

Good Sleep Is Critical for Good Health

Getting adequate sleep can help prevent disability and even death, at home and around the world.

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My patients often say they don't need much sleep or are "able to function" on minimal amounts. I hear busy executives claim that they have too much to do and sleep is not a priority. In these instances, I am reminded of the powerful quote by sleep research pioneer Allan Rechtschaffen: "If sleep does not serve an absolutely vital function, then it is the biggest mistake the evolutionary process has ever made."

I firmly believe that we need to change our casual attitude around sleep. We *do* need sleep, and it must be made a priority if we are to live full and optimally healthy lives.

I became very familiar with our society's sleep culture during my early twenties when I was living in Manhattan and working in the advertising and marketing industries. Sleep was a luxury that many people didn't afford themselves. If anything, long work hours and 2AM calls for "emergencies" were necessary to climb the corporate ladder. "Sleep" was a bad word, especially if you chose to get a good night's rest over going to work.

Sleep research, however, indicates that sleep is of vital importance to health and longevity, whether you look at the Blue Zone studies, epidemiological studies, or the newest studies in telomere research (telomeres are the amazing ends to our chromosomes that are being studied as a link to longevity).

It is estimated that nearly 40 million people die annually from non-communicable diseases (NCDs) worldwide, many of which are preventable. While there is no doubt that unhealthy diets, the use of tobacco and alcohol, and sedentary lifestyles are major causes and risk factors for

NCDs, examining the role of sleep in these conditions is also necessary and important.

What Is Sleep?

Sleep is a physiological shift that occurs in our 24-hour circadian cycles. It's a period of time that allows the body to go through various cellular changes, which contribute to health and healing in every organ system.



Sufficient sleep can help people avoid type II diabetes, hypertension, and cancer.

Sleep affects health through epigenetics, which means that gene expression can be modified (for better or for worse) in each cell of the body. This modification of the gene's expression can change how a cell functions and, ultimately, an organ system (made up of these cells) functions. As scientists explore solutions to combat the increasing number of NCDs worldwide, studies on chronic sleep

deprivation are being connected to type II diabetes, hypertension, cancer, and disease progression in general.

The CDC (Centers for Disease Control and Prevention) reported in 2016 that one out of three people do not regularly get the recommended amount of sleep. In order to understand these studies, first let's define adequate sleep for health promotion. The recommended amount of nightly sleep for adults is seven to nine hours. Sleep deprivation can be divided into the following three categories: (1) not being able to fall asleep, (2) waking up multiple times during the night, and (3) waking up too early.

Humans have sleep cycles that are roughly 90 minutes in length. During one 90-minute cycle, we transition from stages 1 and 2, which are light sleep patterns, to stages 3 and 4, which are deep-sleep patterns (many times going back to stages 1 or 2), and then finally to the REM (rapid eye movement) phase. All phases of sleep are important

and each stage of sleep serves a role in health.

Studies are showing that the majority of physiological shifts we see—that connect sleep with health benefits—actually occur in the deepest parts of sleep. Additionally, we are genetically predetermined as if we are larks, meaning that we need to go to bed around 9:30 to 10PM to link up with our internal clocks (circadian rhythms) or, if we are night owls, we need to be in bed by 11PM to 12AM. (Night owls are actually a minority; we might see this type of behavior more due to social habits than genetic variance). So, getting “enough sleep” can mean seven to nine hours of continuous sleep per night, making sure we are syncing up with our internal clock by going to sleep at a regular bedtime.

The Results of Inadequate Sleep

Studies on inadequate sleep and health focus on the autonomic nervous system and the regulation of hormones and neurotransmitters, and how they affect heart disease, diabetes, hypertension, eating patterns and obesity.

One focus of sleep research is the influence of sleep on the autonomic nervous system (ANS), and the connection to both cardiovascular disease and type II diabetes. During adequate sleep, sympathetic tone in the body reduces (this is your fight or flight nervous system response), which directly causes a decrease in heart rate and blood pressure, and also has metabolic effects in many cells of the body (like in the pancreas). Studies show that in chronic sleep deprivation, there is an imbalance in our nervous system responses. This causes an increase in sympathetic tone and can cause an increased risk of hypertension and heart failure, and has also been linked to an increased risk of type II diabetes.

Nervous system imbalance is not the only contributing factor in insulin and blood glucose regulation dysfunction seen in type II diabetes. Studies are showing that sleep plays a

vital role in the regulation of hormones and neurotransmitters that govern basic eating patterns. A lack of sleep has been shown to affect the cells’ reactivity and sensitivity to both insulin and glucose. One study published in the *Annals of Internal Medicine* showed that participants who were sleep deprived (getting 4.5 hours of sleep for 4 days), were found to have body insulin sensitivity that was 16% lower overall and 30% lower in their fat cells. Within a few days people were seeing a change in how their cells responded to insulin. (An increase in insulin resistance over time also has cardiovascular complications.) If you compound lack of sleep with diets that are high in saturated fats, glucose, and processed and refined carbohydrates, it is easy to see why the CDC reports that more than 100 million American adults have type II diabetes or pre-diabetes.

Obesity is also important to examine. Obesity afflicts 93 million people and, sadly, within those numbers (as reported by a survey in a 2016), 1 in 5 school children, and it is only gaining prevalence. Shorter sleep durations, even in children, are contributing factors to elevated obesity rates. Sleep deprivation has been shown to have effects on the body’s release of hormones that regulate feeding: ghrelin and leptin. Leptin is secreted by the fat cells, which tell our body that we are full, while ghrelin is secreted when we haven’t eaten in a few hours to tell us we are hungry.

Studies looking at participants who were sleep deprived found that leptin levels and sensitivity would decrease, while ghrelin sensitivity would increase. This leads to people feeling hungry more often during the day and having less of an ability to feel full. When looking at chronic sleep deprivation, studies show leptin resistance, which would result in overeating.

As previously mentioned, sleep

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offers cardioprotective effects. The First National Health and Nutrition Examination Survey studied participants over a 10-year span. They found that there was a significant increased risk of hypertension in middle-aged subjects who were sleeping less than five hours per night. The study found that with sleep deprivation there is an increase in sympathetic nervous system tone, which ultimately coincided with elevations in heart rate and blood pressure, along with levels of epinephrine and norepinephrine (neurotransmitters that can further increase sympathetic tone, and over time can contribute to heart and arterial disease).

These changes to our nervous system aren't the only ways researchers are finding that sleep can contribute to cardiovascular health. Immune system changes, specifically inflammation chemical messengers, can become elevated with sleep deprivation. A substance called C-reactive protein (CRP) is a marker of acute inflammation. CRP and other pro-inflammatory cytokines (messengers) have been shown in multiple studies to go up in the body, even within a few days of sleep deprivation.


Studies have also found that protective immune markers, like IL-2 and natural killer cells, are up-regulated during sleep; and when subjects are placed in situations of continuous, shortened sleep periods, there is an immune suppression that is seen specifically with these cells. In addition, the body is less able to fight against common colds, has greater incidences of pneumonia, and has less of an ability to mount the proper immune response to vaccination. Diving deeper into these immune dysfunctions—and with the additional look at sleep deprivation's impact on DNA repairs—we can see associations to certain cancers, such as breast and prostate cancers. In summary:

1. Sleep deprivation can contribute to **obesity** due to its effects on leptin and ghrelin.
2. Sleep deprivation can contribute to **type II diabetes** due to the indirect effects on sympathetic tone, but also to metabolic effects and a reduction in insulin sensitivity.
3. Sleep deprivation has been shown to increase pro-inflammatory markers and increase sympathetic tone, which comes with **cardiovascular risks**.
4. Finally, sleep can have **immune suppressive effects** that can increase susceptibility to colds, pneumonia and, in chronic conditions, can affect DNA's ability to repair, which could be linked to cancers.

What can you do if you think you have a sleep issue? Speak with your primary care physician and discuss why

you might be having problems sleeping. There are a variety of physiological reasons why people don't sleep well, which can be examined by your physician.

But the first step is to examine your sleep hygiene and make sure certain routines are developed. Here are my top five sleep hygiene tips:

1. **Shut down your screens:** Turn off your computer, iPhone, Android, TV, and any other screen at least three hours before bed. The blue light these emit are melatonin suppressors.
2. **Stop eating or drinking before bed:** Stopping any eating or drinking at least three hours before going to sleep will help with any blood sugar changes during the evening (and can also prevent multiple trips to the bathroom at night).
3. **Get outside everyday:** Expose yourself to natural light daily, specifically in the morning.
4. **Get blue-light blockers:** If you work late in the afternoons or into the evenings, get blue-light-blocking glasses, which can help you sleep better at night.
5. **Set sleep rituals:** Set an alarm to go to bed. Set up rituals for yourself. Leave work at the office, and when you walk into your home, start to get into relaxation mode, and soon after, bedtime mode. Going to bed at the same time every night will help to reset your internal clock. 

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