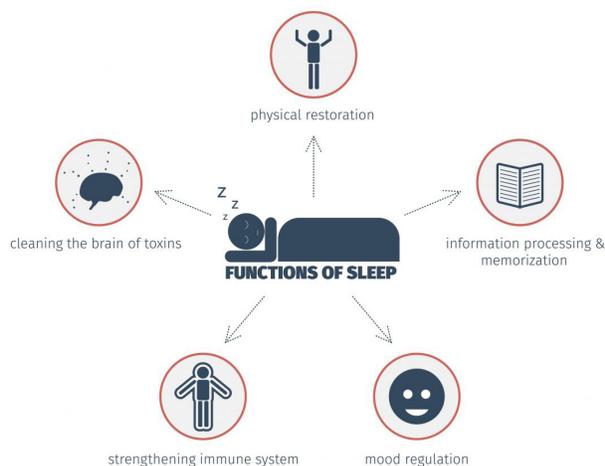


Why Can't I Sleep?

By Elizabeth Crowder

Why is sleep so important?

Sleeping is a time for our bodies to rest and our brains to sort through all the information of the day. While the body is resting, the mind is still processing at a high rate of speed. Our brain sifts through the information and categorizes it in the various parts of the brain. A process called “consolidation” occurs, where the brain changes thing from short term to long term memories. Sleep allows the brain to retain information better. It also gives the body the chance to grow muscle, repair tissues, and synthesize hormones. The neurons that are used when we are awake have the chance to shut down and repair themselves. If the neurons don't have a chance to renew themselves, the body has the probability of malfunctioning in normal tasks.



Sleep deprivation causes many different adverse effects. One of the first effects we can experience is a change in mood, causing irritability, lack of motivation leading to depression, or aggressive behavior towards others. In severe cases, paranoia and hallucinations may occur. Lack of productivity is the second adverse effect. Your body will feel exhausted and you will not feel like doing anything. Concentration and focus will be lacking, decision making will be altered, and your overall performance will decline. Altered school performance can occur when children suffer from lack of sleep, affecting progression in grade level and possibly even college options. Lastly, lack of sleep can cause health problems such as high blood pressure and heart disease, weight gain and diabetes, and suppressed immune system, causing the body to take longer to heal.

The Different Stages of Sleep

There are 2 types of sleep, non-rapid eye movement (NREM) and rapid eye movement (REM). **NREM has 3 stages:**

NREM Stage 1: The first stage of sleep. It is a short cycle, somewhere between 5-10 minutes, and is the period between wakefulness and sleep. Because this cycle is so brief, if people are awakened during it, they sometimes say that they weren't actually asleep.

NREM Stage 2: This second stage can last 30-60 minutes. Our body temperatures drop, breathing and heart rate become more regular, and people become less aware of their surroundings. According to the American Sleep Foundation, we spend 50% of our time in NREM stage 2.

NREM Stage 3: During NREM stage 3, the muscles relax, blood pressure and breathing rates drop and our deepest sleep occurs. People are able to sleep through noises and activities during this stage and it is hard to wake someone up during this stage, which can last 20-40 minutes.

REM: The last stage of sleep is REM sleep. The brain is very active during this stage while the body is very relaxed. Dreams occur during REM sleep and the eye movement is very rapid. It is important to note that the body doesn't go through 1-3 and then REM. Usually, the body goes through stages 1-3 and then back to stage 2 before REM. REM sleep lasts about an hour and the full cycle can be repeated 4-5 times per night

Do I have a Sleep Disorder?

There are 3 sleep disorders that are most prevalent in the United States: **insomnia, sleep apnea, and restless leg syndrome.**

Insomnia: The most common sleep disorder, affecting more than 50% of the US population at some time in their lives. Insomnia is the inability to fall asleep or stay asleep. People with insomnia wake up many times during the night, wake up very tired, wake up early and can't fall back asleep, or take a very long time to fall asleep. Insomnia can cause depression, weight gain, difficulty concentrating, irritability, and impaired work/school performance.

Sleep Apnea: Another sleep disorder that can be quite serious as the body has brief pauses in breathing while sleeping. Many people have no idea that they have sleep apnea but their spouses notice loud snoring or gasping for air while sleeping. It is very important to talk with your doctor if you suspect you have sleep apnea.

Restless Leg Syndrome (RLS): A person with RLS lies awake with burning or tingling in their legs and are unable to sleep because of the need to move their legs around. People with RLS symptoms should also contact their doctor for help and medications to treat RLS.

What Hormones are Involved with Sleep?

There are many hormones involved with sleep. They are spread over several categories: stress, hunger, and sleep inducing.

Stress Hormones: Cortisol and Adrenaline

Adrenaline is released from the adrenal glands and is known to increase the heart rate, increase blood pressure, expand the air passages of the lungs, enlarge the pupil in the eye, redistribute blood to the muscles and alter the body's metabolism, so as to maximize blood glucose levels (primarily for the brain). When a stressful event is encountered, adrenaline is released as the "fight or flight" hormone. Because adrenaline increases heart rate and blood pressure, it makes us feel more alert, which can make it hard to fall asleep.

Cortisol is regulated by the pituitary gland and released by the adrenal gland. Cortisol is the major stress hormone and it also helps the body convert protein into glucose to boost flagging blood sugar levels. Cortisol works in tandem with the hormone insulin to maintain stable blood sugar levels and contributes to the maintenance of stable blood pressure. In regards to sleeping, cortisol is normally rapidly decreasing around bedtime, but in a sleep deprived individual, the cortisol levels can fall at a rate of 6 times slower than a well-rested individual. When cortisol is elevated during the evening and sleep loss occurs, insulin resistance occurs, which can ultimately lead to diabetes.

Hunger Hormones: Leptin and Ghrelin

Leptin is released by fat cells to signal satiety to the brain and suppress appetite. Leptin is lowest in the morning and gradually increases until bedtime. A study was done over 6 nights where the participants were only allowed to sleep four hours per night. At the end of the 6 nights, leptin levels were significantly decreased, especially near bedtime. The leptin levels were comparable to those who had a normal night's sleep for 3 days, but had their calorie intake reduced by 900 kcal/day. The sleep deprived group had

normal meal intake and normal calorie amounts, yet their leptin levels were decreased, which meant they were hungrier with less appetite suppression than those with normal sleep.

The other hormone is ghrelin, which is a peptide in the stomach that stimulates appetite. In a study comparing 2 nights of 4 hours of sleep versus 2 nights of 10 hours of sleep, leptin was reduced and ghrelin was increased, leading to more hunger and a greater appetite. Therefore, sleep loss seems to alter the body's ability to regulate satiety and hunger, leading to increased calorie intake.

Sleep Inducing Hormone: Melatonin

Melatonin is the sleep-inducing hormone, also called the “Dracula of hormones” because it only comes out at night. Melatonin is made in the pineal gland of the brain and around 9 pm, the pineal gland is switched on by the suprachiasmatic nucleus (SCN) and melatonin levels rise sharply in the bloodstream. However, if the person is not in a dimly lit area around 9 pm, the pineal gland will not release melatonin, even though the SCN has turned the switch on. This phenomenon is why it is so hard for people to go to sleep during the day, as the effects of bright light and lack of melatonin make it hard to sleep.

Tips for a Good Night's Sleep



- + **Stay consistent with your bedtime and wake up time, even on the weekends.** If you are going to have a difference between weeknights and weekends, try to limit it to one hour or less
- + **Make a bedtime routine that starts an hour before bedtime.** Use this time as quiet time, where you are not exposed to bright lights or electronics. Remember that melatonin can't work if there are bright lights signaling the brain to be awake. If you are used to watching TV, try reading a book, listening to soothing music, or soaking in a hot bath or steamy shower
- + **Avoid eating large meals several hours before bedtime.** Light snacks are ok though
- + **Avoid nicotine (cigarettes) and caffeine several hours before bedtime** as these can keep you alert and awake
- + **Avoid alcohol 3 hours before bedtime.** While it may allow you to fall asleep quickly, it shortens your REM sleep and causes you to have sleep disturbances in the middle of the night and wake up feeling foggy the next morning
- + **Get daily exercise and sun from being outdoors,** but not too close to bedtime, as this can keep you awake
- + **Make sure you have the right types of pillows and blankets to keep yourself comfortable.** There is nothing worse than trying to sleep while traveling and not having “your” pillow
- + **Keep the bedroom cool and quiet**
- + **Avoid drinking anything within a few hours of bedtime,** as waking up for bathroom breaks can cause disruptions in your sleep cycle

Is there something I can take to help me sleep?

There are a few different medications available for sleep. Some are over the counter, some require a prescription, and some are compounded. **The most common over the counter products are melatonin, diphenhydramine or doxylamine.**

Diphenhydramine is an antihistamine and is the ingredient in Benadryl and ZZZ Quil. Doxylamine is also an antihistamine that is quite sedating, and is available in products such as Unisom Sleep tabs. While the antihistamines are fairly strong in regards to sedation, some people prefer the more natural approach of melatonin, since this product is made in the body. Melatonin sublingual tablets are popular because they dissolve under the tongue and get into the bloodstream faster, increasing the levels of melatonin in the body.

Prescription sleep aids include Ambien, Lunesta, and Restoril. These are available with a prescription from your doctor and can be habit forming, so it is recommended to only use these on a short term basis.

At our Collier Compounding location, we compound a few different sleep aids such as melatonin SR (slow release) and Good-Nite capsules, which contain melatonin, theanine, and magnesium. Melatonin slow release capsules are compounded so that you get a more continuous level of melatonin in the bloodstream during sleeping hours to help you stay asleep longer. Theanine is a non-essential amino acid found in green tea. Theanine stimulates the GABA receptor, which helps the brain slow down. While theanine does not cause sedation, it allows the mind to reach a state of relaxation, relieving anxiety and racing thoughts around bedtime, allowing the body to fall asleep. Theanine is commonly seen at a dose of 100-200 mg. Magnesium is the third ingredient in the Good-Nite capsules and is a GABA agonist like theanine. Magnesium slows down the neuron activities of the brain, allowing the body to have deep, quiet sleep. With less active neuronal conduction between brain cells, magnesium induces calmness and sedation. The higher the levels of magnesium, the longer the duration of deep, quiet sleep. It is for this reason that we combine melatonin, theanine and magnesium into a capsule to be taken at bedtime.

So...that was a lot of information, and we know it can be overwhelming, that's why we are always here to help. Feel free to call and speak to one of our knowledgeable pharmacists and let us help you get...back to sleep.

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