

You gotta sleep!

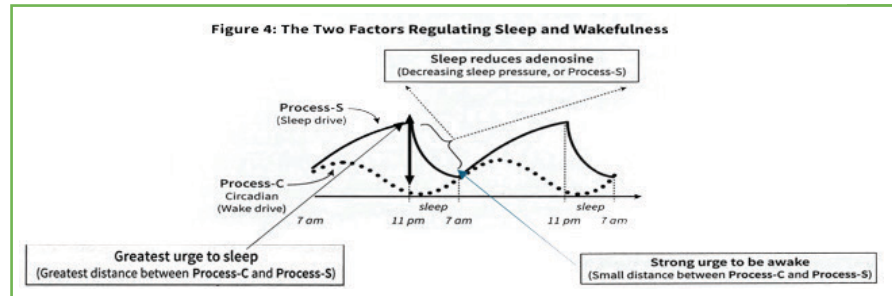
IF I TOLD YOU that there was one thing you could do on your own that would help you live longer, enhance your memory, make you more creative and more attractive, stay slim, lower your food cravings, lower your risk of diabetes, protect you from cancer and dementia, ward off colds and flu, lower your risk of heart attacks and strokes, make you happier, less depressed and less anxious, you'd probably be interested. Yes?

Well, guess what; there is! It's called sleep!

For the past few years, I have become interested (obsessed?) with the subject of sleep. As a part of that interest, I've had the opportunity to speak at NAMM and LDI about the benefits of proper sleep and the harmful effects of not getting enough of it. The title of the talk is "You Gotta Sleep" because, well, you do! This interest came about when I read *Why We Sleep* by Dr. Matthew Walker, a sleep researcher at UC Berkeley.

In it he cites numerous studies from around the world that focus on the functions of sleep in human beings and the effects of not getting enough of it. In fact, if you don't read another sentence in this article, go buy the book or get it from the library and read it. You'll be glad you did.

Our industry doesn't lend itself to regular, adequate sleep, and we are all paying a price for it. The purpose of "You Gotta Sleep" is to make the industry more aware of the effects of irregular, short sleep, and to try to inspire some healthy discussion about what we can do about improving the situation. We pride ourselves on being the best at what we do, but it is abundantly clear that when we are sleep compromised, we also compromise our efficiency, safety, and health. This can and has led to tragic results such as over-



tired workers falling asleep while driving home and the deterioration of our mental health, affecting not only ourselves, but those we work with.

Why we sleep

A good place to begin this discussion is to talk about the systems that drive our need to sleep. There are two primary systems that urge us to sleep, our circadian rhythm and our homeostasis or "sleep pressure" system driven by our adenosine cycle.

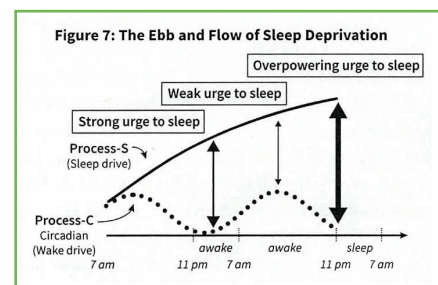
Our circadian rhythm is the primal urge to coordinate our sleep with periods of daylight and darkness. Anthropologically this makes perfect sense. We needed to be awake as soon as there was enough light to hunt and gather food, and we needed a lot of rest at night, so we'd have the energy necessary to pursue those goals. During a typical 24-hour cycle, our pineal gland secretes melatonin, which builds up in our body, eventually signaling that it's time to sleep. While we sleep melatonin dissipates and we are awakened fresh with the dawn.

Adenosine, produced by the liver, is released as long as we are awake. Unlike melatonin that stops production at night, adenosine continues to be produced until we have an adequate night's sleep. If we don't get enough sleep, then it does not fully

dissipate causing us to be drowsy all day regardless of what our circadian rhythm is telling us.

A normal sleep cycle looks like the drawing in Figure 4. This is how our brains and bodies are designed to function. We can deny or ignore it all we like, but biologically it's still going to be there.

However, if we do not get enough sleep, as is often the case in our industry, the sleep drive is stressed to look like Figure 7. In this scenario, as time goes by and we do not get adequate sleep, the urge to sleep becomes greater and greater. At some point this becomes uncontrollable and our bodies resort to microsleeps. If you've ever been driving when you're sleepy and there's that moment where your head drops for a moment, and you get the adrenaline rush; that was a microsleep. It can be very dangerous, even fatal if it happens at the wrong moment, as you can imagine.

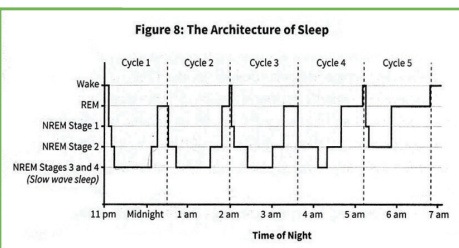


So, what do we do to combat the urge to sleep while we are working long hours day after day without enough sleep? We drink coffee. (Or worse, resort to illicit drugs.) It's important to understand why caffeine combats our urge to sleep, and why it isn't a healthy response.

Caffeine is a powerful drug that we too often take for granted. The reason it helps fight off sleepiness is that it lodges in the same receptors at the base of our brain that accept adenosine, preventing adenosine from settling in and driving our urge to sleep. The problem is that it takes at least 12 hours for a shot of caffeine to leave our system, thereby making it harder for us to get to sleep when the opportunity at last arrives. The more caffeine in our system, the longer it will take to dissipate. The effect of caffeine varies between individuals, but the effect still interferes with our ability to get to and stay asleep.

The architecture of sleep

Our sleep is structured in cycles that start with us awake, and then cycle through a series of Rapid Eye Movement sleep (REM), and 4 stages of Non-Rapid Eye Movement sleep (NREM Stages 1 through 4).

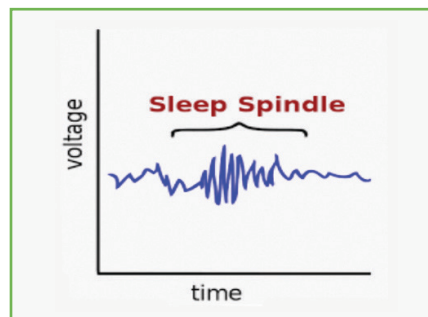
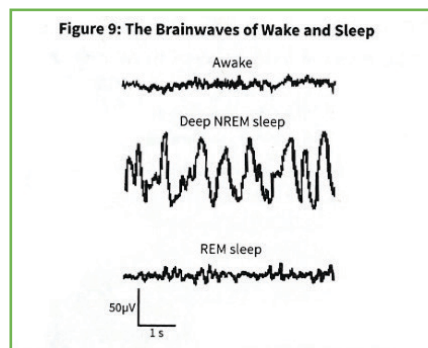


During REM sleep, our brains are in the process of active dreaming where anything is possible (more on that in a moment) and we fly, swim, fight, run, and more in our dreams. In order that we don't thrash around uncontrollably and injure ourselves or our bed mates, our brains cleverly shut off our motor control centers, essentially paralyzing our muscles. A brain scan during REM sleep reveals that our brainwaves look very similar to when we are awake.

Conversely, during NREM sleep we are completely relaxed, allowing our brain

access to all our bodily functions so that it can oversee the repairs needed for us to function properly. When you injure a body part or get sick, the recommendation is rest, for good reason. During NREM sleep, a brain scan reveals brainwaves very similar to those of a Buddhist monk in deep meditation. Not surprising that deep meditation is also recommended for healing mind and body. Much of this NREM healing coincides with sleep spindles in our brainwaves; spikes in the amplitude of our brainwaves that correspond with healing as well as memory consolidation and editing and motor skill enhancement.

Each cycle is important to a healthy body and mind, and no cycle is expendable, despite what we might believe or practice in our industry. A full night's sleep of seven to eight hours is required for the architecture of sleep and the beneficial effects of sleep to be fully realized.



Processes accomplished during sleep

Now that we understand a little about the why and how of sleep, let's look a little closer at some of the functions enhanced by sleep.

Memory

There is a section of our brain called the hippocampus that serves our short-term

memory needs. The hippocampus takes in and temporarily stores things that we may need during the day. The capacity of the hippocampus is limited, and it needs to be emptied nightly to make room for more short-term items. During our NREM cycles our brains review what the hippocampus contains and sorts the information, sending blocks of memories to the appropriate long-term storage places of the brain. Our brains learn through experience what we value and what is superfluous information. Things like spatial navigation through a place we visited may not be of long-term interest to us, so things like that are deleted. However, lessons we have been studying are of great value and are sent to the parts of the brain involved in that learning, creating a consolidation of memories associated with that lesson. In this way the hippocampus is cleared, making room for new lessons and memories.

Takeaway: Inadequate sleep limits our ability to learn and retain new information.

Creativity

During REM sleep, the parts of the prefrontal cortex where our executive functions, like impulse control and reasoning come from, are turned off. This frees up our brains to make illogical, creative connections that the waking brain would reject out of hand. Many great ideas have come while people have been sleeping as the "a-ha" moment we've all experienced. The periodic table of elements came to Dmitri Mendeleev in his sleep after years of trying to sort it out, and upon waking he wrote out what he saw in his dream, a nearly perfect table requiring only one correction.

Takeaway: Inadequate sleep limits our creativity.

Be more attractive

In tests using photographs of people, participants were asked to rate them based on attractiveness. After several of the individuals had been deprived of one full night's sleep and then photographed again, the same individuals who were first chosen as attractive were now deemed unattractive.

Takeaway: Inadequate sleep makes you less attractive to others.

Stay slimmer and lower food cravings

Inadequate sleep compromises the brain's ability to control impulses and increases our craving for fats, sweets, and salty foods. The connection between our gut and our brain (part of the sympathetic nervous system) loses efficacy and decreases our feeling of satisfaction after eating.

Takeaway: It is almost impossible to lose weight or maintain a healthy weight when we are sleep deprived.

Lowers the risk of diabetes

Sleep deprivation is now recognized as one of the major contributors to Type 2 diabetes. In experiments with healthy adults, individuals limited to four hours of sleep for six nights reduced their bodies' ability to absorb a standard dose of glucose by 40% as compared to when they were fully rested.

Takeaway: Inadequate sleep increases the likelihood of Type 2 diabetes.

Protection from cancer

One night of four hours sleep removes 70% killer cells circulating in your immune system. These are the cells that hunt out cancer cells and kill them before they can multiply. Short sleep also hyper-activates the sympathetic nervous system causing sustained inflammation leading to chronic inflammation which in turn causes many health problems including cancers.

Takeaway: Inadequate sleep increases your risk of cancer.

Protection from Alzheimer's Disease and dementia

Alzheimer's Disease is associated with the buildup of beta-amyloid which aggregates plaque in the brain and kills the surrounding brain cells. The glymphatic system in the brain is a kind of sewage system. Glial cells occupy space throughout the brain next to the neurons that generate electrical impulses. In the waking hours, they collect the tox-

ic waste byproducts of the neurons, much of which is amyloid protein, and remove it by means of cerebrospinal fluid that bathes the brain. During NREM sleep there is a 20-fold increase in this effluent expulsion from the brain as the glial cells shrink to allow more room for the fluid to flow and collect the waste collected during the day.

Two very famous short-sleepers, Ronald Reagan and Margaret Thatcher, both suffered debilitating dementia in their later years.

Takeaway: Inadequate sleep increases the chances of dementia and Alzheimer's Disease!

“It takes at least 12 hours for a shot of caffeine to leave our system, thereby making it harder for us to get to sleep when the opportunity at last arrives.”

Wards off colds and flu

In clinical trials when participants were exposed to the common cold virus, those with five hours of sleep each night during in the week before exposure had an infection rate of almost 50%, while those sleeping seven hours or more had an 18% infection rate.

In tests with the flu vaccine, those getting five hours of sleep a night for six nights before the vaccine produced 50% of the antibodies as those getting seven or more hours of sleep! Sleeping after the vaccine showed no improvement in the sleep deprived group.

Takeaway: Inadequate sleep increases your likelihood to get a cold or the flu if exposed and decreases the efficacy of vaccines you may receive while sleep deprived.

Lowers the risk of heart attack and stroke

In studies around the world, those who regularly slept less than six hours a night were 400% to 500% more likely to suffer cardiac arrests than those sleeping more than six hours a night. They were 200% to 300% more likely to have calcification in their arteries, increasing their likelihood of a stroke.

Insufficient sleep causes the sympathetic nervous system to rev up releasing cortisol and causing blood pressure to rise. During NREM sleep, the long, slow waves send a calming signal to the fight-or-flight part of the brain preventing the release of cortisol.

Takeaway: Inadequate sleep increases the likelihood of heart attack and/or stroke.

Be happier, less depressed, less anxious

A full night's sleep yields a balanced mix between the prefrontal cortex that controls logic and executive functions and the amygdala that stimulates our emotions. Those experiencing sleep deprivation show 60% more emotional reactivity in the amygdala when viewing pictures evoking emotional responses as the prefrontal cortex can't effectively regulate the amygdala. This imbalance also leads to suicidal thoughts as the amygdala is over stimulated and not tempered by the prefrontal cortex. As the amygdala is over stimulated it can create a desire for stress relief and increases the likelihood of substance abuse.

Takeaway: Inadequate sleep causes depression, anxiety and can lead to substance abuse.

Our jobs are killing us!

It may sound like hyperbole, but working long and irregular hours, as we do in the entertainment industries, makes us less efficient and more likely to suffer a myriad of maladies caused directly by the lack of regular, adequate sleep. It also increases the likelihood of accidents, inappropriate behavior, and misinterpretation of information. All things we want to avoid in our very dynamic workplaces.

When we are sleep deprived, we are less aware of how it impacts our efficiency, energy, and alertness; much like having too many drinks at the bar lowers your assessment of how fit you are to drive. Being chronically sleep deprived causes us to acclimatize to that state. We don't notice it because it has become our norm! Research has shown that being awake for 19 hours is equivalent to having a blood alcohol level

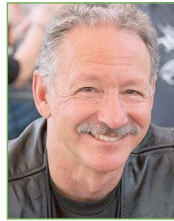
of .08—legally drunk in many parts of the world. And yet we think nothing of driving home in that state.

Something has to change! The question is what can we do about it.

First, we must educate ourselves, our fellow workers, and our employers about the effects of inadequate sleep. Second, we must advocate for schedules that accommodate a healthier lifestyle, promoting our better selves. Third, modify our behaviors so as not to aggravate an already hard situation. Limit our alcohol and drug use; limit our caffeine use; opt for going home and getting more sleep as opposed to going out for a drink after work. Finally, be each other's advocate at work by monitoring behaviors, recognizing that we are not machines, and offering ideas to improve our collective well-being.

This is only a brief summary of a very comprehensive book. Please, consider reading *Why We Sleep* and educate yourself.

Book link: <https://www.simonandschuster.com/books/Why-We-Sleep/Matthew-Walker/9781501144325> ■



Eddie Raymond is a lifelong San Francisco Bay Area resident, graduating from and attending post-graduate work in education at UC Berkeley. He has been a stagehand with Local 16 of the IATSE

since 1975. He retired from Local 16 in 2014. Since 1981, he has been a leader in the progressive improvement of stagehand training in Local 16 as well as in the International Alliance and served as a member of their Craft Advancement Program, providing training and advising the IA's Exhibition and Entertainment Joint Training Trust and as a Safety in Entertainment Instructor. He has been an OSHA outreach instructor and participated in the IATSE's outreach training for OSHA Compliance Officers on the Entertainment Industries.

Eddie was a co-chair of ESTA's ETCP rigging certification program and sits as a member of the ETCP Council. He is Past-President of ESTA's Board of Directors and sits on the Behind the Scenes Foundation Board of Directors.

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