



# *Optimal* SLEEP

by Dr. Kirk Parsley / introduction by Robb Wolf

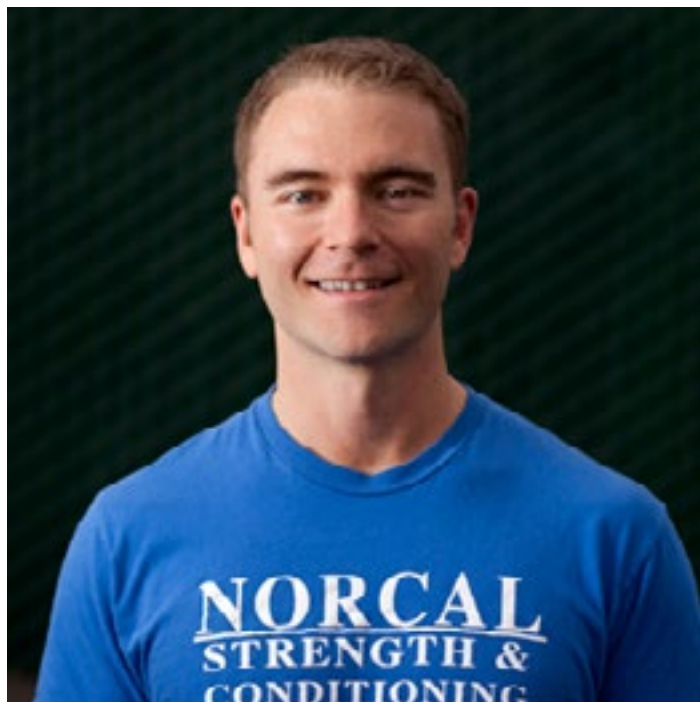


# INTRODUCTION

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## HI, I'M ROBB WOLF.

Hi, I'm Robb Wolf. I'm a former research biochemist specializing in the areas of cancer and autoimmunity research. Over the past 15 years, I've built a pretty good name as a "nutrition guy." I wrote a New York Times best selling book, the Paleo Solution. I've talked internationally on a variety of health topics and have presented to organizations such as NASA, Naval Special Warfare, and the United States Marine Corps. Even though I'm a "nutrition guy," I found by both trial and error and closely monitoring the scientific literature that food is only one part of the equation if we think about things like body fat, athletic performance, diabetes, and aging. I wish food were the whole story; I wish that if people simply improved their eating that they would look, feel and perform better, that blood work would move in a favorable direction. And don't get me wrong, if folks DO follow some kind of a Paleo/ancestral way of eating, all of these considerations DO improve...but it's not the whole story. And, I'll be honest; if I could pick something to specialize in I'm not sure that food would be it! Folks can be pretty pesky about food!



So, after food, what is important if we are thinking about improving body composition, athletic performance and slowing the rate of aging? If I asked a group of people to pick a topic just as (perhaps more) important than food, I'd wager the vast majority would pick exercise as the next piece to consider. And without a doubt, exercise IS important, but the topic that I'd pick, the topic that more experts are recognizing as a critical piece to performance health and longevity, is actually sleep.



# THE IMPORTANCE OF SLEEP WAS NOT SOMETHING THAT STRUCK ME IMMEDIATELY.

I'm like most other driven people in that I relegated sleep to a quasi-optional status. Sleep was for the weak-minded. If one was tough and simply knuckled down, sleep could become largely optional, certainly nothing that warrants much attention. Oh, how incredibly wrong we have been about sleep.

The disconnect about that importance of sleep comes from a variety of places, not the least of which is the culture that pervades some of our most respected and important professions: police, military, fire and medicine. These folks have jobs that frequently necessitate working through the night. They also face selection processes in which they are purposefully placed in a sleep-deprived state to test for mental toughness and weed out the weak and unmotivated. This training is important, but we have all adopted an attitude that sleep is for the weak, that it is optional if we just push hard enough. We could not be more wrong in this, and it is costing us in terms of both quality and duration of life.

**Let me be clear about what happens with inadequate sleep. You will get sick, fat and weak. You will age dramatically faster than normal.** You will increase your likelihood of cancer, diabetes and neurological diseases such as Parkinson's and Alzheimer's. If you are a stud athlete, you will become a has-been well before your time. Scoff, eye-roll or prance about all you like, but at the end of the day here is what I'm selling you: Please sleep more.

If you have problems with that, we can help. My good friend Dr. Kirk Parsley is not only a sleep expert, but also a very bright guy. He reminded me that people are more motivated by fear of loss than potential gain. So, I'm running with the gloom & doom perspective of batching your sleep, but please know that what I'm recommending is actually a huge potential positive, especially if you use your body or your brain to make a living (if you fall into another category, please let me know what the heck you do).



# **IF YOU THINK THIS NOTION THAT “SLEEP IS IMPORTANT” IS SOME KIND OF PSEUDO-SCIENCE COOKED UP BY FRINGE SCIENTIFIC ELEMENTS, THINK AGAIN.**

Risk assessors for insurance companies, military physicians, and cancer researchers all recognize that sleep, or more specifically, lack of adequate sleep, may be one of the most critical pieces to our modern health problem. The Center for Disease Control (CDC) recognized shift work and altered sleep patterns as a known carcinogen, just like tobacco use, asbestos and ionizing radiation. Dr. Parsley and I will do our best to explain the “whys” behind the importance of sleep. If you understand the whys, you are more likely to nut-up (so to speak) and be willing to enact changes. Once you understand how important sleep is, and what happens if you are not getting your fair share, we will help you to get the best sleep you can.

I have a newborn baby and I can guarantee you that I have impacted sleep (duh), but I also guarantee you that I follow the protocols in this book to the best of my ability. Similar to my call to action in the Paleo Solution, I simply ask that you give this plan a legitimate shot. Follow the guidelines, make some basic changes and then communicate your results to us. We have seen this protocol dramatically improve the lives of tens of thousands of people. You are (of course) a unique snowflake, but I think this will work wonders for you, too.

*Robb Wolf*



## KIRK PARSLEY, M.D.

Speaking of snowflakes, I was first introduced to Robb Wolf's work through his podcasts; as, for months, several of my patients told me, "you have to listen to this guy, doc, he talks about all of the same stuff you do". I'd previously taken a college course in the late 90s on the Paleo diet, so, being a super-smart doctor now, I was pretty sure I knew what this guy was going to say. However, I work with a group of guys that you don't want to say no to. Even though I was in no way skeptical, I was incredibly busy. However, after multiple months of prodding by my patients, I began to listen.

Randomly selecting several of Robb's podcasts for my next "cardio day," I dove in. My initial reaction: "Holy S#&T! Who is this guy?" Why was this bio-chemist so smart on nutrition, exercise, and SLEEP? So, I listened more, read many of his blogs, and eventually bought his book. Sadly, I was convinced Robb was helping more people than I could, even as a physician.



This was a powerful revelation to me, as after spending most of my adult life in school (including various phases of my medical education), I had been desperately trying to get my friends, family, and patients to modify their lifestyle in order to optimize their health, but I'd had very limited success. Now, I find out that there is a "gym owner" teaching thousands of people the same information, with amazing success! So, I became a regular listener, and started referring my patients to Robb's website, podcasts, and book.



As fate would have it, not long after I had started recommending his works, I happened to meet Robb at an event we were both lecturing at. The first words out of his mouth were: “I love your stuff!”

My stuff?!?! I thought; how does he know about my work? We didn’t get to talk too much more that day, as Robb was running to catch a plane—just minutes after I met him.

However, we began exchanging ideas over email, text, and occasional phone calls. Fortunately, we both ended up getting invited to speak at another event, and we finally had a few days to really get into each other’s heads. We exchanged ideas for hours at a time, and the confirmation of my work began to set in. I would soon come to realize that Robb and I had come to the exact same conclusions, understandings, and recommendations—while having arrived there from totally opposite ends of the spectrum. Occam’s Razor was at hand.

Robb had started trying to unravel his own health issues, and help his friends and family in changing their diet, exercise, and sleep. His results were proof enough for him, and so he continued to spread the word. He made an amazing change in his own health, and was able to help many others. This only led to more personal research and has culminated in an amazing and extensive knowledge base. It will come to no surprise to those of you who have followed his work, but I am convinced that Robb knows more about health span than any doctor I know or know of.

Compare that to my story. I was a successful power/strength/speed athlete for most of my life, never having any major health problems, just a few minor orthopedic injuries. I played football for 13 of the first 18 years of my life (in Texas, no less). I have been a reasonably high level competitor in track and field, power lifting, boxing, multiple martial arts, beach volleyball, and crew. I am also a former Navy SEAL—which carries with it a substantial amount of mental and physical rigor. I’ve always found it easy to add muscle while staying fairly lean. I have studied nutrition to a reasonable extent, but, I was never super-knowledgeable about diet—even though I often thought I was. I reached some pretty decent physical achievements this way, and therefore never gave much thought to lifestyle or diet—that is, until I entered medical school.





As anyone who has been there knows: medical school sucks! As a student, you are either studying, feeling guilty about not studying, or sleeping (while having nightmares about studying). I am a slow reader. Hence, as the volume of information ramped up, I compensated by not sleeping as much. After all, sleep is kind of a waste of time, right? For the weak?

I was sleeping approximately four to five hours per night, and rarely was it good sleep. I lived off of coffee and protein shakes. I simply didn't have time to waste on cooking or going to buy food. So, I made three or four protein shakes (with water) and took them to school. The shakes were about 100 calories each. In the evenings, I'd have a fairly normal American diner. I guess on average, I was taking in about one thousand calories per day, and I weighed about 215-220 pounds (wicked smart huh?). Right now you're probably thinking; how did this idiot get into medical school? Well, Your guess is as good as mine. But, because I'm a pretty hardheaded simpleton from the middle of nowhere, Texas, I decided I'd keep working out every day. Smart, huh? Soon, as Robb says, "the wheels began to fall off."

As I slept less and ate less, I somehow managed to get fatter. Much fatter! I was tipping the scales at about 240 to 245 lbs.—and now (not so proudly) harboring about 18% body fat. I was no longer strong. I was no longer fast, either, and I certainly did not feel powerful. Ugly scaly patches began growing on my head—soon I would learn that I had developed psoriasis. My blood pressure increased about 20 points systolic, and my once perfect lipid panel began to evoke memories of Lipitor commercials. To take me down another level, my hair starting thinning, and my cognitive capabilities were in free-fall. Keep in mind all of this was happening at the grand old age of 32.

**A year later, I was diagnosed as having ADD. Much later, I would discover that my change in attention was actually do to sleep deprivation—and the subsequent hormonal changes that this book will discuss.**



Well, astonishingly I made it through medical school and a year of internship. I'd love to tell you I achieved this after solving the riddle of my downward spiral, but I'd be lying. I "made it through" ONLY because I didn't completely crash and burn before my training ended—although it was dangerously close.

Soon after escaping hospital rounds, but still sleeping only 4-5 hours per night, still undernourished, still flabby, still stupid, and still using topical steroids to control my psoriasis, I went back to the SEAL teams—this time as a physician.

To the surprise of many people, SEALs aren't just physical studs, they are smart. Really smart, and they have no problem questioning their doctor's knowledge. There is no B.S.ing them. They also operate on a purely empirical system. If you aren't up to the task, they'll call you on it, and they will tell all of their friends that you are incompetent, and very quickly, you will find yourself completely marginalized. I knew first hand it would do me no good to talk the talk, if I couldn't walk the walk. To be successful in this environment, I'd need to be sharp, hard working, and get fit.

Again, I'd love to tell you that I solved the riddle to "fix myself," but it wouldn't be true. However, I now had more time to sleep; my office was a stones throw from the gym. My sleep became longer and of better quality, and I started eating better—because I was HUNGRY! I also started making fitness gains.

Encouraged, I carved out some of my spare time to study further. I studied a little about nutrition, a little about exercise, and a LOT about sleep. I also had the luxury of now working with some world-class trainers (Zack Weatherford and Josh Evert). Having been a SEAL in my early 20s, I assumed that I would be doing a lot of sports medicine. This was my first big surprise of the job!





It quickly became evident the reason the vast majority of my patients came to see me was for the same reason that the vast majority of them were listening to Robb's podcast: "The wheels were falling off!" They weren't recovering well, their performance was diminishing, and their sleep had been terrible for years. But, like me, these guys just put their heads down, and ran harder—sleep or no sleep—whether they felt like it or not. It was expected. That is exactly what we expect SEALs to do. I once read a quote that went something like this: "A professional is someone who does their best work when they don't feel like it." By this definition, I challenge you to find a more professional organization in the world. I have been in many "elite" organizations, but none of them hold a candle to the SEALs. I will always consider any SEAL my brother, and my primary responsibility as a physician.

Therefore, I figured my number one responsibility (as their physician) was to figure out how I could get these men to sleep. This is not an easy task, as during SEAL training, we go a full week without sleep, and frequently sleep deprive ourselves for days on end—once in the SEAL teams. So, as you can imagine, one of my immediate task was simply to get the SEALs to value sleep.

**Medical school hadn't prepared me for this. I do not remember a single lecture about sleep during any of my classes. I also did not have any questions about sleep on any of the 3 licensing exams required to be come a medical doctor.**

My internship in OB/GYN had certainly not prepared me for this—in fact, that profession sleep deprives themselves for their entire career. My extensive sports medicine and orthopedics training had not prepared me for this, and the common medical algorithms were of little use.

Figuring out why an entire community of elite performers—especially one this large—were almost all suffering from the same sleeping difficulties was not going to be an easy task. The reason for their predicament certainly wasn't from a lack of awareness, a lack of medical advice, a lack of funding, or from a lack of access to medical expertise. As I said earlier, these guys are smart, motivated, and at the top of the food chain.



Sadly, after making significant headway in helping my community, I've come to learn that much of the world suffers from these very same issues, oftentimes equally as severe, but just usually a little later in life than the patients I was treating.

Throughout this book, I will outline my discoveries of, and my approaches to, the absolute metabolic mess underlying our current national epidemic of inadequate sleep. While my focus was unlike Robb's in that I did not consider nutrition to be the obvious route initially, my understanding has ended up paralleling Robb's—only in reverse order: I focused on sleep followed by nutrition, while Robb was teaching nutrition followed by sleep.

I postulated that poor sleep was causing metabolic and hormonal derangement, and that nutrition, lifestyle modification, and supplementation could correct these derangements. Robb started with nutrition and lifestyle modification in solving metabolic and hormonal derangement, and enhancing the solution with optimum sleep.

I hope that you will both benefit from and enjoy the information that I have compiled to address the dangerous epidemic of sleep deprivation that befalls us today.

*Kirk Parsley*



## MY BASIC APPROACH TO MEDICINE

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When you graduate medical school, they tell you that half of everything they taught you is wrong, that it's up to you to figure out which half, and that the "wrong" half is going to change every year. You're going to continually learn incorrect or incomplete information, even though you're learning the best stuff that's out there at the time.



With that in mind, I like to go back to what we call an evolutionary biology model. This means: go back to what you KNOW, as far back as you can. We know biochemistry, we know general physical chemistry, we know anatomy, we know physiology. These fields haven't seen any major changes in decades, and they're not likely to. These are foundations. So, anything you base off of these foundations, we say has biological plausibility. "It makes sense." It's a common sense kind of test.

The evolutionary component of that is basically this: we evolved a certain way, just like everything else on this planet. We evolved to be on this planet, and we evolved to succeed on this planet. So let's try to figure out what we were doing better, that was allowing us to be a part of this planet, before we completely took ourselves out of the planet's evolutionary matrix.

Yeah, I said it. If you really think about it, we've taken ourselves off of the evolutionary model. We make it dark when we want it to be dark, light when we want it to be light, cold when we want it to be cold, hot when we want it to be hot. We eat whenever we want. We eat whatever we want. We reproduce when we want to reproduce, we grow fruit in the winter, we can do whatever we want. We've taken ourselves OFF the planet. And it's working out pretty well, right? I'm not complaining. I'm not getting chased by a tiger and neither are you. We're at the top of the food chain, but there is a price for all we have accomplished.



So, I have re-educated myself in medicine. I have reconsidered everything that I learned in 10+ years of education—from an evolutionary perspective.

It's from this perspective that I will talk about sleep, hormones, nutrition, exercise, reproduction, immunity, health and longevity. Most of what you will find in this book can be found elsewhere; in medical literature, in psychology literature, in health and wellness information, and in the general media. As I said, this is an evolutionarily based approach. I did not invent evolution. I am part of it, and so are you.

Unfortunately, I really can't explain to you why I do what I do, and why you have the problems you have if you're having sleep difficulties, until we go through some of this geeky scientific stuff--so bear with me on this part.

**The intent of this book is to explain what happens during ideal sleep, and what doesn't happen without ideal sleep.**

**It's a little technical, but the point of it all will hopefully clear up some of the misinformation and misconceptions believed by so many.**



# WHAT DOES IT MEAN TO SLEEP?

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Call me old-fashioned, but I think when learning anything, I need to begin with defining what I am trying to understand. So, let's start off with an easy question: What is sleep? We have all had the experience, if not, please call me immediately because I would like to write up your case for the medical journals.

Think about it - it's actually kind of hard isn't it? How can it be that something we all do everyday is almost impossible to define? Well, I don't want to get too esoteric before you've had time to judge my credibility, but here it goes. Language is only an approximation of experience. And being an approximation, it makes certain things hard to describe or define. By and large, language is dualistic or comparative. For example, the word "big" needs the concept of "small" to make any sense, just as "up" needs "down," "right" needs "left," and so on. I digress. Don't throw the book away just yet. I'll try to stay on track a little better—back to the definition of sleep.

My favorite definition to describe sleep comes from the Dalai Lama of sleep research and sleep science: William Dement. It actually requires a two-part definition:

***“A BARRIER BETWEEN THE SLEEPER AND AWARENESS OR CONSCIOUSNESS EXISTS, AND THE ‘SLEEPER’ HAS TO BE ABLE TO OVERCOME THIS BARRIER TO BECOME AWAKE, WHEN THE ENVIRONMENT REQUIRES IT (SUCH AS MACHINE GUN FIRE, NOISES OF BURGLARY, AND CRYING BABIES).”***

My only addition to this definition is that you should have some reasonably predictable brain wave patterns (EEG). My reason for adding this part is due to the use of sleep drugs. As I'll discuss later, if you sleep using sleep drugs your brainwave patterns will not look like the normal brainwave patterns associated with sleep.



We've all had the experience when we fell asleep when we shouldn't have fallen asleep, whether you're holding security, or in a classroom, and the smallest little thing can wake us from that sleep. But we will all agree that we were asleep. We know what the sensation of sleep is, and we know that we were asleep. Conversely, especially the men, when you go to sleep in your own warm, safe, bed and somebody crashes their car into the front of your house, you might not wake up until your wife yells at you 20 times, and hits you with a cattle prod.

We all agree that in both cases you're asleep. In both cases there's an environmental barrier, but that barrier height changes depending on what level of sleep you're in, how comfortable you are, how sleep deprived you are, and so forth. Notice that second part of Dr. Dement's sleep definition is that you can be awakened. So, with that part of the definition, being in a coma, or passing out from alcohol, is not the same thing as being asleep. If we can agree to use the two-part definition above, we can get started.

This is a useful way of explaining sleep to people, since we've all already had the experience of sleep. We already know about this barrier that exists between our environment and our conscious thoughts, and we can recall being awakened out of this state. If we cannot be awakened, we're either unconscious, in a coma, or dead.

**This experience that we all share is hard to define. So is love, happiness, depression, fun, and so forth. But let's look at this seemingly banal topic closer, to impress upon you the complexity of what it means to be asleep.**

The reason that it is so difficult to define is because there are hundreds of changes and reactions in your body that need to happen before you actually go to sleep, hundreds more to keep you asleep, and yet hundreds more before you can wake up. So, while the definition listed in the top of this paragraph may be accurate, it is incomplete. If you encountered someone who speaks your language, but has never had the experience of sleep (again, call me immediately), the previous definition would not suffice. A second definition and perhaps a more complete definition of sleep (for this book) uses the advantage of our dualistic language. To be asleep is the absence of wakefulness.



## NOW YOU'RE SCREAMING AT YOUR COMPUTER SCREEN; ***“THAT DOESN'T MEAN ANYTHING”!***

**You are probably thinking that this is a rhetorical definition. Stay with me a little longer.**

The reason I call this the most accurate and complete definition is because we do not actually have a pro-active, sleep-forcing, biological system (sleep experts please cut me a break here, I know about the flip-flop switch). What we do have is proactive biological system that forces us to be awake and aware to the extent that the environment requires. For example, you will become much more awake at the sound of gunshots than the sound of the wind blowing loose shutters around. (If you respond equally to shutters and machine guns, I urge you to go and see your psychologist—you may have PTSD.) Additionally, you can get off work—fantasizing about getting in bed, because you are so tired—get talked into going to happy hour with friends, and the next thing you know, sleepiness is nowhere to be found.

This second definition lets us include the accurate but incomplete definition while adding some more meat to the concept, and meat—as we'll talk about later—is good. So, if you'll buy into this rhetorical definition of sleep, then we can proceed to some more satisfying information. Let's talk about that pro-active system that drives wakefulness.







## HOW WE WERE DESIGNED TO SLEEP (OR NOT BE AWAKE)

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Wakefulness is governed by what we call our adrenal system. Notice I use the word system. We'll use this word because other organs in your body control the adrenal organ, and the adrenals have effects on every tissue in your body. So, talking about the adrenals by themselves does not tell nearly enough of the story to get my point across. What do I mean that the adrenal system governs wakefulness?

A lot of you may know that the adrenals control what Walter Cannon coined the “fight or flight” response. Most of us that have experienced the phenomenon of fight or flight would all agree that this is the most awake you can possibly be. You'd have absolutely no chance of dozing off while being chased by a tiger! Actually, there would be a chance of collapsing into a sleep like state—if you had the pathological condition known as narcolepsy (that can cause cataplexy). Let's stick to the fight or flight response, for now. If we can agree that this state is the exact opposite of being asleep, then we have some solid footing from which we can leap into this book.

I wish I could explain everything you need to know to understand sleep without using any scientific jargon; however, I am not yet a talented enough teacher to do so. Consequently you'll have to grind your way through at least some of it. I urge you to set aside enough time to get through this first chapter, and I promise it will all be easier soon. By the time you're done, you'll likely know more than your doctor about sleep, and you can teach him or her how to correct his or her own sleep issues.

Improving your sleep—like anything else—requires an understanding of the problem. It's just like your diet. You need to understand which foods are detrimental to your health, and which foods improve and support your health. Likewise—if you understand what should be happening—you will be able to understand which of your behaviors are supporting your efforts to sleep, and which behaviors are hindering your ability to sleep. Thankfully, just like nutrition, once you get on a reasonable plan, maintenance is pretty darn easy.

**So, put on your pocket protector and bow tie, and let's get this party started.**



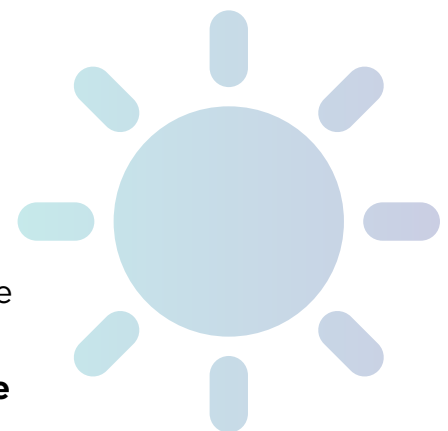
# THE ADRENALS

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The adrenal glands are two little anthill-shaped lumps that sit on top of your kidneys. As I alluded to earlier, these guys play a major role in making you feel and behave in ways that we associate with being awake. They do this by secreting many hormones that then go on to change the actions of all of the other tissues in your body. Now, as you might have guessed, your adrenals don't have any way of knowing what your environment is. So, if there is a burglar in your home, your adrenals have no way of directly sensing that. They get help from your other organs namely your eyes, ears, skin receptors, and brain, to know this,. However, even in the absence of your eyes, ears, skin receptors and burglars, your adrenals can still wake you up, on cue, every morning.

How they do this is not precisely understood. The adrenals have a rhythm to them that are somewhat similar to the tides. The tides come up and go down every day on a rhythm. We know that this is caused by the earth's rotation and the gravitational pull of the moon. However, we don't really know what causes gravity. Likewise, the daily rhythm of your adrenals are associated with the rise and setting of the sun, but their rhythm can be maintained (to some degree) without the sun.

The entrainment of adrenals to sunlight is as good of place to start as any. You have probably heard the term circadian rhythm. Like most scientific words, the word circadian has its origin in Latin: circa means about, and dia means day. So, circadian simply put is: about a day, and this is true. In complete absence of any light, your circadian rhythm will run about 23.5-24.5 hours. **However, defining the word that describes the observed phenomenon does not impart any more understanding. We must go deeper.**





# RETINAL GANGLIA

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Your eyes are a big player in this game. They actually sense the light, and they tell the brain what they are seeing. Actually, seeing isn't the right word. More accurately, your eyes tell the brain what they are sensing. Your brain then interprets what these sensations are most likely to mean, and then your brain alters your behavior accordingly. In addition, your eyes have a group of nerve cells in your retina called retinal ganglia that specifically sense blue light—presumably because the sky is blue. I can't be sure, because I wasn't involved in the design. This is where our story of losing the biological drive to be awake actually begins: decreasing blue light to the eyeballs.

Thousands of years ago, when humans were developing into the creatures that would harness electricity, build machines, and create the Cinnabon, we developed the ability to sense the sun's light, and the absence of the sun's light. We have never been well adept at seeing at night, nor have we ever been fast enough, strong enough, or lethal enough to compete with most of the planet's nocturnal predators. So perhaps it was a simple case of natural selection. Perhaps the humans that felt awake at night fell off of cliffs, fell into holes, or got eaten by big cats. However, it's just as likely that humans have always been stimulated awake by the sunlight, and in the absence of it, slept when the sun went down. Which brings us back to the retinal ganglia.

As the sun goes down, the amount of light entering your eyes obviously decreases. More importantly, the amount of blue light will decrease and begin pushing you toward the process of going to sleep. Notice that I said "process".

**We like to say things like "out like a light," but I can assure you that there is nothing nearly as simple and absolute as a light switch involved in the sleeping process.**

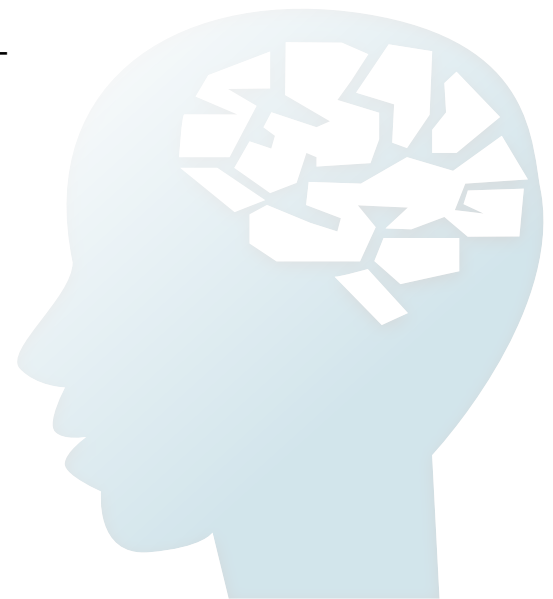
Hundreds of things must happen before we go to sleep, hundreds more to maintain sleep, and even hundreds more before we are able to wake up. The decrease of blue light on the retinal ganglia is the first step.



## **Step two: the retinal ganglia increase their firing rate and begin to change the chemical composition of our brains.**

Little structures called neurotransmitters control much of the activity of our brains. Just as their name implies, they are literally little signals, carrying messages from one neuron (nerve cells) to the next. Think of them as the much-folded notes that got passed around the rows of students in grade school. The students are neurons and each note is a neurotransmitter. The notes could cause an increase in activity (excitatory neurotransmitters) with a message like “Ms. Jones has cookies behind her desk” or decrease activity with a message like “we only get the cookies if we are well-behaved today” (inhibitory neurotransmitters). Some kids are severely gluten= intolerant and may therefore display very different behaviors than the other kids who read the note. This is also true with neurons: some neurons are excited by a certain neurotransmitter, and some are inhibited by the same neurotransmitter.

The retinal ganglia stimulates the release of a neurotransmitter known as GABA (gamma-amino-butyric-acid) to travel down a neuropathway that eventually excites an area of the brain called the pineal gland (pronounced pie-neel). The pineal gland sits in the back of the brain and has been called the third eye by some more ancient and esoteric cultures. When stimulated to do so, the pineal gland secretes the mother of all sleep enhancing hormones: melatonin.





# MELATONIN

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So, as I was saying, your pineal gland releases melatonin. Melatonin then shuts down the adrenal glands, those little organs sitting on top of your kidneys. These adrenal glands are secreting lots of hormones. They are secreting DHEA-Sulfate, cortisol, aldosterone, epinephrine and nor-epinephrine. (If you're a geek like me, you might find it cool that epinephrine and nor-epinephrine are what we call "adrenaline" in common language because they come from the adrenals). Adrenal hormones control lots of stuff in your body, and when these hormones are really high, we call that "the fight or flight" response, which works great to keep us safe in really dangerous situations.

But in day-to-day life, the adrenals are designed to just keep us awake and alert in proportion to the environment we find ourselves in—which can occasionally be fight or flight. But, let's get back to the story of normal sleep.

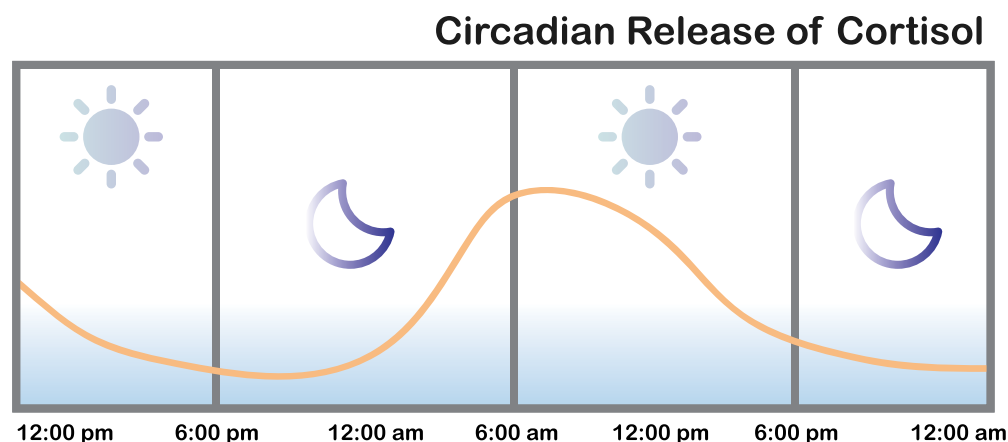
Once adrenal function decreases, the effects of these adrenal decreases include the lowering of body temperature, a decrease in heart rate, and a decrease in blood pressure. Your brain slows down, your blood sugar drops, and eventually, you fall sleep.

**What's that? You want more information on these fascinating hormones? Okay, okay! Your wish is my command.**





## CORTISOL AND OTHER ADRENAL HORMONES



This graph approximates cortisol, but it could use any other adrenal hormone. We chose cortisol because it is easy to measure, it stays in the blood stream a long time, and it's a big molecule. Cortisol also has lots of measurable effects, but the one we like to talk about most is its ability to raise your blood glucose. It is in a group of compounds known as glucocorticoids.

In the picture above, cortisol is in arbitrary units. At some point in the picture above, your cortisol level goes down below the level that woke you up. Your adrenal function has decreased because the sun has gone down. After the sun goes down, you start feeling really sleepy. At the lowest part of the curve you are in the deepest levels of sleep—known as stages 3 and 4 of sleep (and to all of you sleep physicians out there: yes, I know these stages have been combined now). Stages three and four sleep are called “deep sleep”. This is also what we call “slow wave sleep cycles” or “deep sleep cycles.” What is happening during deep sleep is the secretion of growth hormone and testosterone, which implies increased anabolic activity, or growth, when we are young, everything is growing. After puberty, anabolic growth mainly means repair; repair of overused muscles, injuries, brain tissue, and so on---- but only if cortisol is low enough. If adrenal function remains too high, a common problem in Western civilization, this anabolic period is compromised

Chronically elevated cortisol also beats down inflammation, meaning it shuts down the normal inflammatory response. If you've ever heard of people who have transplant surgery, they have to be on some sort of glucocorticoid to prevent rejection, because glucocorticoid drugs essentially minimize your immune function—with long-term exposure.



**DHEA: Dihydroepiandrosterone** (you can see why everyone just says DHEA) is another adrenal hormone. To be accurate, DHEA can be produced in other organs of the body. DHEA can go on to make testosterone, estradiol, or more cortisol. It can actually affect the nuclei of individual cells to help with energy production, thermal regulation of cells, and lots of other things like that.

Your adrenals also secrete a hormone known as **Aldosterone**. Aldosterone lowers your blood pressure. Some forms of hypertension medications take advantage of this mechanism to lower blood pressure.

Finally, I'll mention **epinephrine and norepinephrine**. These two hormones affect your blood pressure, too (through a different mechanism), but also, your heart rate, dilation of your lung passages (bronchial tree), your attention, and lots of things that we can think of as being part of the "fight or flight" response.

As an aside, the classification system that I am dividing above is that of hormones versus neurotransmitters. There are other chemicals that have this same weird classification system, but to me, it is easiest to think of neurotransmitters and lots of the cellular signalers (eicosanoids, interleukins etc.) that we'll talk about later as really small hormones.

**When epinephrine and norepinephrine are in your bloodstream, we call them hormones. If they are in your brain, we call the neurotransmitters.** That is why I say they can affect your attention. In fact, just to be a geek, I'll point out that they can have an effect on your affect! (Yeah that was for you DJ).

Hormones convey information throughout the body. Hormone sensitivity is the key to everything. **Everything that happens in your body can ultimately be traced back to hormones.**





Additionally, what makes you feel better or feel worse has everything to do with hormones. It may be true that you have an intracellular (inside the cell) excess of some form of protein or mineral. It may be true that your cell is failing to do this or that. It may be true that a cell is doing too much of this, but it's failing to do that or doing too much of this instead of that. But all of these are just the end results of what the hormones instructed the cell to do. Take insulin as an example. We know that people who have problems controlling blood sugar are called diabetics, and most people at least know that diabetes has something to do with insulin. If the cells of your body take insulin inside of the cells that changes the machinery inside of your cell to also let glucose into your cells. However, insulin also controls how many receptors your cells have to bind insulin. So, if insulin has a hard time getting into the cells (because few receptors exist). We call this "insulin resistance".

Ironically, this lack of intracellular insulin will also result in fewer insulin receptors. It is easy to see how this self-perpetuating cycle can get out of control. In this example your cells would also get little glucose—which cells need to do their job, and you need as a fuel reserve. Interestingly, sleep deprivation is KNOWN to cause this same pattern of insulin resistance.

So, in summary, we can see that the adrenal hormones are increasing your blood glucose, effecting your heart rate, respiratory rate, blood pressure and metabolic rate, and affecting your attention, mood, focus and other cognitive functions.

It doesn't require an advanced degree in science to extrapolate how all of this affects the fight or flight response. So, think now about what the opposite of fight or flight is, and you can easily see that being asleep would easily fit as a logical state.

**So, now I see your science tolerance gauge entering the red zone...**

**LET'S SWITCH GEARS FOR A SECOND TO  
DISCUSS SOMETHING MORE PRAGMATIC!**



## HOW MUCH SLEEP WE REALLY NEED.

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This is probably the question I get asked the most. A patient will discuss his or her problems with me, and when I suggest improving sleep as a possible tool for reaching our agreed upon goals they always come up with some version of “how much sleep do I need”? While this isn’t quite what I would call a philosophical question, it is nebulous. My answer is always; “it depends.”

You’re thinking, boy I’d punch you right in your oversized nose if you gave me that answer, and believe me, I’ve had my concerns with a few SEALs.

However, let’s just assume that I’m actually a competent doctor for a second, and let me explain why I give this annoying answer.



**If your goal is to survive, I cannot tell you how much sleep you need. There is too much biodiversity and too many variables to even approach this question. If your goal is to thrive, we have a place to start.** Unfortunately though, all sleep is not equal, and you won’t always need the same amount. For example, if you do not have any sleep debt (a concept I’ll discuss next), and you have been lying around a spa in Fiji all day, you’ll need less sleep than if you have huge sleep debt and you’ve just spent a 14-hour workday landscaping.

So, what is this “sleep debt” all about? I learned the phrase for Dr. William Dement—truly the grandfather of sleep medicine. It is metaphor for understanding our sleep needs. Just like using a credit card, or line of credit, you can spend money that you don’t actually own; you can operate your body on energy that wasn’t intended for such use. The exact details of why we sleep are still not understood, but we all know it to be a restorative process. We knew that before anyone ever developed a test tube, a polysomnograph, or discovered the first hormone. But, now, science is confirming and better defining the restorative processes that occur during sleep. Keep in mind however, even if we can discover and define every process that occurs while we are sleeping, that information still may not explain why we need to be asleep to accomplish these processes.



**One way to understand sleep debt is by looking at financial debt.** For example, if you spend \$5,000 per month, and you only earn \$4,000 per month, you will be accruing a financial debt of \$1,000 per month, for every month that you hold that pattern of spending. We all agree that at some point this pattern of spending will become unsustainable, and we will be in big financial trouble (see banking crisis of 2008).

Likewise, if you need eight hours of sleep per night and you only sleep six, you are incurring a sleep debt of approximately 2 hours per night. Now, the cells in our bodies do not run off of 24 hour clocks that we have invented to keep track of our perception of time, but they do have cellular mechanism in them that approximate the notion of time—so that is why I say “approximately 2 hours” of sleep debt. Just like the money, at some point you are going to have to pay this back! It may not be until you go on vacation, or stay in bed for 3 days with the flu.

If you do not pay it back with sleep, your body will use resources that are meant for other activities (building collagen in your skin, building muscle, fighting off infection, repairing damaged tissue, etc.), to keep you alive and moving. This is equivalent to spending your child’s college savings to finance your daily life. You may notice that the few examples that I listed above are all things that we commonly associate with aging. That’s not a coincidence. **Sleep debt accelerates aging.**

With the invention of the Internet one can find data to support most any claim, but, most of the credible research supports that seven and a half to eight hours per night is the optimum sleep (keeping in mind that this is an average over multiple months). Dr. Dement, and others have done research in where they put people in completely darkened bedrooms for 14 hours per day, and the subjects would initially sleep about 12.5 hours for multiple weeks before gradually decreasing their nightly sleep to about seven and a half or eight hours per night.

There are lots of unanswered questions about the concept of sleep debt, such as; does it accrue linearly? How long can you carry a sleep debt? How can you distinguish sleep debt from organic disease that makes one sleepy? However, for our purposes, it is safe to say, that if you feel the need to sleep longer than your do, and you are sleeping less than seven and a half or eight hours per night, you most likely have some amount of sleep debt.



# WHAT IS OPTIMAL SLEEP?

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**Optimal sleep has several components:**

- **You should fall into it easily and relatively quickly.** This actually gets into a concept called “sleep latency.” We’ll discuss this in detail later, but the basic concept is this: it should take you about 15 minutes to fall asleep. Substantially more or less indicates sub-optimal sleep.
- **It should be uninterrupted (or at least perceived as uninterrupted).** Sleep studies reveal that we all wake-up multiple times per night, but are usually unaware of this if our sleep is healthy.
- **It should be regular, meaning you go to sleep and awaken at approximately the same time every day, including weekends.** There will, of course, be some normal variation to this with seasons, life stressors, and obligations. However, we are speaking in generalities here. Suffice it to say that sleeping is like any other activity, in that the more disciplined and consistent one is, the better one will be at it.
- **It should be restful and restorative. THIS IS THE MOST IMPORTANT ASPECT OF OPTIMAL SLEEP!** If you sleep exactly 8 hours every single night, go to sleep and awaken at exactly the same time every day, and incorporate every bit of sleep information within this guide, but you awaken exhausted every day, and count down the hours until you get to sleep again, your sleep is NOT optimal.

Everything that we need to repair is being repaired while we sleep. Your immune system can function at its maximal level because the adrenal function is at its minimal level. You consolidate memories, whether that’s remembering math formulas, phone numbers, girls’ names, front sight focus, over-head squats, clean-and-jerks, or how to go through the kill house. Nearly all of the stuff that we call muscle memory is becoming more embedded and durable during sleep. If you don’t get optimal sleep you’ll never get better at the activities that require muscle memory. You can run through it every day of your life and you will never become great at anything. As an aside: if you do want to become great at anything requiring muscle memory, I recommend Dan Coyle’s book: *The Talent Code*. But, let’s get back to optimal sleep.



Another thing that happens during optimal sleep is that you emotionally categorize the day's events. This single point has huge implications for the military, para-military, law enforcement, and any other type of emergency response workers. If you don't sleep well, then you cannot appropriately categorize events. You're much more likely to get post traumatic stress disorder (PTSD). You are also much more likely to become an alcoholic, or dependent upon other drugs to decrease your anxiety and stress levels. You are even more likely to commit suicide. Let me write that one again: **You are more likely to end your own life, intentionally, if you do not sleep well. If that isn't enough motivation to get you off the couch and into your bed at 10 PM, I don't know what will be.** Presumably, if you're more likely to commit suicide, then you must be more likely to become clinically depressed—since suicide is, by definition, nearly always associated with depression. You are also much more likely to engage in spousal abuse, child abuse, road-rage, and just about any other socially unacceptable activity one can think of. Why is this?

Remember when we discussed the little hormones in your brain called neurotransmitters? Well, these little hormones are not constant. They are constantly being depleted and restored. We replenish neurotransmitters during sleep—primarily during what we call REM sleep (not to be confused with the popular band in the 90s: REM stands for Rapid Eye Movement, which is one of the first observations of sleep medicine).

If you want to be all you can be in any physical measurement (muscle mass, muscle strength, speed, agility, body fat percentage, etc.), you'll need to have optimal anabolic hormones. As you've probably guessed by now, you replenish these anabolic hormones during optimal sleep, and without optimal sleep, you don't. It really is that cut and dried.

**Optimal sleep is the sleep that makes you better; better looking and better at any type of activity—physical or mental. Better at dealing with your emotions.** With optimal sleep, you will be a better husband, wife, son, daughter, spouse, athlete, employee, entrepreneur, dancer, rapper, fighter, teacher, doctor, artist or whatever.

If you feel any of these aspects slipping, you are likely not getting optimal sleep. It is possible that other problems exist, but if you know you aren't sleeping well, this is an easy and necessary place to start looking.



# HOW DO I KNOW IF MY SLEEP IS OPTIMAL?

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**The most objective and easy to understand measure of this is a concept I introduced in the last section: Sleep latency.**

Basically, sleep latency works like this; you do all of the stuff you need to do to get ready for bed—put on your favorite PJs, brush your teeth, floss, take your supplements, put on the heating blanket, turn out the lights, fluff your pillows, lick your elbows, or whatever your ritual is, and then you put your head on the pillow. Once you're done with your ritual and you are actively engaged in the process of letting yourself “fall” asleep, the timer starts. Ideally (on average) you should fall asleep in about 15-20 minutes. If you fall asleep in less than 5 minutes, you are severely sleep deprived. This measure is part of Dr. Dement's work and is referred to as the Multiple Sleep Latency Test (MSLT). A full MSLT is more involved than this, but this “time to fall asleep at night”, is a reasonable approximation.

Next on my list of self-assessment is performance--in whatever it is that you do. A sudden decrease in performance, mental or physical, can often be traced back to poor sleep. I will discuss the actual hormonal changes later on, but let's just say you aren't firing off all cylinders. This may be subtle: “I walk in a room all the time and I forget why I am there,” “I often walk out to my car and realized I forgot my wallet” etc.

It may be not so subtle: “I go inside to get my wallet, I go back and get in my car and realize that I forgot my phone. I go back in my house, I get my phone, I go back and sit down and I forgot my briefcase... 45 minutes later, I finally get on the road and start driving to work, I go past my exit because I'm going to my daughter's school and I forgot...”

It may be severe and obvious: “I fall asleep on my way to work, I can't concentrate for more than 3 minutes, my FRAN time went from 3 minutes to 12 minutes, I've gained 15lbs. of fat but haven't changed my diet or exercise routine, I can't perform sexually, I cry during Hallmark commercials, etc.



Another sign of insufficient sleep is chronic inflammation. I don't just mean that your joints are swollen or your eyes look puffy. This is a metabolic condition that implies your body's cell-mediated immunity and repair is malfunctioning. Chronic inflammation happens because you don't repair at night. Your immune/repair mechanisms are malfunctioning because you have chronically elevated cortisol. If your adrenal function doesn't get really low during deep sleep, you don't repair.

You know how you feel when you get the flu? You feel like crap. Why do you feel like crap? Do you feel like crap because there's a virus in your body? NO! You feel that way because your body is fighting that virus. Your body is using all of the energy that it ordinarily uses to make you active and happy and all that other stuff to make proteins and chemical products to fight that virus.

**So, if you're chronically sleep-deprived, you're not hitting those deep levels of sleep, and your immune system isn't doing what it's supposed to do, then you're chronically inflamed because your body's trying to carry on that job all the time. It is as if you're running around with 30 percent of the flu—every day.**

\* We will discuss this in greater detail in later chapters, but if you snore loudly, you likely are not getting optimal sleep.



**To summarize; you should sleep at consistent and regular intervals, take 15-20 minutes to fall asleep, sleep through the night, and wake up feeling refreshed and ready to get out of bed.**

**Ha! you say. Haven't felt like that since you were 10 years old? Well, I'm here to tell you, brothers and sisters, you can have that again.**





## HOW CAN I BECOME AN OPTIMAL SLEEPER?

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The answer to this should be obvious. Just follow Dr. Parsley's easy 12-step process, and everything should be good in a couple of days, right?

My first comment to anyone that I consult on sleep is that sleep is an infinitely complex process. There are hundreds if not thousands of processes involved, all working in concert. There is no "easy button" here. It will require a systematic approach some trial and error, and some disciplined effort. This book will give you the framework to design your systematic approach. If you set about this process in a systematic and disciplined way, you will achieve optimal sleep.

You may not be able to do it alone. I will discuss multiple resources, including the help of specialized health-care providers, in this book. I will continue to add material to my website as it becomes available. I am committed to helping you, but I cannot do it for you. ONLY YOU can do it, but you can do it. Thousands of people already have. So, let's get this party started, shall we?

**One word of caution: please be realistic with your goals.** I am as ambitious as anyone. I think lofty goals are the most inspiring, and the most likely to be achieved. However, you wouldn't expect to lose 20 pounds in a few days, or go from a couch potato to being a world-class athlete in a few weeks. The more broken your sleep currently is, the longer it will take to perfect it. Remember, however, that you will begin to see improvements long before you reach optimal sleep, and once you achieve optimal sleep, you are unlikely to ever have to put much effort into it again.

