# Quantum Biology 10: Hormones 102

## Readers Summary:

1. What is the next step to the Hormone 101 blog on clinical hormones?
2. Review of the hormone cascade?
3. Did you miss the key part of the conversion?
4. What is it about Vitamin A that no one seems to get?
5. How does Vitamin A tie to neuro-immune and endocrine diseases and disease of the human neocortex?

Two years ago I gave you the Hormone 101: Clinical thoughts revealed blog post. That was a small dose of reality at the beginning of this journey. There was some foundational hormone biochemistry there given to you in simple terms. Most people jumped all over the free T3 link to pregnenolone in the post. They thought that "their cure" for hypothyroidism and/or chronic pregnenolone steal syndrome was increasing free T3 or just lowering reverse T3 to raise pregnenolone. **So what was not observed**?

# A trip down memory lane for the hormone cascade

Leptin resistance occurs first in the brain. Then insulin resistance happens soon their after in the liver, gut, and peripheral tissues. This eventually leads to adrenal resistance. This resistance occurs at the PVN in the brain. It does not happen in the adrenal gland. What happens is that the outflow from our sympathetic system in the brainstem overwhelms the parasympathetic nervous system. This increase in overall cortisol initially, is the stress hormone that

allows for fight or flight syndrome (life or death). As this condition persists chronically over time, cortisol levels decrease and flatline on adrenal stress index testing.

Evolutionary design always makes sure just enough cortisol production is available for life's action to occur at the expense of the other hormones that also are made from the same precursor hormones. You learned in the Hormone 101: Clinical thoughts revealed blog post that this precursor is pregnenolone. Pregnenolone is made from the conversion of cholesterol, and cholesterol is made from LDL.

So anytime the body is stressed or inflamed for any reason, both good and bad,  it up-regulates LDL cholesterol production to make more lifesaving hormones.

This conversion requires **free T3 and vitamin A** as **cofactors** to complete this step.  Blocking cholesterol production, for any reason at all both good or bad,  will increase cellular stress and result in inflammation.  Molecular chaos is what we call inflammation.  In times of infection or stress, LDL levels are always designed to rise to protect the cell.  This is precisely what we observe in clinical medicine.  It also makes the point of trying to lower LDL cholesterol seem rather odd when you understand how the hormone system is designed to work.  Vitamin A is also called retinol and it is normally found bound to every opsin protein in humans.  It is designed to work with visible light from the sun only.  Today, it is being forced to work within the spectrum emitted by technology devices.  This creates massive optical signaling problems in cells.  The major collateral damage is in how protons can operate in cells properly.

So you might be asking what might you have missed?

The last blog about pseudotumor cerebri told you that Vitamin A cycling in the brain is linked to the photoperiod from our environment.  This is a 100 epigenetic signal.  It implies

Vitamin A is how the brain codifies the light cycle for a normal physiologic function to tell time in our SCN. It also means Vitamin cycling has to be correct for you to convert cholesterol to pregnenolone in your brain and peripheral target tissues where hormones are made to make the other hormones you also need!!! What is a 50 cofactor of converting cholesterol to pregnenolone? Vitamin A is the answer. I told you this in the Hormone 101: Clinical thoughts revealed blog post. This is not just a low free T3 story for low pregnenolone. The sun optimized both T3 and Vitamin A cycles in humans. Your technology gear ruins both. On my blog and my forum, very few people have caught that **pregnenolone concentration is more dependent upon the Vitamin A level in the brain** than the thyroid's free T3 level in the brain or body. Why?

# Why is it that no one talks about Vitamin A in the brain?

Simple, they can not measure it directly with labs. I told you in Brain Gut 11 that close to 50 of the circuits in our brain are wired to light and not to dietary metabolism!!!!

How important? **Consider this biologic factoid:** "Songbird studies examine the effects of retinoid signaling on vocal/auditory learning and are uniquely suited to study the behavioral effects of Vitamin A Deficiency because the neural circuitry of the song system is discrete and well understood. **Similar to human speech acquisition**, avian vocal learning proceeds in well-defined stages of template acquisition, rendition and maturation. Local blockade of retinoic acid production in the brain or excess dietary retinoic acid results in the failure of song maturation, yet does not affect prior song acquisition. Together these results yield significant insights into the role of vitamin A in maintaining neuronal plasticity and cognitive function in adulthood."

**Vitamin A helps humans acquire speech.** You think anyone in autism research might be interested in that link? I told you recently in a podcast with Dr. Tim Jackson, of MTHFR support, that I believed autism was 100 an epigenetic disease tied to mitochondrial damage. Here is one of many reasons why I believe this.

In the central nervous system, the function of retinoic acid, the active metabolite of vitamin A, is best understood from its action in guiding embryonic development in the brain, specifically the neocortex; as development comes to completion at term, retinoic acid signaling declines in the fetus. Alterations in retinoic acid during pregnancy, however, has marked effects on the development of the neocortex in humans. The neocortex is the part of the surface of the brain where most of the functions that separate us from chimps and other animals are located. **This has big implications for a disease like autism.** All speech areas are formed on the neocortex in the frontal and temporal lobes. Social interactions are built into the surface of the temporal and parietal neocortex. Neocortical development of humans begins at 5-8 weeks gestation. Check this hyperlink for more on this. This means that the environment that cortex is in then (the mother's environment) is when the bad wiring begins. So before you get pregnant, you might want to optimize your free T3 and your vitamin A cycle in your brain. It also means that later children will be at higher risk since the firstborn tends to get most of the mom's best substrates needed to build a human body. Even living in a polluted city can block the light from your eyes and cause issues.

However, it is becoming increasingly clear that this Vitamin A signaling mechanism **does not disappear** in the young child or adult brain, but becomes **more regionally focused in the hypothalamus** and takes on new physiologic roles. Vitamin A is required for opsin functionality. These functions are often tied to processes of neural plasticity whether in the

hippocampus that allow us to learn. This is why learning of language and social cues is slowed. They tend to occur in the neocortex by the age of 6 years old for both cognitive functions. This happens via complex multiple pathways of development under the control of BDNF, progesterone, cortisol, and melatonin; we believe humans control homeostatic neural plasticity using Vitamin A in the olfactory bulb and the hypothalamus as adults based on the latest data we have. The role of retinoic acid in the control of neuro-plastic processes has led to suggestions of its involvement in many neurologic disorders, autism, and both degenerative and psychiatric conditions. Most are linked to the movement or lack of movement of protons easily within the TCA and urea cycles.

These new links were big **epigenetic clues** that electrons from your diet might not be the biggest factor in how your brain manages to tell about energy balance for your cerebral cortex. Vitamin A is not really a story tied to our diet. We get plenty of vitamin A from food, but how we use it in the brain is tied to the correct season and the photoperiod of a day. I laid this out in the hyperlink from the Salk Institute in the last blog. In fact, human embryology is apparently tied directly to mother's Vitamin A stores and how her brain has codified the photoperiod in the life she lives with prior to pregnancy. Codification of the photoperiod in humans takes the substrate epigenetic signal, called visible light (EMF), and marries the absence of it to make a chemical signal using Vitamin A cycling in the brain. This all gets its origins from the photoelectric effect of the sun on our retina. This is why diseases of the brain often have photophobia associated with them, like concussions, migraines, hot flashes, pseudotumor, and brain tumors, and certain dementia's.

The electrons we get from food seem to codified in the free T3 level from our thyroid. This is why I suggest 18 months ago that electrons from food and from the environment are coded

for differently in the quantum electron blog post, Do Food Electrons Impart a Quantum Effect? The electrons from food only count for only 10 of the current that moves along electron chain transport to oxygen in our mitochondria. The electrons and photons from light count close to 5 times as much. This is why pseudotumor cerebri and obesity are diseases linked to 'light issues". It is also why migraines are linked to the same process. 1 in 6 women worldwide is affected by migraines. They also tend to be hypothyroid and have chronic low pregnenolone. Coincidence?

So how do know if the brain has lost its tight control over Vitamin A in the brain? I told you how this might occur in Brain Gut 11. The tell-tale signs on labs testing will have an altered adrenal stress index and have an altered salivary melatonin level. This underscores why clinicians may miss these connections because these tests are rarely ordered unless you are a pilot or truck driver who is being monitored by the FAA or NTSB. It appears the government realizes these tests are important for people whose jobs are tied to exposure to fake light. What clinicians are not realizing and many of you are beginning to see is that mankind is now affected by the very same issues.

You can never hope to repair your chronic pregnenolone steal syndrome with maneuvers to raise free T3 or lower reverse T3 without first addressing your photoperiod and the Vitamin A cycle in the brain. This is why for 2.5 years I have been a stickler for circadian signaling to light and dark. You will never solve the low free T3 or high reverse T3 without first addressing the Vitamin A issue. The light day cycle for humans is massively important.

The analogy I provided you in CPC #6 should open 'your perception' to what you keep missing. The photoperiod has to be accurately accounted for. Moreover, your timing of sleep must occur precisely within that **daylight and night cycle correct for your season and global location** to get back what

you have lost.  If you have a persistently low free T3, high reverse T3, low pregnenolone, and you struggle to get to optimal,  you may now see why this is hard to fix. You need to tighten the reigns on light and dark and pay close attention to seasonal changes because your brain and body do.

# Vitamin A 101

When we speak of dietary Vitamin A we are speaking of retinol and not beta-carotene in vegetables.  They are not equivalent in a quantized brain.  In fact, most of the problems with long-term vegetarians are directly tied to a loss of the Vitamin A cycle in the brain.  Vitamin A in the form of retinol only comes in animal foods.  So what does Vitamin A do?  Most people know that Vitamin A is huge in vision and sight and uses ***opsins***.  Vitamin A is critical in the quantum photo-transduction of light in our retina.  A lack of Vitamin A makes it impossible to see in low light environments because Vitamin A is needed for the optimal physiologic optics found in our cornea and our retina.  Many parts of our retina cannot use the TCA cycle.  These optics all operate under the laws of quantum mechanics.  If the epigenetics are off, then the underlying physiology that runs our biology is off.  The photobiology is well known to scientists and clinicians but incredibly complex even for the well educated.  Most of them only appreciate the detail on a surface level of understanding.  The problem is the Vitamin A cycle accounts for 5 times more biologic power than does our diet because it is involved with transferring information in the eye over energy.  We can say this because the retina uses a Warburg metabolism.  That is not common knowledge even to the most learned in any field.  It underlies why the drug Cycloset has a massive effect on diabetes **without using** insulin pathways in its mechanism of action.  Most people believe insulin is the primordial etiology of diabetes.  I do not because of my observations of light and how the brain codifies it using protons in the TCA cycle.

This observation has passed by most inquiring minds in research circles.  Nature gives us clues to her mystery every day if our mind is open to her whispers.  Her secrets are found in the sublime realities of life, not the common ones.  We do so many things today in science without grace and beauty, because we miss her lessons. The sublime things are the things hiding in the shadows of life, the silence of nature, the small things that the big mass of humans does not examine.  When you pay attention to these signs, it is like using Mother Nature as your playmate or research assistant. You have to leave the 'city' of your comfort and go into the wilderness of your intuition, and when you do,  you find what we might be capable of.  We often find answers by being observant of the little things everyone else ignores or takes for granted.

# Immune System

How many times have we heard some talk about the link between poor sleep to immunity but completely fail to explain why this observation is made?  The short answer is Vitamin A recycling being yoked correctly to light and dark.  When we can't sleep well, the immune system molecular clocks go awry.  Why?

Vitamin A controls this process.  This link I believe is huge in the development of many autoimmune diseases and in some genetic ones like cystic fibrosis.  It is now well established that widespread immune alterations, anemia, and increased infectious disease morbidity and mortality occur during vitamin A deficiency.  What is not commonly know is how it ties to the molecular clocks of the immune system by way of the brain.  Infectious diseases that induce the acute-phase response also impair the assessment of vitamin A status by transiently depressing serum retinol concentrations. Vitamin A deficiency impairs innate immunity by impeding normal regeneration of mucosal barriers damaged by infection, and by diminishing the function of neutrophils, macrophages, and natural killer cells. Vitamin A is also required for adaptive

immunity and plays a role in the development of T both-helper (Th) cells and B-cells. In particular, vitamin A deficiency diminishes antibody-mediated responses directed by Th2 cells, although some aspects of Th1-mediated immunity are also diminished. These changes in mucosal epithelial regeneration and immune function presumably account for the increased mortality seen in vitamin A-deficient infants, young children, and pregnant women in many areas of the world today.

# Vitamin A, Sleep, and Immunity

Sleep is when humans rebuild our biologic cellular terroir (think levee one). During this time, the immune system is also undergoing autophagic repair as well. This is why sleep and repair are linked. They occur only when we are maximally chemically reduced. Quantum chemistry works best in cold. Semiconductive currents increase with lower temperatures. That is another reason why the temperature has to fall in our bodies at night. Melatonin controls that process in the hypothalamus. Our immune system repairs and **gets stronger at cooler temperatures during fasting**. When the environment is cooler it means mitochondria are using UCP to generate free heat. When we fast we are doing the same thing. We are turning our subcutaneous fat to CO2 and to water. That water is homogeneous in the matrix. The careful observer will note, the chemical signal the immune system reacts to, however, is a fever. When a fever is present it signifies a temperature rise, and this causes certain immune cells to morph into antigen presenting cells and natural killer cells. Something changes in immune cells. This activation depletes our immune system of its reserves during high light waking hours when we are oxidized by the what life requires during wakefulness. Dropping our temperature as we sleep allows us to replenish our immunity. What controls this entire orchestra of hormonal regulation? It is the circadian photoperiod that controls these unseen movements in the matrix. The brain has to tell when we are facing oxidation and when we are in a

period of chemical reduction.  Vitamin A is critical in yoking light to leptin at our SCN.  The SCN is the part of your brain that is entrained to light and dark cycles.  Light is yoked to leptin via the Vitamin A cycle in the brain.  Vitamin A is the quantum signal obtained via your retina, transduced into a chemical message in your hypothalamic leptin receptor.  The photoperiod is yoked to leptin and the brain is the master receptive organ to this epigenetic EMF from the sun.

Sleep is a time for recycling and rebuilding to get us ready for the next day.  Wound healing has been shown to be affected by sleep. A study conducted by Gumustekin et al. in 2004 shows sleep deprivation hinders the healing of burns on rats.

It has been shown that sleep deprivation affects the immune system function directly. In a study by Zager et al. in 2007, rats were deprived of sleep for 24 hours. When compared with a control group, the sleep-deprived rats' blood tests indicated a 20 decrease in white blood cell count, a significant change in the immune system.  It is now possible to state that sleep loss impairs immune function and any immune challenges directly alter sleep.

Moreover,  it has been suggested that eutherian mammals that invest in longer sleep times are investing in strengthening their immune system to compensate for the environment they are adapted too.  This may explain why blue light has had massive effects on the man in 50 short years.  Comparative anatomical studies on species with the longer sleep times have shown higher white blood cell counts as a rule. Rats kept awake indefinitely develop skin lesions, hyperphagia, loss of body mass, hypothermia, and, eventually, fatal sepsis.

It has now been shown that sleep increases telomere lengths on leukocytes in humans. Sleep has also been shown to effectively combat the accumulation of free radicals in the brain, by increasing the efficiency of endogenous antioxidant mechanisms in the brain. What are those systems?  They are melatonin,

DHEA, and the oxytocin systems. We spoke about them in Brain Gut 11. We followed it up with a deeper scale of meaning using neural chemistry in Brain Gut 16. You might connect more dots.

These mechanisms are mediated by the hormone DHEA which is one of the major antioxidants in the brain and correlates directly with effective sleep by lowering IL-6 levels. Higher IL-6 levels are seen in people with altered adrenal stress index testing and those with altered melatonin cycles. When melatonin cycles are altered it creates an imbalance in Magnesium-calcium optimization inside the cells of the brain. The result is dehydration and a change in the density of water in our CSF. This is very similar to what we see in pseudotumor cerebri. It also may help you understand what causes a hangover headache and why re-hydration seems to help. When the Mag-Ca balance is off it tells the astute clinician that melatonin and serotonin balance is also off in the brain-gut axis. All the quantum physiology in this post has a common tie to the neural-immune and endocrine systems and many of the diseases that still perplex modern healthcare.

Progesterone is another critical hormone for brain homeostasis and learning as well. We spoke about it in Brain Gut 16. We make progesterone directly from pregnenolone. We make pregnenolone from LDL cholesterol proper levels of free T3 and proper Vitamin A cycles in the brain. This is why the brain is a major source of cholesterol synthesis normally. In neurodegenerative diseases, cholesterol formation is dramatically lowered in the brain. This means that we can not make the proper amount or pregnenolone or progesterone. One can not sleep well if progesterone is low in the brain. Sleep is vital to mammals, but it is supremely vital to humans because they have shrunk the benefits of hibernation found in all eutherian mammals into two short critical hours of our sleep cycle at night. This occurred because the massive rapid growth of our brains extinguished the need to sleep through

the winter months.  It also helped that the world we evolved into was equatorial and had 12-hour constant photoperiod.  There is little photoperiod variability normally at the equator.  Today that is no longer true for humans.

Since man can directly control his environment to light,  being awake during winter was naturally selected for in his direct ancestors, the primates,  because they have the same natural adaptations. The programs that control our fat mass (leptin) however still remain tied to our ability to sleep well.

**Sleep Geeks:**  The homeostatic sleep propensity (the need for sleep as a function of the amount of time elapsed since the last adequate sleep episode is 100 controlled by the photoperiod) must be balanced against the circadian element for satisfactory sleep. These things are controlled along with corresponding messages from the circadian clock (SCN); this signal from the brain tells the body it needs to sleep.  Sleep duration is affected by the DEC2 gene. **The optimal amount of sleep is not a meaningful concept unless the timing of that sleep is seen in relation to an individual's circadian rhythms.** A person's major sleep episode is relatively inefficient and inadequate when it occurs at the "wrong" time of day; one should be asleep at least six hours before the lowest body temperature for optimal functioning. The timing is correct when the following two circadian markers occur after the middle of the sleep episode and before awakening:

1. maximum concentration of the hormone melatonin, and (you can test this but it's hard because you got to wake up at 3 AM)
2. minimum core body temperature. (Easy to record with new sleep aids)

# Sleep Implications

A University of California, San Diego psychiatry study of more than one million adults found that people who live the longest self-report sleeping for six to seven hours each night. Another study of sleep duration and mortality risk in women showed similar results. Researchers at the University of Warwick and University College London have found that lack of sleep can more than double the risk of death from cardiovascular disease, but that too much sleep can also be associated with a doubling of the risk of death, though not primarily from cardiovascular disease. Professor Francesco Cappuccio said, "**Short sleep has been shown to be a risk factor for weight gain, hypertension, and Type 2 diabetes, sometimes leading to mortality."**

These all tie to a failure of autophagy in sleep stages 3 and 4 mentioned in Cold Thermogenesis 7 and Brain Gut 11. Here, we see why poor sleep links to sleep apnea and the neolithic diseases that are associated with sleep apnea. Growth Hormone is released in a pulsatile fashion from 12-3 AM during restorative sleep cycles 3 & 4, and this hormone facilitates autophagy and recycling of proteins. These proteins are the N semiconductors in our quantized cell.  In essence Growth Hormone keeps us younger and in great shape when we sleep like a rock star because it improves the ability of our semiconductors to conduct electrons and protons in a zero entropy system. The problem for modern man is he does not sleep well because of his brain's creations.  This is due to a loss of Vitamin A controls of the photoperiod and circadian cycle.

This is why pregnenolone steal syndrome is tied to low Vitamin A and free T3 and why you shouldn't think pregnenolone steal or hypothyroidism is a free T3 **"only"** story.

# Skin Connection

Many skin disorders perplex patients in our modern world. They are also quite common in younger patients. They should not confuse us when we observe the decoupling of modern life from the normal photoperiod. The dermatologist has found the huge link to skin and Vitamin A but they don't seem to understand why. When I was in medical school we would joke that dermatologist need only to know how to write prescriptions for Accutane (retinoid) and steroid creams. That appears to be the answer to many of the things they do. It clearly is a stereotypical generalization.

But what is the implication? Vitamin A is huge in the skin too. Remember, the skin and brain are derived from the same embryological tissue in an embryo. I believe before too long we will find a blue light opsin in the skin and subcutaneous fat. This blog shows you how important Vitamin A is to the brain and circadian biology. Vitamin A has vital functions in skin health. It helps us avoid acne, psoriasis, and skin cancer. It is a vital regulator of the skin's immune system, with the action of Vitamin D metabolites in the skin to keep out viruses and bacteria by making the skin and mucous membranes better barriers against many conditions. This is why the presence of acne, aphthous ulcers, herpes, molluscum contagiosum, stretch marks, sun tanning, sun burning, Hebner phenomena, malar rashes, rosacea, contact dermatitis are all deep quantum clues to an epigenetic etiology.

**A parting note:** Dietary deficiency of Vitamin A is rare, but the loss of the recycling in the brain is common and the most overlooked manner in which it occurs is the excessive use of alcohol. Nothing in our diet depletes Vitamin A faster than booze. The biggest factor is blue light, but when you mix the two you are creating an appetite for destruction. I also find it ironic that boozing and nightlife tend to walk together in modern humans. It is also why so many headache syndromes are

tied to photophobia and meningismus, like migraines.

Creativity is seeing something that everyone does but you bring to life with meaning via your perceptions and observations. That ability gives life to the sublime, that others believe doesn't exist already. Playing with your dreams by thinking allows you to bring life to your creations. I like using Mother Nature as my playmate. You have to leave the 'city' of your comfort and go into the wilderness of your intuition, and when you do you find what we are capable of. And we find it by being observant of the little things everyone else ignores.

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- Brain Gut 11: Is Technology an Achilles Heel?
- Do Food Electrons Impart a Quantum Effect?
- Cold Thermogenesis 7
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