

Why GO TO Bed?

BY DR. SARAH BALLANTYNE, PHD



14 Easy Steps to Healthier Sleep

by Dr. Sarah Ballantyne, PhD

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SARAH BALLANTYNE, PH.D. is the creator of the award-winning online resource [The Paleo Mom](#); co-host of the syndicated top-rated [The Paleo View Podcast](#); and New York Times bestselling author of [The Paleo Approach](#), [The Paleo Approach Cookbook](#), and [The Healing Kitchen](#). Sarah earned her doctorate degree in medical biophysics at the age of 26 and spent the next four years doing research on critical care medicine, innate immunity, gene therapy and cell biology, earning a variety of awards for research excellence along the way. Sarah's transition from academic researcher to stay-at-home mom to award-winning and internationally recognized health advocate and educator was driven by her own health journey, which included losing 120 pounds and using both diet and lifestyle to mitigate and reverse a dozen diagnosed health conditions. As a scientist both by training and by nature, Sarah is deeply interested in understanding how the foods we eat interact with our gut barriers, immune systems, and hormones to influence health. Sarah's innate curiosity goes further than just understanding diet and she is also deeply interested in the impact of lifestyle factors like sleep, stress and activity. Her passion for scientific literacy and her talent for distilling scientific concepts into straightforward and accessible explanations form the foundation of her work and her dedication to improving public health. Learn more by checking out Sarah's [website](#), [podcast](#) and [books](#). You can also find Sarah on [Facebook](#), [Twitter](#), [Instagram](#) and [Pinterest](#).



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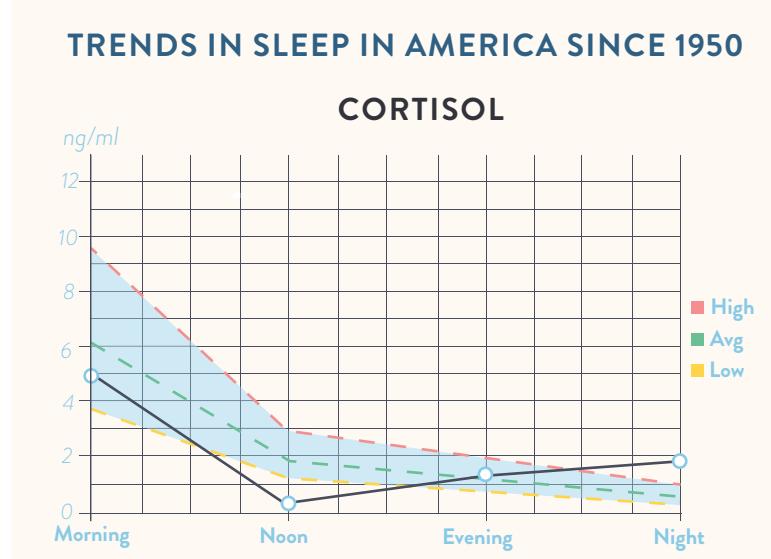
INTRODUCTION

Why “Go to Bed?”

In the past half century, American culture has shifted to focus on increasing productivity at the expense of health. We eat more convenience and fast food, spend less time outside, and are more sedentary than ever. Changes in sleep patterns are no exception to this problem. In the last 50 years, the average amount of time that Americans sleep each night has decreased by 1.5–2 hours from over 8 hours of sleep every night to under 7. That’s a staggering amount of sleep—equivalent to a full month of continuous sleep every year!—that we need but are not getting. Perhaps unsurprisingly, this leaves a significant sleep deficit that is never resolved. From what we know about how lack of sleep affects our brains, hormones, and immune system, this may be the single greatest contributor to chronic illness in general.

*That's right: Sleep. Not diet.
Not activity. Not stress. Sleep.*

Epidemiological studies show a very strong correlation between short or disturbed sleep and obesity, diabetes, and cardiovascular disease. In fact, lack of adequate sleep has been associated with increased morbidity and mortality from all causes. This means that if you consistently don't get enough sleep, you have a much higher risk of getting sick and/or dying. It also indicates that shortchanging yourself on sleep could not just undermine your health, but shorten your lifespan. Studies have also evaluated the role that sleep plays in healing from specific diseases, like breast cancer, and show that the less you sleep at the time of diagnosis and through



treatment, the less likely you are to survive. Even more compelling, mechanistic studies explaining exactly how sleep, or lack thereof, affects our body at the cellular and molecular level are showing us exactly why sleep is so important for health.

Not only that, but how much we sleep impacts our hunger levels, what foods we crave, how impulsive our behavior is (in general, in the grocery store, and at the dinner table), how we respond to stress, our emotional state and responses, how motivated we are to be active, and how likely we are to suffer addiction (including tobacco use, alcohol, drugs and food addiction).

Getting enough sleep is important for health directly but also indirectly, since it reduces the likelihood of us engaging in other destructive behaviors.

In fact, as our scientific understanding of exactly how sleep impacts health and behavior increases, the stronger the case is for sleep being the lynchpin of health:
Sleep holds everything together.

And yet, with this vast body of scientific literature proving just how critical adequate sleep is to health, getting more sleep is a hard sell. What most people seem to want is a pill or tasty beverage to compensate for not getting enough sleep. Case in point: the burgeoning gourmet coffee, coffeehouse, coffeemaker, energy drink, and energy supplement industries. However, there is currently no substitute for sleep. **Caffeine and energy drinks/supplements mask fatigue, giving us the illusion that we're doing fine without enough sleep, while simultaneously eroding the quality of our sleep when we do finally get ourselves to bed.** This causes a vicious cycle, where we are reliant on these dubious substances to keep us functioning at a sub-par level while living our lives in a chronically sleep-deprived state.

Sleep is that determinant of health that we so willingly give up for any other



priority, including both work and play. Ironically, it seems easier to completely overhaul the foods on our plates than it is to make small changes in our priorities with regards to lifestyle. Diet is important, certainly, but it's far from the only important input to health. The scientific literature hammers home the importance of adequate sleep, stress management, and activity for long term health and longevity. When we get enough sleep, it's easier to manage stress, easier to be active, and easier to make good decisions with regards to our food. This is all demonstrated in the science. If you are making changes to your diet and/or exercise regime with the goal of improved and lifelong health, putting sleep at the top of your priority list may be the single best thing you can do to guarantee success.

This book will motivate you to get enough sleep.

A huge proportion of this book is about sharing the biological mechanics be-

U.S. GALLUP POLL: HOURS OF SLEEP/NIGHT 1942-2013

“Usually how many hours do you sleep per night? “

HOURS OF SLEEP/NIGHT	1942	1990	2001	2004	2013
	%	%	%	%	%
5 HOURS (OR LESS)	3	14	16	14	14
6 HOURS	8	28	27	26	26
7 HOURS	25	30	28	28	25
8 HOURS	45	22	24	25	29
9 HOURS (OR MORE)	14	5	4	6	5
NET: 6 HOURS OR LESS	11	42	43	40	40
NET: 7 HOURS OR LESS	84	57	59	59	59
AVERAGE HOURS PER NIGHT	7.9	6.7	6.7	6.8	6.8

hind sleep and how sleep impacts health. I hope that, with a science-nerd-level understanding of the full implications of your sleep choices, you will feel highly motivated to put sleep back up near the top of your To Do list. Yet, I recognize that it can be challenging to adjust priorities to make this happen, so I'll also be sharing tons of strategies to help you succeed at your sleep goals.

Of course, even when you do shift your routine to allow for more time in bed at night, that's no guarantee that your body will cooperate. This book will also detail how other choices we make during the day impact sleep quality, including the science explaining why the body responds the way it does to certain choices. Even better, this book contains every scientifically-validated tips and trick for improving your sleep.

This book will give you the tools you need to improve your sleep.

This book is jam-packed with the science of sleep as well as strategies to help you get the sleep you need. It also contains the 14-Day Go To Bed Challenge. I've distilled the vast field of sleep science into 14 simple steps that you can take to improve your sleep. Now that this book is in your hands, you are just 14 days away from better sleep and better health!



WANT TO READ THE FULL BOOK AND JOIN THE *Challenge*?

GO TO Bed!
14 EASY STEPS TO HEALTHIER SLEEP

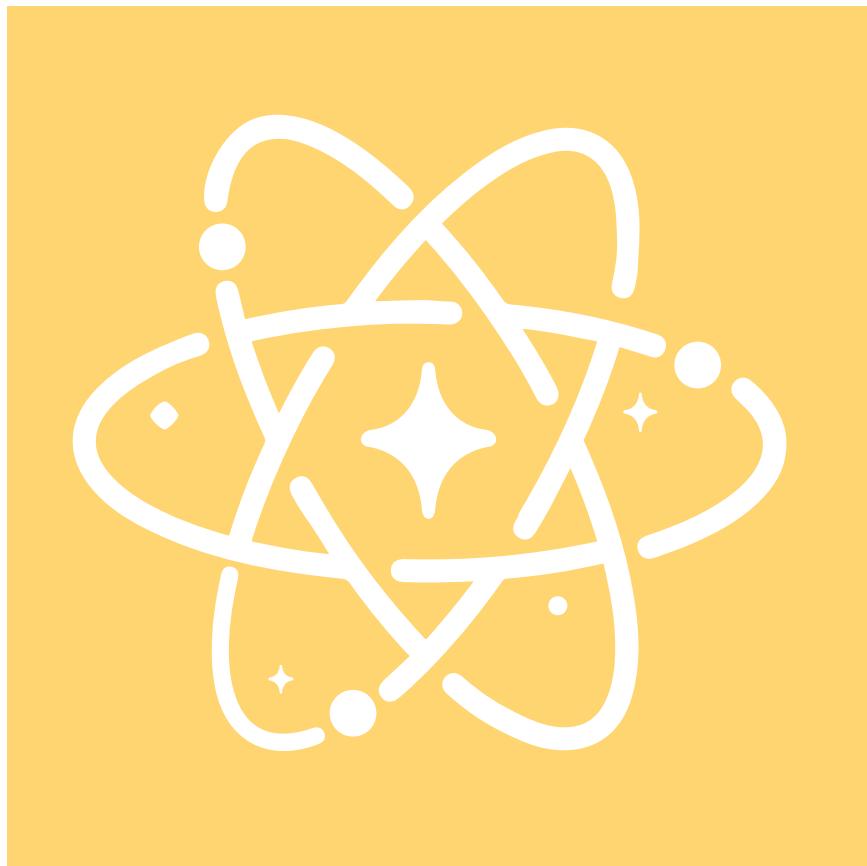
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PART ONE

The Science of Sleep



CHAPTER QUICKSTART

PART ONE: *The Science of Sleep*



Pg. 13 1. WHAT IS SLEEP?

Click on each number to visit each page!

- Scientists use behavioral and electrophysiological definitions to explain the phenomenon of sleep.
- Non-rapid eye movement (NREM) sleep is characterized by less frequent but stronger brainwaves and delineated into four separate stages. A lot of the physiological recovery we associate with sleep happens during this type of sleep.
- Rapid eye movement (REM) sleep is characterized by frequent, unsynchronized brain waves. Most dreams occur during this phase.

Pg. 20 2. THE PURPOSE OF SLEEP

- There appears to be three main reasons for sleep: restoration, synaptic plasticity, and energy conservation.

Pg. 23 3. SLEEP-WAKE CYCLES

- The circadian clock is controlled by specialized cells in the brain that connect to the retina of the eye and tell the brain what time of day it is, regulating many hormonal and other responses.
- Circadian rhythm depends upon proper functioning of the hormones cortisol (the stress regulator) and melatonin (a sleep-inducing peptide).
- Sleep homeostasis is the process by which our bodies regulate the feeling that we need to go to sleep.
- Our brains use complex mechanisms to regulate the drive for sleep, but the accumulation of the protein adenosine is one critical contributor. Adenosine builds up as we use energy throughout the day, then it is cleared while we sleep by specialized nerve cells.

Click on each number to visit each part!

PART:
1 2 3

Pg. 27 **4. HOW MUCH SLEEP DO WE NEED?**

- The National Sleep Foundation has compiled expert opinions and sleep research to determine that the average adult needs 7-9 hours of sleep per night.
- For people with an autoimmune disease or other chronic illness, 9 hours or more is a common and often necessary part of the healing process.
- Keeping honest estimations of the amount of sleep we get, including the time that it takes us to fall asleep, could be a hugely important part of monitoring our sleep habits.
- Research on modern hunter-gatherers has demonstrated that they also sleep between 7 and 8.5 hours per night, tending to cycle their sleep with the sun (including shorter sleep in the summer and longer sleep in the winter).

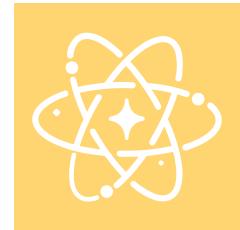
Pg. 31 **5. SLEEP DEBT**

- Sleep debt occurs every time you do not get enough sleep – even just sleeping 30 minutes less than your body needs on weeknights.



PART ONE

The Science of Sleep



WHAT IS SLEEP?

Pop quiz: what is your definition of sleep? If you had to describe sleep, how would you do it?

Kind of a tricky prospect, isn't it? Believe it or not, scientists are still fine-tuning the scientific definition of sleep—in part because it's a common experience for all animals, and in part because we're still making frequent discoveries about the details and the “whys” of sleep. There are two different ways that scientists look at sleep: behaviorally and electrophysiologically.

The behavioral criteria for sleep are all of the following:

- Decreased behavioral activity (i.e., you're still and not engaging in conversation)
- Site preference (i.e., your sleeping place, like your bed)
- Specific posture (i.e., lying down)
- Rapid reversibility (i.e., you can be woken up, unlike when you're in a coma)
- Increased arousal threshold (i.e., you are not aware of your environment while sleeping)
- Homeostatic control (i.e., your body rebounds and makes you sleep more after being deprived)

Of course, these criteria are completely common sense when you think of it: while they may not seem particularly quantifiable, behavioral definitions are sufficient for many kinds of scientific studies.

The electrophysiological definition of sleep identifies a specific pattern of whole-brain activity (measured by electroencephalogram, or EEG), eye movement (including patterns of both non-rapid eye movement, or NREM, and rapid

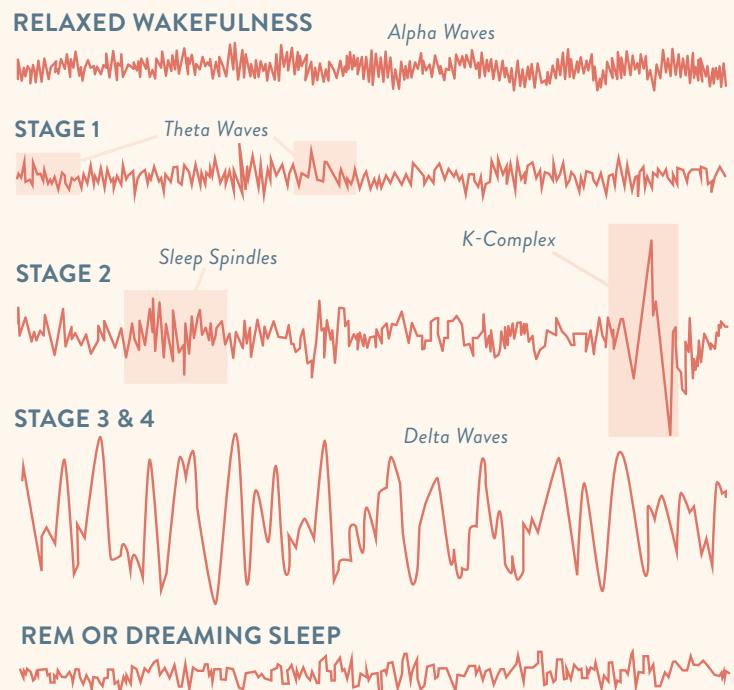


eye movement, or REM), and changes in muscle tone. This method of defining sleep allows for better quantification of sleep as well as defining and understanding the sleep stages.

In general, there are two different types of sleep: non-rapid eye movement (NREM) and rapid eye movement (REM). These two types of sleep can be identified by movement of our eyes underneath our eyelids while we sleep and by examining brain activity, as measured by electroencephalogram (EEG). An EEG is a non-invasive method of detecting small electrical currents in the brain (the brain version of an electrocardiogram, or ECG, which measured small electrical currents in the heart and is used as a diagnostic test for some types of heart disease). Neurons (brain cells) communicate with each other using electrical signals, called impulses, which show up as wavy lines on an EEG recording (we call this a measure of “brainwaves”). Neurons are active all the time, even when you’re asleep, but the pattern of their activity changes depending on what sleep stage we are in, i.e., the shape, frequency and amplitude of the brainwaves change.

NREM sleep is characterized by brainwaves that are less frequent but stronger in amplitude and are more synchronized. REM sleep, on the other hand, is characterized by brain waves that are more frequent and less synchronized. During NREM sleep, the body position will move about once every 20-30 minutes, whereas your body is functionally paralyzed during REM sleep. As you might have guessed, REM sleep is also characterized by observable rapid eye movement (your eyes are darting

SLEEP BRAINWAVES





back and forth beneath your eyelids), whereas there is no such eye movement in NREM sleep. NREM sleep is sometimes called “quiet sleep,” because the brain activity measured by EEGs shows a much less active pattern than REM sleep, which in contrast is called “active sleep”.

NREM sleep is separated into four sleep stages. Healthy sleep has you pass through each phase sequentially in a “sleep cycle”: stage 1, then stage 2, then stage 3 (and 4, which is sometimes combined with stage 3) and finally culminating in REM sleep. The next cycle starts at the beginning with stage 1. Each night when you fall asleep, your body goes through this cycle about four or five times. A complete sleep cycle takes an average of 90 to 120 minutes, with each complete cycle taking longer and longer through the night. The first sleep cycles each night also have relatively short REM sleep times and longer periods of deep sleep (stage 3 and 4); but, later in the night, REM sleep periods lengthen and deep sleep time decreases (which is why we dream more in the morning).

Each sleep stage seems to allow for slightly different beneficial processes in the brain. Although the details remain a mystery, the sleep cycle stems from an interaction between the circadian clock and a separate sleep-wake homeostatic process.

Stage 1 sleep is a light NREM sleep that begins the moment you drift off.

STAGE 1

Theta Waves



You can think of stage 1 like your transition from being awake to being asleep. From a brainwave perspective, this stage is the transition from waking-type brainwaves when the body is resting, called

“alpha waves,” to sleeping-type brain waves, called “theta waves.” During this stage, which lasts only about 5 minutes, your heart rate will decline, your body temperature will drop, and your eyes will slowly move in a pattern from side to side. This phase of sleep is usually dreamless and is easily disturbed. Have you ever woken with a start shortly after going to bed, thinking you heard someone calling your name or that you were falling? These are relatively common phenomena during the early phases of sleep. An interesting fact about stage 1 sleep is that how we perceive it varies per individual; so, you might think you were



just drowsy for this part of your sleep cycle, whereas your partner might consider this to be actual sleep for them.

After that, the body begins to transition into established sleep.

In stage 2 sleep, which lasts between 10 and 25 minutes in our first sleep cycle (remember: each cycle lasts longer and longer), eye movement stops and brain waves become slower with only an occasional burst of rapid brain waves, called “sleep spindle,”.

STAGE 2

Sleep Spindles



During sleep spindles, it is theorized the brain is sorting through the information it picked up that day and synthesizing it with existing knowledge. As you might have expected, memory consolidation occurs while we are in stage 2

sleep. Along with sleep spindles, the brain activity of stage 2 sleep is characterized by sharp, short bursts of brain activity; these brainwaves are called a “K-complex,” and scientists believe that their purpose is to keep the brain prepared in the event that we need to be awakened.

Deep sleep begins when a person enters stage 3 sleep, characterized by extremely slow brain waves called delta waves.

During this stage, more of the brain’s active centers shut down for the night,

and the remaining active brain cells become more synchronized in their brainwave pattern. As the neurons fire in more synchronized patterns, their combined frequencies increase to create the delta waves. The goal of stage 3 sleep is to get to

STAGE 3 & 4

Delta Waves



this point.

In stage 4 (which, again, some scientists characterize as just an extension of stage 3), the brain produces the slow delta waves almost exclusively.

This is why the stages 3 and 4 are referred to as slow-wave sleep, deep sleep, or



delta sleep. In this stage of sleep, there is no eye movement or muscle activity, blood pressure is reduced by 20-30%, and the brain becomes much less responsive to external stimuli. It is very difficult to wake someone from deep sleep—and if you do happen to wake up during this stage, you will likely feel very groggy and unrested. This is when some children experience bedwetting, sleepwalking or night terrors.

Deep sleep seems to be one of the most critical times for body repair.



At the beginning of stage 3/4, the pituitary gland releases growth hormone, which stimulates the growth and repair of important tissues. Your brain cools during this phase, as less blood is directed to it (in part because of the lowered blood pressure), which may help to improve its function and allow for repair. Interestingly, it seems that there are also increased levels of interleukins (there are many different types, all of which are released by white blood cells, some of which reduce inflammation and some which stimulate inflammation), indicating increased immune system activity during this phase of sleep as well; so, immune function is related to deep sleep too! Since slow-wave sleep is so important, our bodies designate a lot of time to it: at its peak importance, which is generally young adulthood, deep sleep makes up about 20% of our total sleeping time, but then it declines in later adulthood (especially after the age of 65). When someone is sleep-deprived, they pass more quickly through the earlier stages of sleep and spend more time in this stage as well.

After deep sleep, REM sleep begins. Brain waves during REM sleep increase to levels experienced when a person is awake, appearing more erratic in their pattern and with higher frequency.

REM SLEEP



Unlike the restorative quality of “quiet sleep,” this dreaming, “active” sleep is just that: it is almost as active as if you were awake! In general, breathing becomes more rapid, irregular and shallow, eyes



jerk rapidly, and limb muscles are temporarily paralyzed (except in those who sleepwalk, acting out their dreams). Similarly, heart rate increases, blood pressure rises, sex organs become aroused, and the body loses some of the ability to regulate its temperature. Additionally, the sympathetic nervous system, which is responsible for the “fight or flight” response, is twice as active as when you’re awake! However, despite all of this activity, your body remains relatively still, since all muscles except for those controlling eye movement and breathing are paralyzed during this phase of sleep.

This is the time when most dreams occur. Scientists are still trying to understand how dreams contribute to our health and what they may mean, but it appears that **dreaming sleep is really important for managing learning and memory.** Studies have shown that repeated interruption of REM sleep, rather than NREM sleep, decreases cognitive performance compared to a night with the standard 3-5 REM cycles.

Waking may occur after REM, when you cycle back to stage 1 sleep. If the waking period is long enough, the person may remember the dreams from the most recent REM cycle, but short awakenings might not be remembered. As the night progresses, REM cycles become longer and can last up to an hour depending on how long and restfully you sleep. In total, REM sleep accounts for about one to two hours of your sleep each night, with the rest of the time spent in light sleep to deep (NREM) sleep.

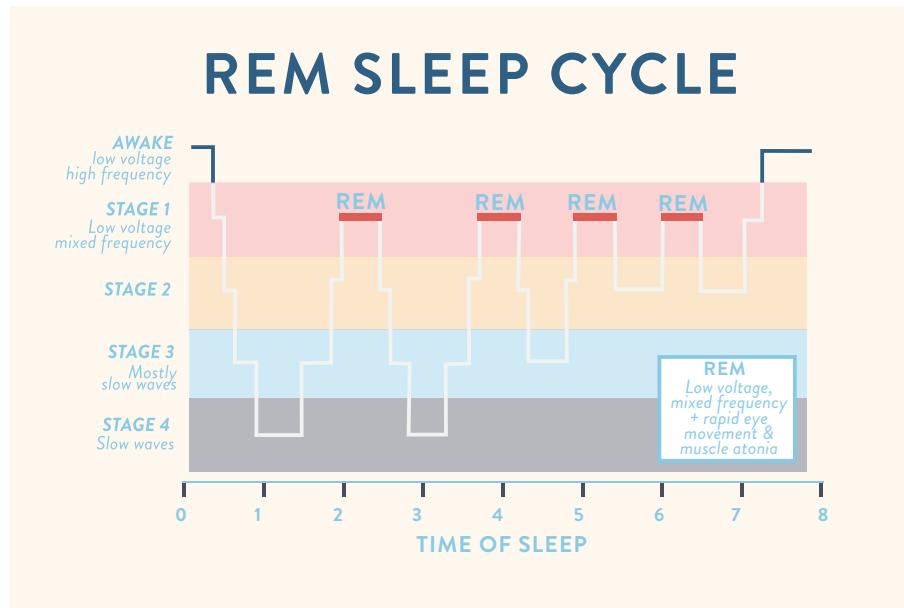
How much time we spend in each sleep stage changes as we age. Infants spend almost half of their time in REM sleep. In contrast, adults spend nearly half of our sleep time in stage 2, only about 20% in REM, and the other 30% is divided between the other three stages. Older adults progressively spend less time





in REM sleep. Differences in how much time is spent in each stage of sleep is called “sleep architecture”, and scientists are still debating the best way to represent the transition between stages throughout the night.

How does the brain control the sleep stages?



Recent research provided new insight on how a small number of specialized neurons in the brain regulate these phases of sleep — some of these cells promote wakefulness while others promote sleep. These neurons work together in a complex way; those that promote wakefulness inhibit those that promote sleep, and vice versa. This interaction normally leads to either a relatively stable period of wakefulness or a relatively stable period of sleep.

When I talk about sleep quality, I’m talking about how the body cycles through these sleep stages, including whether or not we’re spending the appropriate amount of time in each sleep stage at the appropriate time of night, in order to optimize all of the necessary biological processes that occur while we’re asleep. The most important take-home here is that there is a normal structure to sleep and this structure is sensitive to many factors, like hormones, what we eat during the day, our stress levels, and our sleep environment. Improving sleep quality means progressing towards achieving a healthy sleep architecture, including lighter stages of sleep, deep sleep, and REM sleep.



THE PURPOSE OF SLEEP

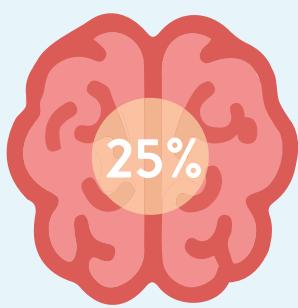
Sleeping is like eating and drinking: we absolutely need to do it to live. But have you ever stopped to think about why? Believe it or not, the exact purpose of sleep evaded researchers until the past decade (and there are still tons of unanswered questions). We're now beginning to be able to dissect those essential biological processes that happen while we're sleeping to more completely understand the function and importance of sleep.



There appears to be three main reasons for sleep.

1. Restoration

Sleep provides the opportunity for total-body rejuvenation. In fact, many body processes are enhanced or only take place during sleep: muscle growth, tissue repair, protein synthesis, and growth hormone release are just a few examples. Likewise, new research demonstrates that the major purpose of sleep is to allow for detoxification processes in the brain.



**TOTAL CALORIES
PER DAY**

The brain uses about 20% to 25% of the total calories we burn every day.

Yes, the brain needs a lot of energy to carry out all the wondrous functions it performs. And when our cells use energy, they produce waste. This metabolic waste is made up of a variety of biological compounds, many toxic, that are the byproducts of cellular metabolism. So, considering how active the brain is, this equates to a large accumulation of metabolic byproducts concentrated in one relatively small organ. In most of the body's organs, this waste enters the bloodstream, and it's part of the liver and kidney's jobs to filter it out and make sure it's eliminated from the



body via urine and stool. However, the brain is protected from the bloodstream via the blood-brain barrier (BBB) and requires many specialized systems to get molecules from the brain into the bloodstream.

The BBB is a highly-selective barrier, meaning that it only allows certain substances into and out of the brain. In general, the BBB is totally critical to the health and safety of our brains, but it makes detoxification a more complicated process.

To remove metabolic waste products from our brains, our brains have a specialized system called the glymphatic system. The glymphatic system consists of a gentle flow of normal brain fluids (cerebrospinal and interstitial fluid) through the brain which propels waste products of neuron metabolism to the space around veins in the brain (paravenous space). Close to the veins are small lymphatic vessels, into which the waste products are directed in order to return to the circulation for clearance by the kidney and liver; however, the glymphatic system is vastly more functional while we're asleep.

During sleep, the brain cells (neurons) shrink by 60%, increasing the space between them so the toxins that build up during the day can be flushed away more effectively.

Additionally, the brain has specialized neurons called “microglia” that are like the housekeepers of the brain. While we sleep, they go through and aid in sweeping up the toxins and damaged neurons that built up during the day. From there, the toxins are either converted back to their active form or are flushed into the circulation and brought to the liver for filtration.

The buildup of certain proteins is a normal part of the process of a working, happy brain. For example, while we are awake, our brains produce the by-product adenosine, a naturally-occurring protein whose accumulation seems to indicate to our brains that it's time to sleep. Without sufficient sleep, the metabolic byproducts like adenosine buildup in your brain. This can then neg-





atively impact cellular health, neurotransmitter systems, hormone systems, communication between brain cells, and stimulate inflammation in the brain. And anything that impacts the health of the brain impacts every other system in the human body.

2. Synaptic Plasticity

Synaptic plasticity refers to our brain's ability to change. This concept sounds simple but is fairly new: for a long time, scientists believed that we were hard-wired from a young age and that the brain didn't change much until old age. However, our brains are flexible (like "plastic") and make new connections all the time. The brain is kind of like a muscle in that the connections that are used all the time are reinforced and the connections that are hardly used tend to degrade or disappear. These changes are related to memory and other brain functions, and our plasticity depends on getting adequate sleep. So, a newly discovered purpose of sleep is the formation of memories. Though learning happens while awake, sleeping improves our ability to encode and consolidate memory, and it looks like sleep is necessary for long-term memory.

3. Inactivity and Energy Conservation

Understanding sleep from an evolutionary perspective, there are two more functional advantages to sleep. Sleep is a process that mammals adapted over time so that they were inactive during the most dangerous time, the night,

when reduced ability to detect predators using vision would have been a major disadvantage. Being inactive at night and in a safe resting/hiding space would make it easier for the species to survive in the wild. Additionally, the metabolism slows (about 10% less in humans), so it helps to conserve energy and reduce the need to hunt and gather food during the day to a more manageable level.





SLEEP-WAKE CYCLES

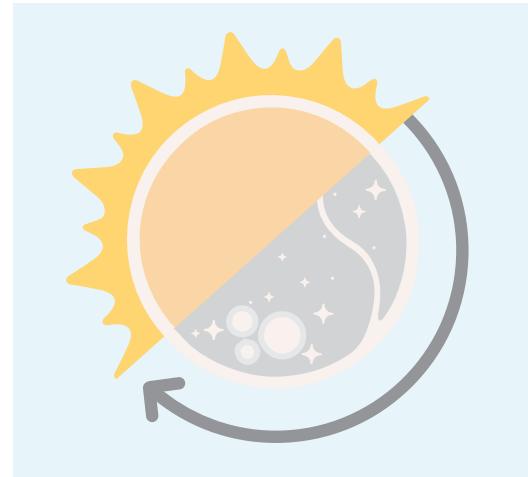
I'm sure that you can already beginning to see that sleep is super important, and we're going to discuss that in even more detail in [Part Two](#). But, in order to understand all of the many ways that sleep impacts our health (and how we might be able to make small changes that could have huge impacts on our sleep!), it's important to note how our bodies regulate sleep-wake cycles.

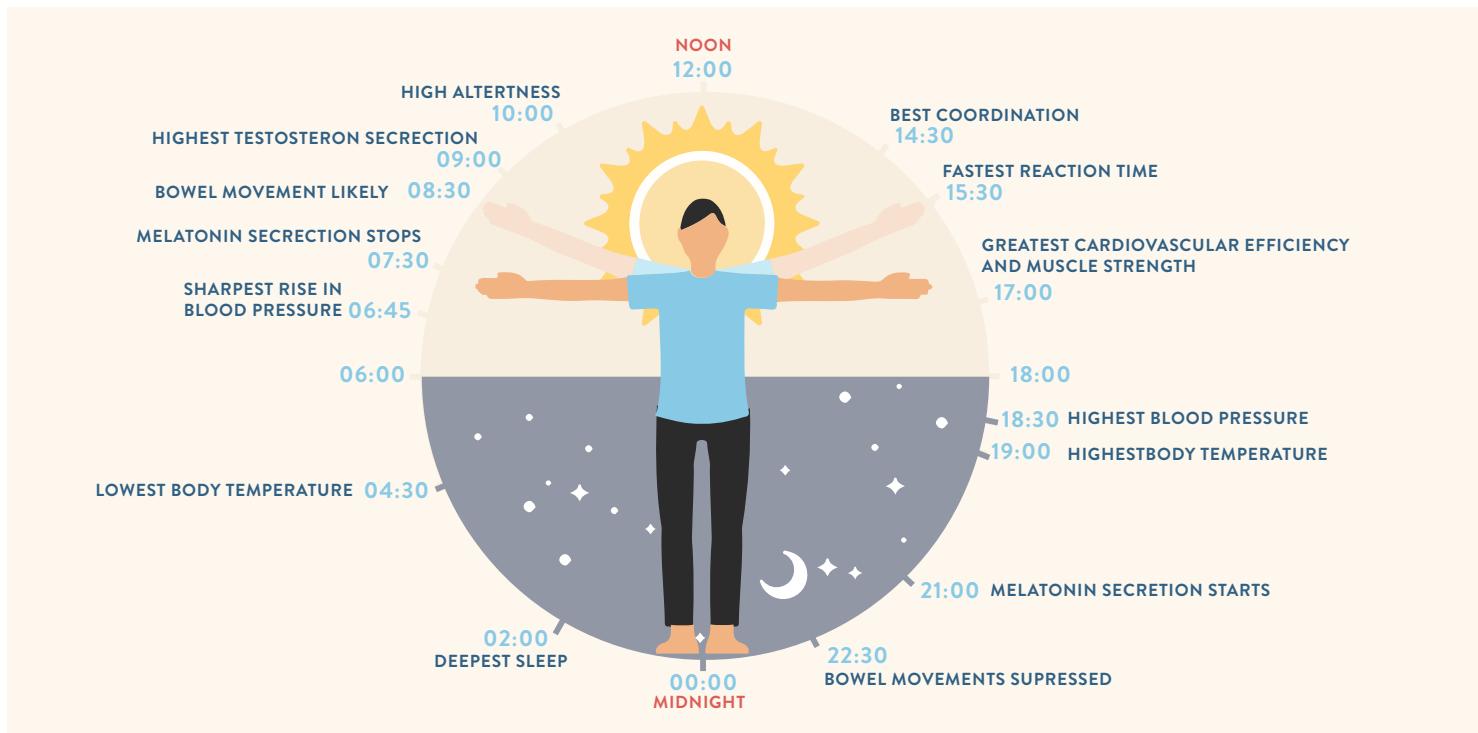
Circadian Rhythm

The term "circadian rhythm" refers to the fact that a huge array of biological processes within the human body cycle according to a 24-hour clock. Circadian rhythm allows your body to assign tasks to various organs and parts of your brain based on the time of day (and whether or not you are asleep). For example, prioritizing tissue repair while you are sleeping, and prioritizing the search for food, metabolism, and movement while you are awake. Circadian rhythm also influences a natural pattern of daily variations in body temperature, blood pressure, time-sensitive hormones, and digestion. Circadian rhythms are how your body knows what time it is (like when it's time to get up in the morning)—and properly regulated circadian rhythms are critical for health.

Your brain has a master clock, called the circadian clock, which is controlled by specialized cells in a region of the brain called the suprachiasmatic nucleus of the hypothalamus (abbreviated SCN). The SCN is connected to the retina of the eye by specific nerve fibers, which is how our brain knows what time of day it is – based on the light our eyes are being exposed to! This eye-brain connection is one of the critical reasons why getting the right kind of light exposure at the right time of day is so important for keeping our bodies in a regular hormonal rhythm; this is also why some people with traumatic brain injury experience disrupted sleep patterns.

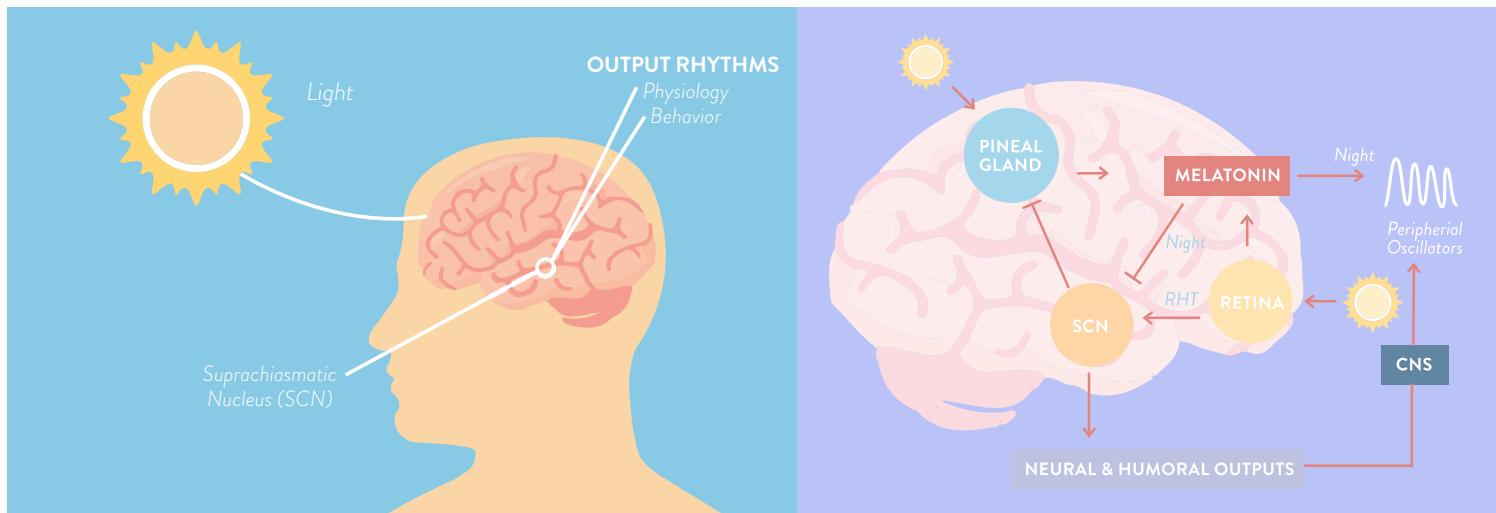
We know that the SCN is absolutely critical for the sleep-wake cycle, because damaging the SCN eliminates regular, patterned sleep behavior based on time





of day. This part of your brain is the conductor: it controls the ebb and flow of certain hormones that act as messengers throughout the body, communicating the time. As the levels of cortisol and melatonin cycle throughout the day (cortisol peaking shortly after waking and melatonin peaking during the first half of the night), they tell all the cells in your body what “time” it is. The cells each then set their own internal clocks to the brain’s clock (like setting your watch to Greenwich Mean Time).

In order to have healthy circadian rhythms, your circadian clock needs to be set to the right time.





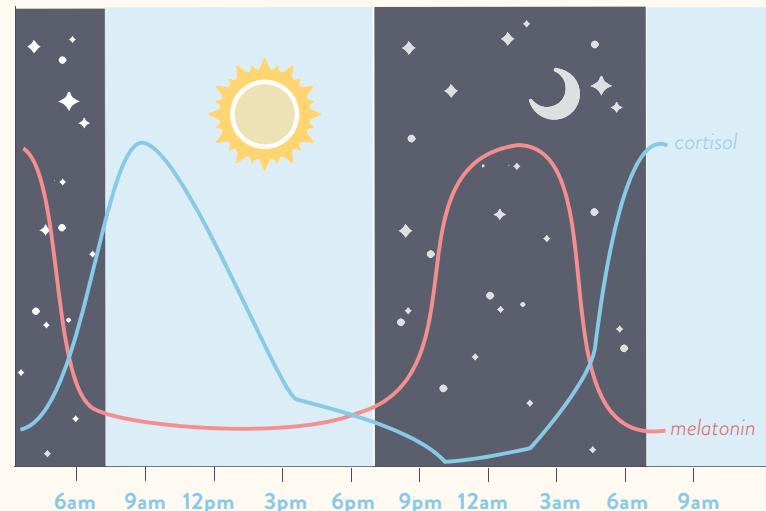
The circadian clock is set by a variety of external factors, called “zeitgebers” (that’s a German word for “time givers”). The most important zeitgeber is light, as I mentioned before, because the relationship between the retina and the hypothalamus provides general feedback for your circadian rhythm. This notion is supported by the fact that visually impaired people almost always (~90% of the time) have circadian rhythm and sleep problems. Your lifestyle (e.g., activity throughout the day) also sends a signal to your brain to help to interpret when in your circadian rhythm you are - this explains why some people aren’t able to tolerate exercise right before bed; it confuses their SCN! Finally, hormones are a critical zeitgeber that can make a huge difference when it comes to sleep quantity and quality.

The vast majority of your hormones cycle during the day (not just melatonin and cortisol), meaning that the amounts in your blood vary throughout the day.

Hormones are the chemical messengers of the body and aid organs in communicating with the brain and each other; so, this cycling impacts every system in and many functions of your body, from your immune system, to how well you digest your food, to how much insulin is released in response to sugar intake. You can see why prioritizing circadian rhythm is so important: it not only helps regulate the levels of and sensitivity to different hormones, but, even more critically, it regulates the natural ups and downs that your hormones go through during the day and night. And this is necessary for health. When your circadian rhythms are properly regulated, you sleep well, you have energy in the mornings, your energy is constant throughout the day until it starts to gradually diminish in the evening... and it reduces your risk of developing or worsening chronic disease.

CIRCADIAN RHYTHM

Daily Cortisol & Melatonin Cycles

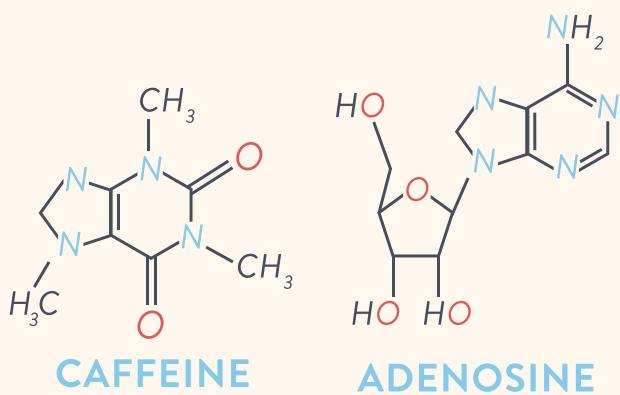




Sleep Homeostasis

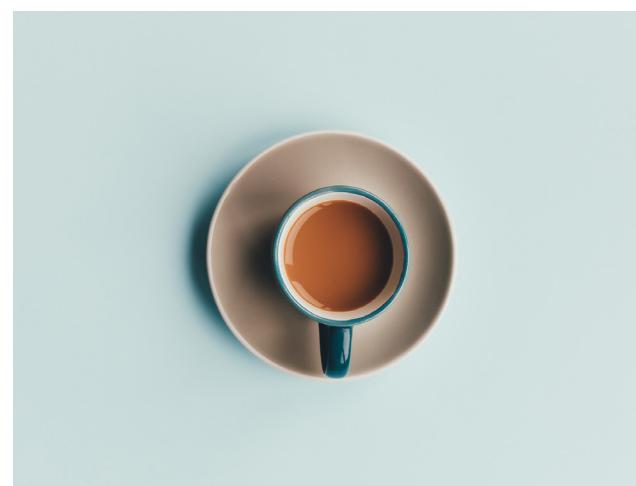
Our circadian rhythm is an incredible, fine-tuned tool that our bodies use to tell time and function at our healthiest. A less-considered aspect of sleep-wake regulation is called sleep homeostasis, which creates your drive for sleep. “Homeostasis” is a general term used in biology to describe processes your body takes to stay in a stable and/or constant condition, and “drive” in the field of biology is considered to be an innate urge or need. So, we can consider sleep ho-

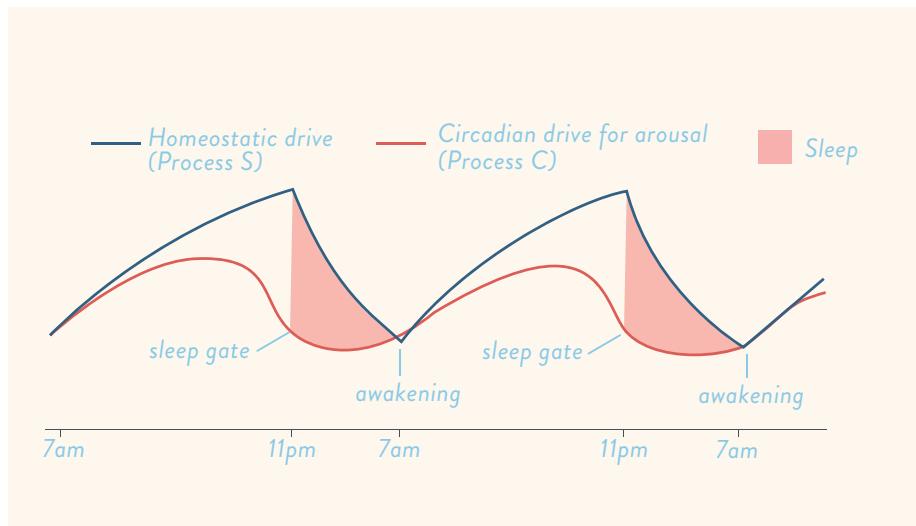
meostasis to be the process by which our bodies regulate the feeling that we need to go to sleep. In comparison to circadian rhythm, we know much less about the details of sleep homeostasis, but it appears to be controlled by the sleep-regulating substances that accumulate in the cerebrospinal fluid during waking hours. The best-understood sleep-regulating substance is adenosine.



As I mentioned before, adenosine is a protein that accumulates in the basal forebrain during wakefulness and is a natural byproduct of using energy stores in the brain. Being the central protein for adenosine triphosphate (ATP, the basic energy molecule of the body that fuels biochemical reactions), free adenosine accumulation is a sign that the brain is using energy stores in the form of glycogen. During sleep, the adenosine is cleared away and replaced by more glycogen—as you might recall, this was one of the examples of why we need sleep in the first place. Commonly-used stimulants like caffeine actually work as adenosine antagonists, preventing the effect of drowsiness (and this is also one of the reasons why we don’t want to overuse caffeine!). However, the details of this process and what other factors may be involved in regulating sleep homeostasis are still being uncovered by scientists.

In other terms, the “sleep homeostat” is





basically your sleep debt. It is a term that refers to both your body's gauge of the amount of sleep you've experienced recently as well as its drive to return to balance, i.e., paying off your sleep debt. You can think of it as the sliding scale of how tired you feel based on how much sleep you've had the

last few nights. When your circadian clock tells your body it's time to prepare for sleep and your sleep homeostat agrees that sleep is currently needed by your body (and you actually listen and go to bed!), that's when you have a good night's sleep!

In combination, your natural circadian rhythm and sleep homeostat generate a drive for sleep each day that may be influenced by other factors. If you are looking to improve your sleep, these two biological mechanisms may be the key!

How Much Sleep Do We Need?

The National Sleep Foundation recently convened with experts from sleep research, anatomy and physiology, as well as physicians from a variety of specialties, including pediatrics, neurology, gerontology, and gynecology to reach a consensus on our general sleep needs from the broadest range of scientific disciplines.





The panel revised the recommended sleep ranges and came up with these guidelines:

NEWBORNS (0-3 MONTHS)	14-17 hours
INFANTS (4-11 MONTHS)	12-15 hours
TODDLERS (1-2 YEARS)	11-14 hours
PRESCHOOLERS (3-5 YEARS)	10-13 hours
SCHOOL AGE CHILDREN (6-13 YEARS)	9-11 hours
TEENAGERS (14-17 YEARS)	8-10 hours
YOUNGER ADULTS (18-25 YEARS)	7-9 hours
ADULTS (26-64 YEARS)	7-9 hours

If you are trying to heal from an autoimmune disease or other chronic illness, don't be surprised if what your body needs is on the longer end of that range (say 9 to 10 hours) or even exceeding that range (some people with autoimmune disease report needing 12 hours of sleep every night to heal). I believe even grown-ups need bedtimes. By making sure yours is early enough to hit a minimum of 7 hours of sleep every night, you'll be greatly improving your health and reducing risk of all chronic illnesses.

I think this recommendation is deserving of some contemplation. As health-conscious members of the Paleo and/or the alternative health communities, we are used to thinking in terms of going beyond the minimums established by conventional medical and scientific communities. For example, we strive to regulate our blood sugar so perfectly that we have an even lower HbA1C than what is considered normal; we understand that optimal range is different than lab range for a variety of tests; and, we understand the RDA is likely a gross underestimate of how much essential nutrients we need to be optimally healthy (as opposed to just not completely malnourished). The conven-



tional medical and scientific communities are shouting from every megaphone that we need a bare minimum of 7 hours of sleep every single night. Not only are we not doing our normal one-upping thing and saying “oh yeah? Well, we’re going to get a minimum of 8 hours per night, so there!”, but we’re not even listening at all!

The fact is that 35% of Americans don’t ever get 7 hours of sleep. 65% of Americans never get 8 hours of sleep. And, however much sleep you think you’re getting, you’re very likely getting less.

Most of us overestimate how much sleep we get. We look at the clock when we turn out the light and think of that as the beginning of our sleep. But, it’s normal to take 30-60 minutes to fall asleep, and it’s normal to have at least a few brief wakings in the night. When we simply look at the clock at the beginning of the night versus the morning, we think of that as how much we slept.

Studies that have compared how individuals report their sleep with how much they actually slept measured by wrist actigraphy (like a Fitbit) and have found that on average, we report that we got 48 minutes more sleep than we actually did. But, here’s where things get interesting: the less you sleep, the more likely you are to overreport your sleep. So, people who got 5 hours of sleep per night on average overreported by 1 hour and 20 minutes (so, they said they got 6.3 hours instead of 5) and people who got 7 hours of sleep only overreported by 20 minutes. What does this mean? That if you get 6 hours or less, chances are good that your sleep situation is worse than you think.

Maybe you’re scoffing at me and thinking, “well, I eat a super healthy, nutrient dense diet! I don’t need that much sleep!” So, let’s use the Paleo approach to this topic and take it back to what the science says about our evolutionary biology-established need for sleep. It’s fascinating when the research goes back to an ancestral model by studying hunter-gatherers, because it gives us a sense of our biology without the many alterations that have occurred with modern life (e.g., our constant exposure to screens!). Then, we can compare what’s changed and hopefully optimize our behaviors to meet our genetic needs—because even though our world has changed infinitely just in the last century, our biological adaptations develop over a much, much longer period of time (think from tens of thousands to millions of years). Looking specifically at our sleep needs, two



HUNTER GATHERERS



9-10 hours “in bed”
but a total of 7-8.5 hours sleep

recent studies of hunter-gatherers show that our general recommendation of 7-8.5 hours per night is about right.

A study of Argentinean hunter-gatherers (the Toba/Qom) published recently showed that these people go to bed a couple of hours after sunset and get up at dawn. The results showed that while they spend 9-10 hours “in bed,” they get a total of 7-8.5 hours sleep: an average of 7 near the summer solstice (i.e., the longest days of the year with the most sunlight) and an average of 8.5 near the winter solstice (the shortest days of the year, when there’s much less sun to enjoy and be productive in). Sleep quality was comparable to what medical professionals in Western countries deem normal sleep.

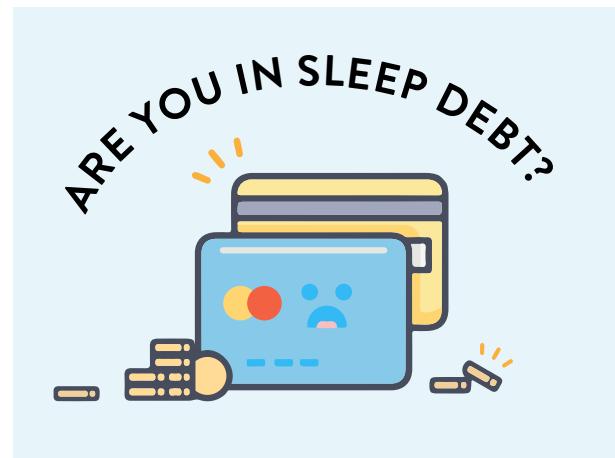
A second study examined three different hunter-gatherer societies (the Hadza of Tanzania, the San of Namibia, and the Tsimane of Bolivia) for both their sleep habits and sleep efficiency. These peoples also typically go to bed several hours after sunset and rise a little before or at dawn, yielding between 6.9 and 8.5 hours of sleep (again averaging toward the lower end of that range in the summer and the higher end of that range in the winter). Additionally, researchers found that sleep latency (the time it takes to fall into a deep sleep at the beginning of the night) was pretty similar to our society’s standards: about a half an hour to an hour. Again, their sleep quality is comparable to what we call normal in Western societies.

What does this information tell us? Aiming for 7-8.5 hours of quality sleep every night (or you can get really geeky and track with your FitBit in sensitive mode and aim for a more specific 6-7 hours after “restless” time is subtracted) puts us at levels comparable with hunter-gatherers and, presumably, our Paleolithic ancestors. And to get that, we probably need about 9 hours in bed.



Sleep Debt

Defining how much sleep you need within the normal ranges can be a challenge. Do you enjoy perfect health with 7 hours every night, or do you need 9 hours on a regular basis? And what if you're someone who needs more sleep than the top end of the range (which happens during both chronic and acute illness)? How do you know? While scientific researchers are indeed working on a blood test to evaluate sleep debt, being able to ask your doctor to run a test that will tell you if you're getting enough sleep is probably at least a few years from being a reality.



In the absence of a definitive test, you can ask yourself the following questions:

- Do I have to set an alarm in the morning? Would I sleep past my alarm time if I didn't have one set?
- Do I drag myself out of bed? Or need caffeine in the morning to get me going?
- Do I always sleep in on the weekends?
- Do I get less than the minimum 7 hours sleep per night even once or twice per week?

If the answer is “yes” to any of these questions, you owe a sleep debt. And even if you’re almost getting the right amount of sleep, (i.e., your sleep debt is very low), your health will suffer. A recent study showed that getting just 30 minutes less sleep per night than your body needs on weekdays (while sleeping in on weekends) can have long-term consequences for body weight and metabolism!

Most research into the role that sleep has on health uses “short sleep” as an investigatory tool. Short sleep means sleep that is restricted to a shorter duration than you would normally get (typically 3-5 hours is used in most studies). However, as researchers start to look at sleep debt, which can be a tad more subtle, instead of more dramatic situations, it’s becoming clear just how sensitive the human body is to inadequate sleep.



In one case, the study participants kept sleep logs, and the researchers calculated how much less sleep they got than the recommended 8 hours a night cumulative over the work week (not including sleeping in to “catch up on sleep” on the weekends). The study participants were people newly diagnosed with type 2 diabetes. At the start of the study, when the participants were recruited, those that typically didn’t get enough sleep were 72% more likely to be obese. The researchers then followed the participants over a year to see what would change. The amount of sleep debt that individuals had didn’t typically change over the course of the study, but they found that sleep debt dramatically impacted risk of obesity and insulin resistance, and the correlation between the two increased throughout the study. At 12 months, for every 30 minutes of weekday sleep debt, the risk of obesity was 17% higher and the risk of insulin resistance 39% higher. That’s right, just 30 minutes of sleep debt had a huge impact on blood sugar regulation!

Now, this study was done in a population that has much higher risk of developing these conditions than the average Paleo dieter. But, when you combine this with the huge collection of mechanistic studies showing that inadequate sleep increases insulin resistance, causes cortisol secretion, causes toxins to build up in our brains, causes neurotransmitter imbalances, contributes to inflammation, and causes increased hunger and cravings... this isn’t research that should be dismissed. Another recent study showed that some components of the immune system that become overactive during short sleep do not return to normal after two days of sleeping in. Basically, the weekend isn’t enough to help restore healthy immune function. This is super important for everyone but especially those of us dealing with chronic illness or autoimmune disease.

So, we’ve talked a lot about what constitutes the science of sleep and discussed our minimum sleep needs and recommendations. I’ve said over and over again that sleep is critical for health, so I want to get into the nitty-gritty of the link between sleep and many facets of health!

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PART TWO

Sleep & Health



CHAPTER QUICKSTART

PART TWO Sleep & Health



Pg. 39 1. SLEEP AND DISEASE RISK

- Sleeping less than 6 hours a night has been associated with an increased risk of all-cause mortality by 12% - almost as much as being obese. It is also associated with increased risk for being obese, inactive, and not eating enough vegetables; type 2 diabetes and/or insulin resistance; autoimmune disease; stroke; myocardial infarction (heart attack); colorectal cancer onset; and breast cancer prognosis.
- Sleeping more than 9 hours per night increased risk of disease by 25%, so being a long sleeper isn't always great for your health either!

Pg. 44 2. INFLAMMATION

- Inflammation refers to a response from the immune system, which can be specific (like fighting an infection) or non-specific (as is the case in that systemic, bad-type of inflammation).
- Three consecutive nights of inadequate sleep has been shown to produce an inappropriate immune response, and the effects of losing sleep last several days after the incident.
- Sleep deprivation may also increase changes of developing an infection and susceptibility to onset of a cold.

Pg. 48 3. AUTOIMMUNE DISEASE

- Autoimmune disease occurs when the immune system attacks cells that are our own; there is no common etiology or understanding of their origin – it appears that there are many underlying factors associated with the onset of autoimmunity.
- Less sleep is associated with worsened autoimmune disease systems and may contribute to the onset of rheumatic autoimmune disorders like lupus and rheumatoid arthritis.

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1 2 3

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pg. 50 **4. WEIGHT GAIN AND OBESITY**

- Medical research also shows that there's a stronger connection between obesity and lack of sleep than any diet factor.
- Short-term changes in sleep patterns can worsen insulin resistance, dysregulate cortisol, and increase leptin – all of which can lead to a pattern of seemingly uncontrollable weight gain.
- Sleep deprivation changes the amount of dopamine receptors in the brain, mimicking the neuropathology of someone with food addiction-type behaviors (think obesity or binge eating disorder).

pg. 60 **5. THE HYPOTHALAMIC-PITUITARY-ADRENOCORTICAL (HPA) AXIS**

- The HPA axis regulates the physiological stress response and is a known contributor to many health conditions.
- The stress hormone, cortisol, is a critical component of the sleep-wake cycle.
- Chronic stress is related to many health issues, including immune system problems, inflammation, and weight problems.

pg. 65 **6. CARDIOVASCULAR DISEASE**

- Even without a diagnosed sleep disorder, there is a relationship between sleep and cardiac function, endothelial cell function, and coagulation.
- Sleep disorders are associated with increased risk for serious cardiovascular problems, including hypertension, atherosclerosis, stroke, and heart failure.

pg. 67 **7. SEX HORMONES**

- Given the complex and incredibly important role of the sex hormones, it is not surprising that their rhythms may be altered by inadequate sleep.
- There is some evidence of an association between estrogen, sleep, and the onset of certain cancers.
- Follicle stimulating hormone patterns may change in post-menopausal women.

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- Testosterone levels are altered by sleep deprivation in both men and women.
- Pregnenalone is a hormone precursor that can act on the GABA receptor, is related to improved sleep, but its relationship to the hormones progesterone and cortisol make it an easy target for dysregulation.

Pg. 70 **8. COGNITIVE FUNCTION**

- Reduced sleep duration is related to a partial shutdown of the prefrontal cortex, which makes attentiveness quite the challenge for most people.
- Sleep deprivation makes people more impulsive, and getting enough sleep optimizes decision-making.
- Cravings, especially for calorie-dense foods, are increased after sleep deprivation, and these have been demonstrated to alter behavior.
- Working memory is disrupted in people who don't get enough sleep. This phenomenon has been best-studied in school-age children; those who got enough sleep tended to do better on tests and have better behavior than their sleep-deprived peers.
- Conversely, doing exercises that improve working memory may improve sleep quality.
- Not getting enough sleep is related to memory consolidation and long-term memory.

Pg. 73 **9. MENTAL HEALTH**

- Something about sleep disturbance alters brain chemistry such that we are more susceptible to mood disorders; research points to people with obstructive sleep apnea being much more likely to develop depression within one year of being diagnosed.
- Researchers are examining whether there is a relationship between sleep and other psychological conditions like borderline personality disorder and psychotic episodes.



PART TWO

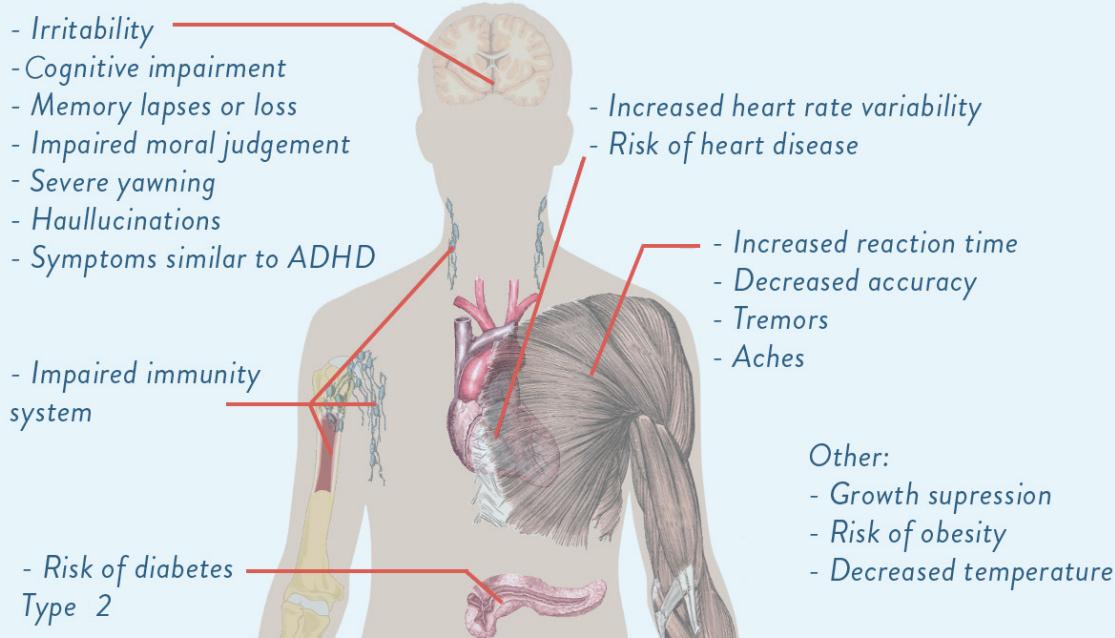
Sleep & Health



Research is exploding with new reports linking inadequate sleep with disease. There are many obvious effects to not sleeping enough, even after one night. You might be familiar with some of the symptoms of inadequate sleep: being forgetful, inability to concentrate or calculate, mood swings, irritability, feeling drowsy, yawning, feeling less motivated, sugar cravings, and a fantastical willingness to switch from drinking coffee to a straight caffeine IV!

Of course, you don't feel good when you don't get enough sleep. But the impact that sleep deprivation has on our behavior is just the tip of the iceberg. Inadequate sleep is also linked to an impaired immune system, increased risk of diabetes, increased risk of cardiovascular disease, increased risk of obesity, and a growing list of other chronic illnesses. And while the world debates about the

THE EFFECTS OF SLEEP DEPRIVATION

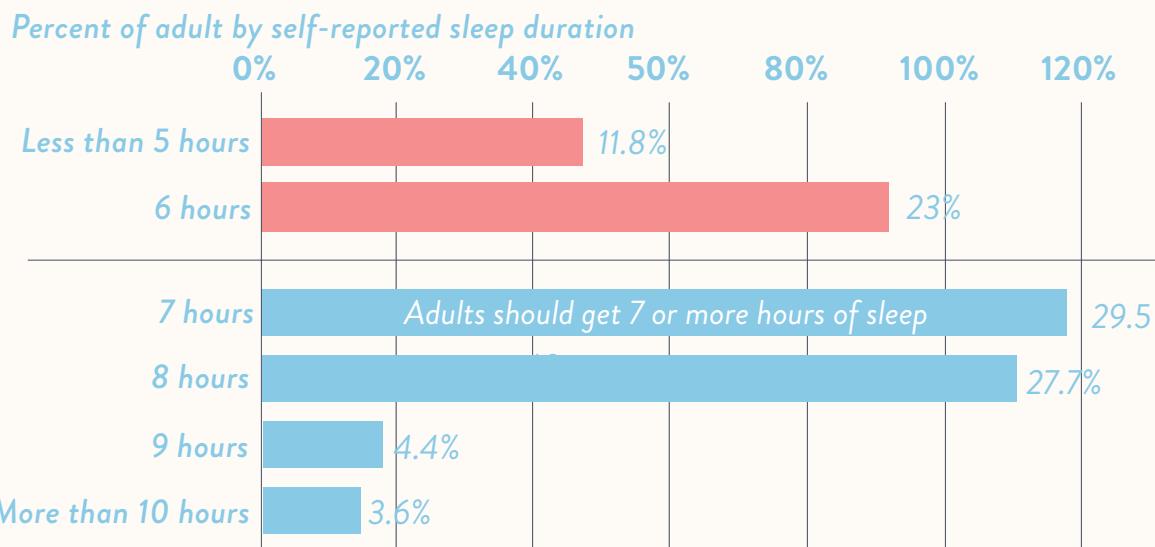




perfect carbohydrate to fat ratio of our diet and whether or not saturated fats are evil, how little sleep we get as a society in relation to how much we need is the elephant in the room!

The body of scientific literature linking inadequate sleep, more technically called “short sleep”, with disease is vast, so vast that there’s now huge meta-analyses combining data from multiple studies to establish a statistically powerful link. There’s also a very broad collection of mechanistic studies exploring the cellular and molecular details of exactly why we need sleep and all the bad things that happen in our bodies when we don’t get enough of it. The benefit for us is that quantifying the role that sleep plays in disease is pretty easy: I can tell you exactly how much your risk for diabetes, obesity, cardiovascular disease, cancer and autoimmune disease goes up if you don’t get enough sleep.

MORE THAN A THIRD OF U.S. ADULTS DON’T GET ENOUGH SLEEP



Source:CDC

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1 2 3

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This is also the body of scientific literature that the American Academy of Sleep Medicine and the Sleep Research Society used to establish their guidelines and the consensus statement, published in 2015:

“Adults should sleep 7 or more hours per night on a regular basis to promote optimal health. Sleeping less than 7 hours per night on a regular basis is associated with adverse health outcomes, including weight gain and obesity, diabetes, hypertension, heart disease and stroke, depression, and increased risk of death. Sleeping less than 7 hours per night is also associated with impaired immune function, increased pain, impaired performance, increased errors, and greater risk of accidents.”

So, the recommendation that we get a minimum of 7 hours of sleep is no joke. And it should be a hard and fast rule for anyone who prioritizes their health (especially those of us who are health overachievers, as many in the Paleo community are!).

Confession: I may have spent just a tad too much time geeking over the cool science that connects sleep and your health. So, some of the following sections might be a bit dry at times. I think everyone should devour every inch of this book with gusto, but I understand if you’re having trouble with your sleep and don’t want to miss another night of rest; if that’s the case, I give you formal permission to skim this section and head to [Part 3](#), where we start to talk about the more practical tips.

In the meantime, the following is perhaps one of the most comprehensive summaries of the relationship between sleep and all aspects of your health and wellbeing that you can find anywhere... So enjoy!

SLEEP AND DISEASE RISK

One of the scientific strategies for quantifying how a factor impacts health is to look at something called all-cause mortality. Large cohorts of people are followed for years (sometimes decades) and every death, including cause, is recorded. Then scientists can compare how many people died in each category of the factor being evaluated. In the instance of sleep, these studies tend to define short sleep as less than 6 hours per night, normal sleep as 6 to 9 hours per



night, and long sleep as over 9 hours per night. Some studies look at narrower ranges, for example <5 hours, 6 hours, 7 hours, 8 hours, 9 hours, >10 hours. Comparing the number of deaths in each category gives us an indication of how sleep affects health. Yes, the number of deaths include deaths as a result of acute illness, chronic disease, old age, and accidental death. However, when you look at this number as a whole, it's a very good way to measure overall health and longevity regardless of the type of disease or natural cause. More sophisticated statistics can account for other known health inputs such as smoking, being overweight, and activity level to hone in on the effect of sleep independent of other risk factors.

A 2010 meta-analysis pooled data from 27 different cohorts and found that sleeping less than 6 hours per night increased risk of all-cause mortality by 12%. To compare, being obese increases risk of all-cause mortality by 18%. Smoking about doubles the risk of all-cause mortality. For every hour of physical activity that replaces sedentary time, risk of all-cause mortality drops by 16%. And, for every daily serving of vegetables (up to 5 servings), risk of all-cause mortality drops by 5%. So, using all-cause mortality as an indicator, the health impact of getting less than 6 hours of sleep per night is in the same ballpark as being obese, being sedentary, and not eating enough vegetables.

But here's where things get interesting.

Getting less than 6 hours of sleep per night also increases the chances of being obese, being inactive, and not eating many vegetables.

So, not only is not getting enough sleep an independent risk factor for disease, but the probability of having additional risk factors goes up! In the Paleo community, we are focused on the healthiest diet choices, activity, and maintaining a healthy weight. We need to add consistently getting 7-8 hours of sleep to this list of Paleo priorities. And guess what? Not only will that make us healthier, but being well rested makes making healthy food choices easier, increases our

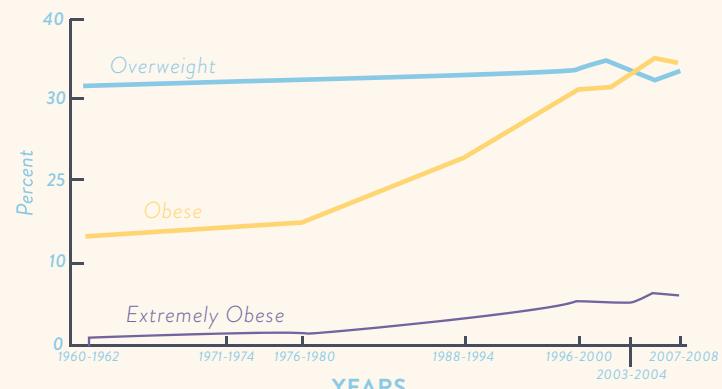


motivation to move, and directly affects hunger and metabolism, major contributors to body weight.

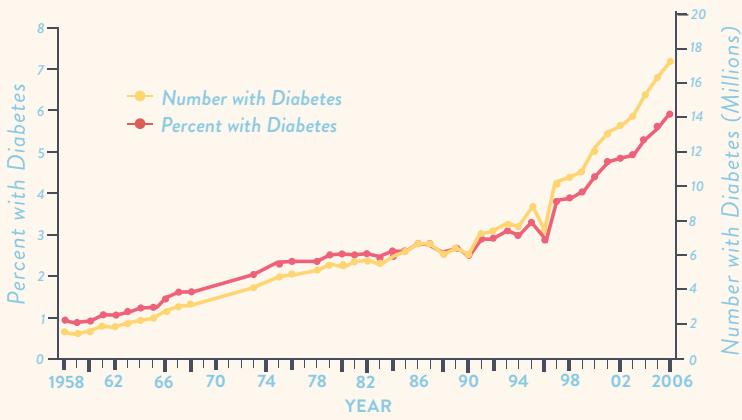
Sleeping less than 6 hours per night increases risk of obesity by 55% in adults (90% in children!). But, when it comes to obesity, researchers have teased out some other fascinating links between how we sleep and obesity risk. Variability in bedtime during the week >2 hours increases risk of obesity by 14%. That means that if you normally go to bed at 10pm on weeknights and stay up until midnight Saturday for a party, your risk of obesity is higher. This is such a normal pattern for students and working adults alike! Sleep duration variability increases risk of obesity by 63% for each hour of standard deviation. That means that if some nights you get 6 hours and other nights you try to make up for it and sleep 9 hours, that inconsistency is dramatically increasing risk of obesity! It's also important to sync our sleep time with the sun: following the night owl patterns of late-to-bed, late-to-rise doubles risk of obesity compared to early-to-bed, early-to-rise, even in people who get enough sleep!

TRENDS IN OVERWEIGHT, OBESITY, & EXTREME OBESITY:

Adults aged 20-74 years United States, 1960-2008



NUMBER & PERCENTAGE OF U.S. POPULATION WITH DIAGNOSED DIABETES



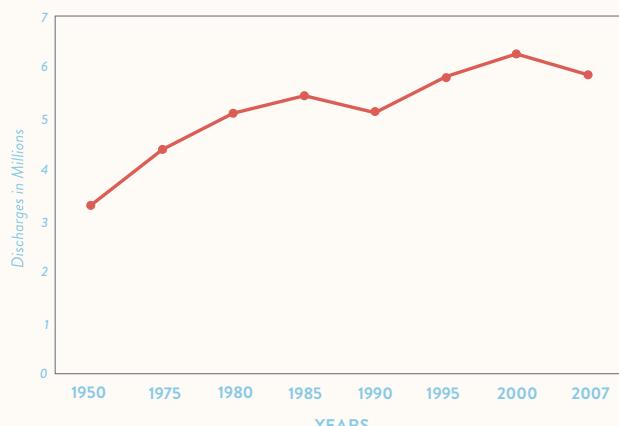
are only allowed 4-5 hours of sleep per night and develop glucose intolerance within a few days! What might be even more fascinating is that there's emerging evidence that the impact of sleep on insulin sensitivity and glucose metabo-

Sleeping less than 6 hours per night increases risk of type 2 diabetes by 50%. But, if you pool diabetes and impaired glucose tolerance together, that risk soars to a whopping 240%!

The link between sleep and insulin sensitivity is very strong. In fact, there are studies where participants



RISE OF CARDIOVASCULAR DISEASE

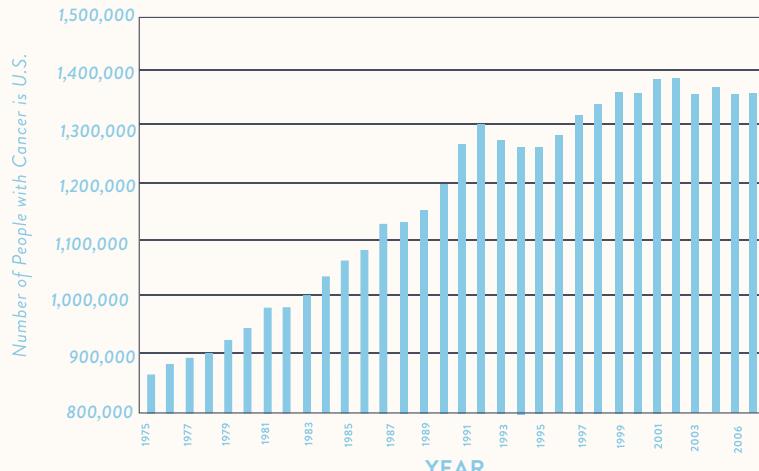


incidence. However, having a non-apnea related sleep disorder (the most common of which is insomnia, which can be as mild as having a night or two a week where either you can't fall asleep or you wake up in the middle of the night and can't get back to sleep) increases risk of autoimmune disease on average by 50%! Some autoimmune disease incidences are more sensitive to non-apnea sleep disorders than others. For example, the risk of systemic lupus erythematosus goes up 81%, rheumatoid arthritis risk goes up 45%, ankylosing spondylitis risk goes up 53%, and Sjögren's syndrome risk goes up 51%. It's even worse if you suffer from obstructive sleep apnea, a condition that tends to go along with obesity and diabetes, which more than doubles risk of autoimmune disease. Shift workers, known for having erratic sleep schedules and routinely getting inadequate sleep, have a 50% higher risk of autoimmune disease. It's also known that short sleep increases symptoms of many autoimmune diseases.

lism is even greater than diet. Research presented at last fall's Obesity Society Annual Meeting shows that a single night of lost sleep was worse than six months of a high-fat Western diet in terms of insulin sensitivity and glucose metabolism!

Research into risk factors for autoimmune disease is still in its infancy. There have yet to be any large population studies looking at average sleep duration and autoimmune disease

NUMBER OF PEOPLE DAGNOSED WITH CANCER IN THE US 1975-2006





Routinely sleeping less than 6 hours per night compared to getting between 6 and 8 hours every night doubles risk of stroke, doubles risk of myocardial infarction, increases risk of congestive heart failure by 67%, and increases risk of coronary heart disease by 48%. Those are huge numbers! And it's worth adding here that we are so quick to blame diet factors for the dramatic increase in cardiovascular disease seen over the last 50 years. In the 70s and 80s, saturated fat and cholesterol were to blame. Now, it's high fructose corn syrup, PUFAs, and processed food chemicals. I certainly believe that diet is a factor here, but when you look at the body of literature explaining how inadequate sleep raises LDL cholesterol, raises blood pressure, increases heart rate variability and causes inflammation, I think there may be a bigger fish to fry (in non-hydrogenated oil, of course!).

When it comes to cancer risk, finally, there's some less than morbidly bleak news. In the studies that have looked at prostate, breast and lung cancer, there was no increased risk with short sleep even comparing people who get under 5 hours of sleep per night to those who get 7-8 hours. The exception is studies of colorectal adenoma, in which the risk increases by 50% with less than 5 hours of sleep. However, how much sleep you get upon and after breast cancer diagnosis is a predictor of survival, and getting less than 6 hours of sleep increases risk of death by 46%.

Is sleeping too much a problem?

The coin does have a flip side. There's a collection of studies showing increased disease risk in long sleepers. A large meta-analysis looking at all-cause mortality showed 25% higher risk for those sleeping more than 9 hours per night (compared to 7-8 hours) and a 54% higher risk for those sleeping more than 10 hours. However, there's a chicken versus egg discussion to engage in here. Are people sleeping more because they're sick or are they sick because they're sleeping more? A recent study evaluated the effect of sleep on survival rate in groups with different levels of physical activity and found that long sleep, more than 9 hours, only increased all-cause mortality in physically inactive people.





And when the American Academy of Sleep Medicine and the Sleep Research Society reviewed the scientific literature on this topic, they came up with the following for their consensus statement:

“Sleeping more than 9 hours per night on a regular basis may be appropriate for young adults, individuals recovering from sleep debt, and individuals with illnesses. For others, it is uncertain whether sleeping more than 9 hours per night is associated with health risk.”

As you can see, the consequences of inadequate sleep is far more dire than simply walking around feeling like a zombie the next day. Sleep isn't just important, it's critical for health! And, there's no substitute. This isn't like outdoors time where we can take a vitamin D3 supplement and use a light therapy box for circadian rhythm entrenchment and suffer no ill effects from a life spent indoors. Coffee, energy drinks and supplements just mask the fatigue, give the illusion that everything's fine, and then erode sleep quality the next night. They are crutches that don't provide our bodies with any tangible support other than to allow us to continue to ignore our body's signals and abuse our bodies through neglect.

Inflammation

Inflammation is a hot topic in the scientific community today. This buzzword has been linked with several medical conditions that are of major concern for the modern Western world (gastrointestinal diseases, autoimmune diseases, heart diseases—and more!). And if you read my blog, you've probably learned about these links before. But did you know that we're now starting to believe that inflammation is also the explanation for depression and other mental health concerns? Seriously! So, understanding inflammation is an absolute key to mastering your health.

IS INFLAMMATION STEALING YOUR SUNSHINE?



Challenge CALENDAR



	-8	PURCHASE <i>GO TO Bed!</i>	-7	READ PARTS 1 & 2 OF GO TO BED E-BOOK BUY YOUR AMBER GLASSES	-6	READ PARTS 3 & 4 	-5	READ PARTS 5 & 6
-4	-3	DO PRE-SLEEP SURVEY & <u>GET SLEEP SCORE</u> START IMPROVING SLEEP HYGIENE (see page 92 in Go To Bed)	-2	GET SUPPORT & ACCOUNTABILITY FROM FRIENDS & FAMILY Follow Go To Bed Facebook & Instagram	-1	PRINT OUT ALL PRINTABLES (see page 289 in Go To Bed) 	1	<i>Challenge BEGINS!</i> CREATE A BEDTIME
2	3	WEAR YOUR AMBER GLASSES 	4	GET MEDITATING 	5	GET OUTSIDE! 	6	GET A ROUTINE
7	8	GET 30G OF CARBS 	9	STEP AWAY FROM SCREENS 	10	CREATE MORE TIME TO RELAX 	11	DON'T EAT BEFORE BED
12	13	CUT OFF THE CAFFEINE AT NOON 	14	GET MOVING! 	15	GET TO BED EVEN EARLIER! 	16	POST <i>Challenge</i> SURVEY Get your new <u>sleep score!</u> SUBMIT POST-CHALLENGE TESTIMONIAL (Email us at contact@paleomom.com)

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