/repairing damages incurred during the day***
- ***rebalancing healthy levels of hormones that support healthy growth & development of cells***
- ***detoxing the brain and body of waste products***
- ***maintenance of our immune systems for reliable peak responses***

Sleep may influence how much we eat, what we eat and how fast our metabolism runs. It influences how fat or thin we become, how well we fight off infections, how creative and insightful we can be, how easily we cope with stress, how quickly we process information and learn new things, and how well we can organize and store memories. Sleep deficits contribute to a myriad of problems with memory, mood and conditions as diverse as diabetes, excess weight, dementia and even early mortality. As we will explore throughout this quartet series, not getting enough restorative sleep also disrupts our ability to connect to the prefrontal cortex, making us more emotionally labile, reactive and impulsive [David Perlmutter, MD and Austin Perlmutter, MD. Brain Wash, pp. 129-130].

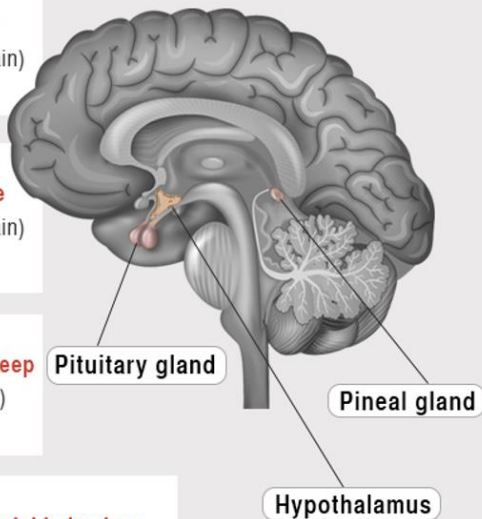
Like our food choices, sleep directly influences the expression of our DNA.

In early 2013, scientists in England found that a week of sleep deprivation altered the function of 711 genes, including some involved in stress, inflammation, immunity and metabolism.

Anything that negatively affects these important functions in the body also affects the brain.

We depend on those genes to produce a constant supply of proteins to replace or repair damaged tissue, so it's critical that they function properly.

Hormones released in the brain during sleep



Growth hormone:
> Essential for growth and tissue repair
- Produced in the pituitary gland (in the brain)
- Released during sleep

Antidiuretic hormone (ADH):
> Prevents the production of dilute urine
- Produced in the pituitary gland (in the brain)
- Levels of ADH increase during sleep

Melatonin:
> Signals to the body that it is time to sleep
- Produced in the pineal gland (in the brain)
- Released with increased darkness

Oxytocin:
> Involved in childbirth, lactation and social behaviour
- Produced in the hypothalamus (base of the brain)
- Levels peak after 5 hours of sleep
- Levels may influence the content of dreams

Prolactin:
> Involved in over 300 functions including lactation, metabolism and immune system regulation
- Produced in the pituitary gland
- Levels are higher during sleep than in daytime

Sleep Deprivation Symptoms

- **PHYSICAL:**
 - Decreased reflexes
 - Slowed response time
 - Reduction in word memory
 - Decreased reasoning and judgment
 - Cardiac dysrhythmias
 - Decreased auditory and visual alertness
- **PSYCHOLOGICAL:**
 - Mood swings
 - Disorientation
 - Irritability
 - Depression
 - Decreased motivation
 - agitation











Although we may not notice the side effects of poor sleep on a genetic level, we can certainly experience the observable effects: confusion, memory loss, brain fog, low immunity, obesity, cardiovascular disease, diabetes & depression. Despite the science, we cling to the idea that less sleep means we're able to get more things done by maximizing our productivity. We are encouraged to hustle, to get up early and grind until late in the night. This

mentality has relegated sleep to a second-tier level of importance & created a national debt that needs our attention.

[David Perlmutter, MD and Austin Perlmutter, MD. Brain Wash, pp. 129-130].

Stages of Sleep

Sleep is a multi-dimensional process, involving stages demarcated by differences in breathing patterns, brain waves and functionality. Our descent into sleep occurs quickly. When we stretch out, turn off the lights and close our eyes, if our circadian rhythm is on point with the flow of light-dark and our pineal gland is pumping melatonin in concert with the nighttime darkness and our other body rhythms align, then our neurons swiftly fall into sleep (Stage 1) [Michael Finkel. *The Science of Sleep*. National Geographic. August 2018, pp. 40-77].

		GAMMA
Intense Concentration and Learning		
		BETA
Problem-solving and Engaging		
		ALPHA
Relaxating and Recharging		
		THETA
Dreaming, "Auto-Pilot" States, Learning		
		DELTA
Deep, Dreamless Sleep		

"Neurons, some 86 billion of them, are the cells that form the World Wide Web of the brain, communicating with each other via electrical and chemical signals. When we're fully awake, neurons form a jostling crowd, a cellular lightning storm. When they fire evenly and rhythmically, expressed on an electroencephalogram (EEG) by neat rippled lines, it indicates that the brain has turned inward, away from the chaos of waking life. At the same time, our sensory receptors are muffled, and soon we're asleep." [Michael Finkel. *The Science of Sleep*. National Geographic. August 2018, pp. 40-77].

Our brains are not less active when we sleep but *differently* active. Through sleep spindles, brief but powerful bursts of synchronous neuronal firing, our brains are stimulated so as to preserve recently acquired information and perhaps also to link it to established knowledge in long-term memory. Sleep spindles are the defining characteristic of Stage 2. In addition to memory consolidation, accumulating evidence from sleep labs has linked proficiency of task performance, mental or physical, with the numbers and density of sleep spindles. Furthermore, dramatic reduction in numbers of sleep spindles have been demonstrated to have profound impairment in the sleep-dependent consolidation of procedural motor memory, a deficit characterized by the condition of schizophrenia.

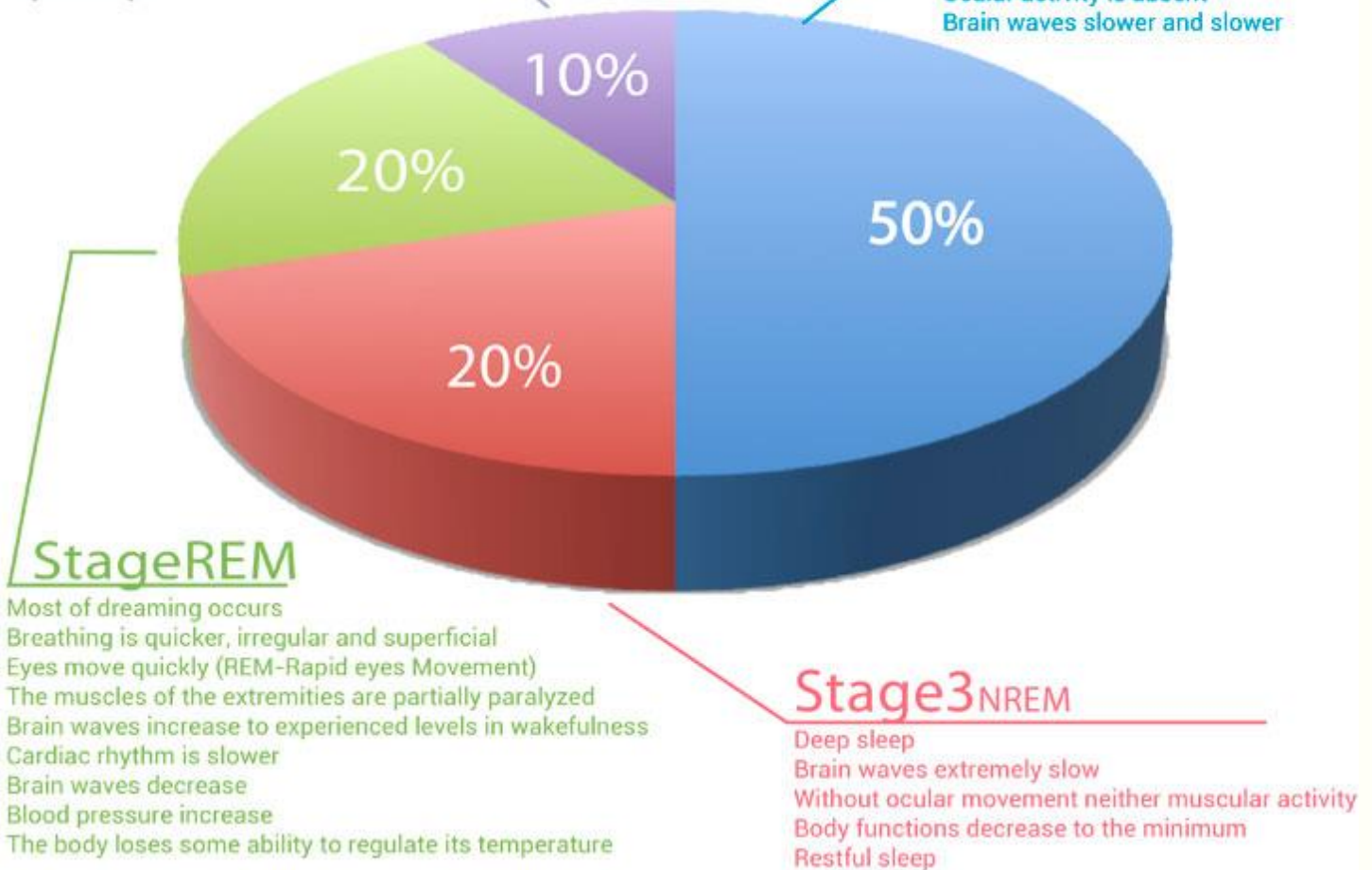
[Manoach et.al. *Sleep-Related Movement Disorders (SRMD) and Parasomnias*. Encyclopedia of Sleep. 2013].

Stage 1 NREM

Very light sleep
Eyes move slowly
Muscular activity slows down
Breathing becomes slow and constant
Myoclonic jerk

Stage 2 NREM

Deeper sleep
Complex K on EEG
Ocular activity is absent
Brain waves slower and slower



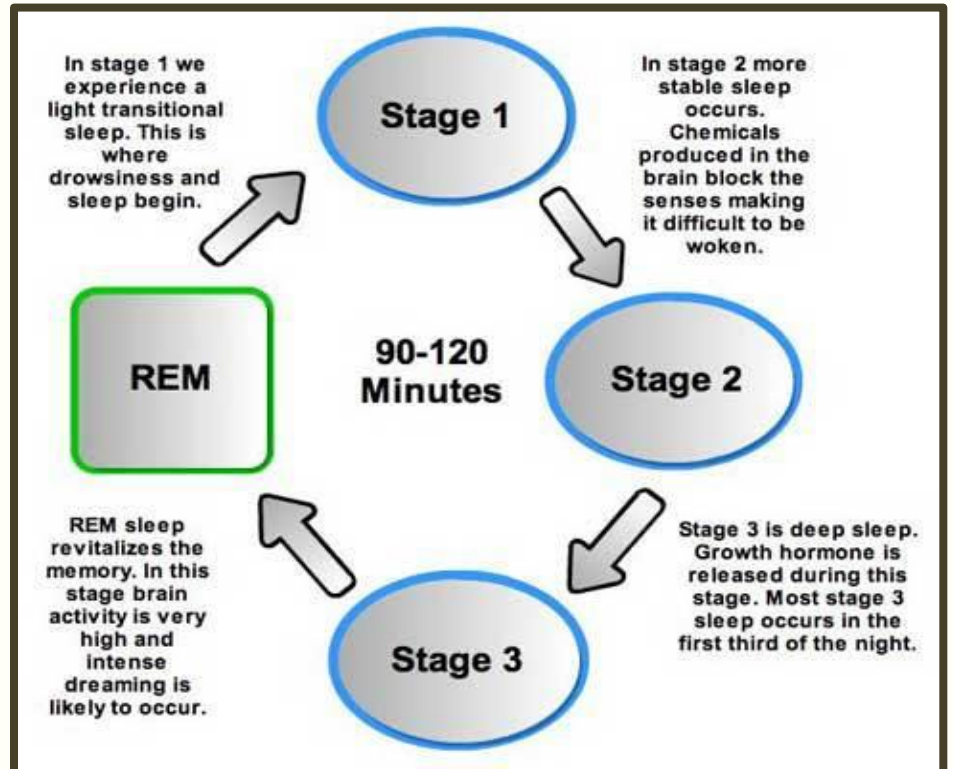
How many times have we puzzled over a solution to a problem or encountered difficulty with a new concept, only to wake up the next day with a whole new clarity and the ability to breeze through our previous stumbling blocks? There is great veracity to the old adage of putting it to the side, sleeping on it with the idea that things will look better in the morning. Sleep is a bridge. It literally makes connections possible that we might never have consciously formed: ideas we've only intuitively realized, connections between past experiences, old memories and new knowledge are all powerfully reinforced, integrated and distilled.

***“The waking brain is optimized for collecting information,
the sleeping brain for consolidating.***

At night we switch from recording to editing.”

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

As we enter Stage 3 (some sources further divide this cycle into stage 3 and stage 4) we proceed into deeper sleep, more defined by diminished responsiveness, reduced mobility and recuperative activities. It's during deep sleep that our cells produce growth hormone, which is needed throughout life to service bones and muscles, that we reduce inflammation, boost immune function, repair and regenerate tissues, build bone and muscle and restore energy. While all this housekeeping and repair occurs, our muscles are fully relaxed and mental activity is minimal.



The REM stage of sleep can be compared to a rabbit hole we each descend to star in our own personal *Alice in Wonderland* story. REM sleep is ruled by the limbic system, our most primitive deep brain region, the seat of our emotions—elation, joy, love, passion, aggression, fear—and home to our most savage and baser instincts. Here we are free of conscious control, let loose to dream in wild technicolor, with full reign to imagine, do, be, experience anything, no matter how fantastical, impossible, forbidden, dangerous. Due to a shift in neurotransmitter production, we are in a chemically altered state of consciousness: our brains are literally on a mini-vacay, deprived of continual sensory input and independent of the logic centers and impulse-control regions that dominate our hours spent awake. *[Michael Finkel. The Science of Sleep. National Geographic. August 2018, pp. 40-77].*

While we are under the influence of REM sleep, our muscles, with a few exceptions—eyes, ears, heart, diaphragm, undergo a pseudo-paralysis and become immobilized. Our bodies no longer thermoregulate and our internal temperature remains at its lowest setting; we are literally out cold. Our sexual organs become engorged. At the cellular level, protein synthesis peaks, keeping the body working properly. We believe the unbelievable; despite all evidence to the contrary, we're almost always convinced we're awake. REM sleep also seems essential for regulating mood and consolidating memories.

[Michael Sinkel. *The Science of Sleep*. National Geographic. August 2018, pp. 40-77].

Generally, a healthy sleep begins with a spiral down through the non-REM stages to deep sleep, a momentary return to wakefulness, followed by a 5- to 20-minute REM session. With each ensuing cycle, REM time roughly doubles. Overall REM sleep occupies only about one-fifth of total rest time in adults, with stages 1-3 or non-REM sleep, occupying 80% of our cycle.

Takeaway 1: Sleep deprivation is a condition that occurs if you don't get enough sleep.

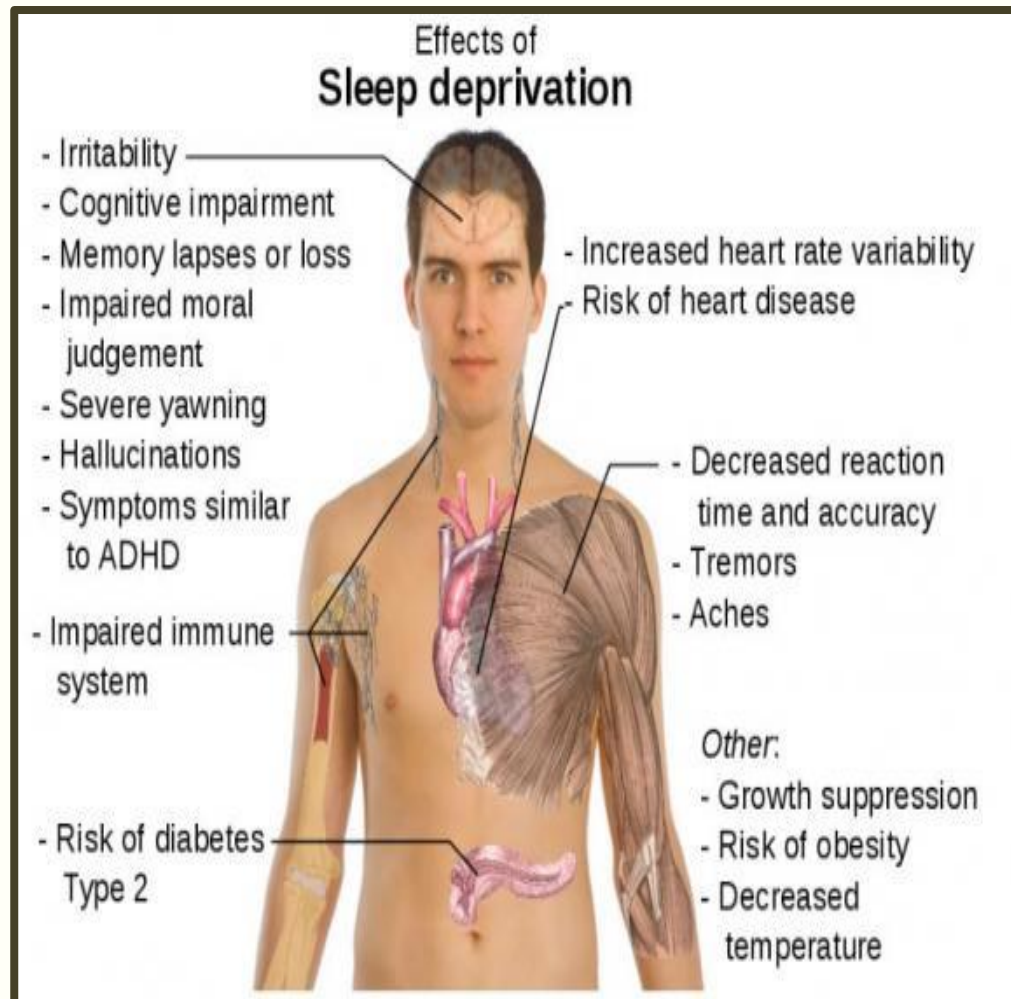
Sleep deficiency is a broader concept that occurs if you have 1 or more of the following:

You don't get enough sleep (sleep deprivation)

You sleep at the wrong time of day (out of sync with body's natural clock)

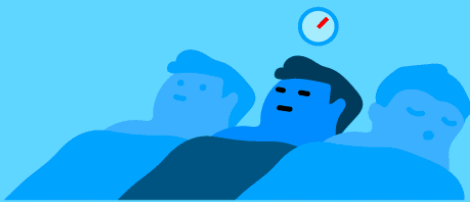
You don't sleep well or get all of the different types of sleep that your body needs

You have a sleep disorder that prevents you from getting enough sleep or causes poor quality sleep



Takeaway 2: The 2 basic types of sleep include rapid eye movement (REM) where we dream and non-REM, which is known as deep sleep or slow-wave sleep. Generally, non-REM and REM sleep occur in a regular pattern of 3-5 cycles each night. Our ability to function and feel well while we're awake depends on whether we're getting enough total sleep and enough of each type of sleep. It also depends on whether we're sleeping at a time when our body is prepared and ready to sleep.

The 4 Stages of Sleep



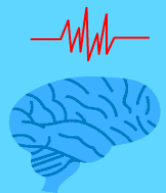
NREM Stage 1

- transition period between wakefulness and sleep
- lasts around 5 to 10 minutes



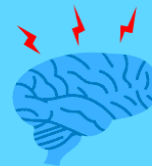
NREM Stage 3

- muscles relax
- blood pressure and breathing rate drop
- deepest sleep occurs



NREM Stage 2

- body temperature drops and heart rate begins to slow
- brain begins to produce sleep spindles
- lasts approximately 20 minutes



REM Sleep

- brain becomes more active
- body becomes relaxed and immobilized
- dreams occur
- eyes move rapidly

Resources:

*Excerpts within this article taken from the following texts:

David Perlmutter, MD and Austin Perlmutter, MD. *Brain Wash*, pp. 129-130

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

Manoach et.al. *Sleep-Related Movement Disorders (SRMD) and Parasomnias*. *Encyclopedia of Sleep*. 2013.

Wellness Challenge: **Power to Choose**

Choice is one of our mind-body connections which provide us transit from our mental options to our physical actions. It is linked to our attitudes, our will to commit and our perseverance to continue regardless of any obstacles that may rise up to block our path. It is at the seat of our individual power and when choice is invoked it drives us forward to overcome hardships, inconveniences, personal inconsistencies, and impossible odds.

One such example was discovered at the end of World War 2 during interviews conducted with Jewish survivors after their liberation from Nazi concentration camps. One dialogue queried how, at the very end of the war and after years in the camp enduring a multitude of physical and mental hardships, one survivor had made it through the final grueling weeks when no food was dispensed of any kind. With the war lost, Germans defeated and scattering, simply abandoning the camps, How did this emaciated prisoner of war endure impossible conditions and hang on until rescue when so many others succumbed and died of accumulations of mistreatment, malnutrition and disease?

The survivor explained that when he heard the circulating news that food would be completely withheld, he made an independent choice for himself and set about completing a fast by his own design. Again, he mentally chose and personally decided that he would commit to and uphold a fast apart from any decisions imposed by his captors. By his choice, the Nazi's could not impose their will, their desperation or their punishment onto him. By his choice, he accepted, persevered and survived the last few weeks of the Holocaust and gained his release from the camp when so many others were lost.

Choice is Power: *With it, we can create our own path, generate our own success, claim our own futures. When we choose to exercise our power of choice, we can become our own heroes, realize our most ambitious goals, and sometimes succeed beyond our wildest dreams, hopes or expectations.*

Choose who you are around judiciously: *Find your teachers and those who uplift, support and inspire. Reject the black holes and ditch those that bring you down or dwell on the negatives.*

Choose how you think of yourself wisely: *Cherish your goals, your victories, your defeats, your challenges, your mistakes, your family/home/life you have worked to achieve. Cherish all that makes you who you are. Most other people's opinions don't count.*

*To quote the illustrious Dr. Seuss,
'Be who you are and say what you feel,
because those who mind don't matter
and those who matter don't mind.'*

Choose what stressors are really worth it: *Like the mantra we learn in grade school for fire safety, 'Stop, Drop and Roll,' consider adopting this phrase or one like it to help facilitate counteractive measures, mindfully acknowledging a moment, breathing, adjusting perspective. In the coming week, when an event occurs that finds you emotionally, physically and/or psychologically heightened, use your phrase to: Stop, mentally step back and take time to breathe. Drop, dial back on the drama and think objectively. Roll forward with a new resolve. In this way, practice stepping back to analyze a heated moment, weighing how much time and energy you'd like to emotionally invest and then course-correcting if needed.*

Today, Choose to enjoy life and take a time out in a given moment, hurried or not, to look around and see, breathe and appreciate the view, your health, your blessings before continuing your day. Keep in mind that taking 10 breaths of mindful appreciation equates to only 30 seconds of your day. Slow the rush, ease the strain and just breathe.

In upcoming weeks, When you encounter typical daily struggles and unforeseen challenges, begin to consider some of your Choices: to start or stop; to quit or try again; to proceed with a positive attitude or endure with a negative attitude; to embrace change and see where it takes you or to stay where you are and remain the same. Then mindfully choose, employ all the tools in your toolbox to steady yourself, to ready yourself and to continue your journey forward with new determination.



Editor's Note: *Ripples of Gold*

Fall has always been my favorite season and for some reason it always transports me right back to my grandmother's kitchen...golden light streaming through a wall of kitchen windows into a small room made toasty warm from the heat of the stove where canned and frozen veggies from summer are busily bubbling and simmering in a huge soup pot...

Outside of the maze of memory, the autumn textures, smells, the very stir of the air calls to the senses: The clarity of vistas only experienced with lower humidity and cooler temps. Bright color-filled days with trees ablaze in vibrant burgundy-reds, unreproducible salmon-pinks and brilliant golden-orange contrasted by thickening purple shadows closing the curtains of early dark. Crisp winds swirling crackly leaves in miniature tornadoes. Smoky traces lingering in the air from wood stoves, firepits, campfires and bonfires. Bountiful harvests abounding with muscadine and scuppernong grapes, apples, gourds, squashes and pumpkins, figs and quince. Even the spices utilized in the kitchen seem richer, an earthy mixture of cinnamon and nutmeg and clove heightening once-a-year favorites (persimmon pudding!!).

Pulling the fall quartet series together has been quite compelling, and I feel the resulting issues will complement the distinctive shades of the upcoming season...in a word, elemental, with evocations of fire and water, sun and moon, light and dark. As we continue to grow our foundation and journey together deeper into the season of harvests, of celebrations, where the days become shorter and shorter, I hope the topics we have chosen will ripple and wind through the autumnal season, enrich your health practices and perhaps illuminate a few dark corners.

This year's addition of a monthly newsletter has been quite the adventure (with unexpectedly steep learning curves at times!) in my own personal journey through wellness, and I hope you as readers have been able to find nuggets applicable to and capable of enhancing your own stories as well. Our mission at Power of 1 Wellness from the onset has been to shine a light and tease apart the complex, sometimes seemingly contradictory, overlapping aspects of wellness that act in concert to produce a robust symphony of health. I hope in this endeavor we have succeeded beyond all measure.

Shine on!!

