

Sleep Health: 20 Facts About Your Biological Body Clock

The Body Clock

Every tissue and organ in your body operates according to biological rhythms. The so-called body clock keeps body processes running according to a schedule. Your circadian rhythm is the 24-hour cycle that regulates the timing of processes like eating, sleeping, and temperature. This ensures that there is a periodicity with necessary biological processes. Genes involved in circadian rhythms operate according to feedback loops. This means that when adequate proteins are manufactured, this sends a signal to the gene to halt further production of the protein.

Many organisms, including people, animals, fruit flies, and even bacteria, are governed by circadian rhythms. Your exposure to light, both natural sunlight and artificial indoor lights, affects your circadian rhythm. You also have something called a master clock in your brain. The master clock is comprised of approximately 20,000 neurons and it is located in a part of the brain called the hypothalamus. The master clock governs all the biological clocks in the body.



Power Up Your Day

Human beings are a diurnal species. We are active during the day. Some organisms are nocturnal. They are active at night. When you wake up in the morning and light enters your eyes, it reaches the brain and affects the activity of certain genes that help you power up for the day. Light exposure also reduces the production of melatonin, the hormone that helps you fall asleep. As the day progresses and sunlight diminishes in the afternoon, melatonin production turns back on. Melatonin production peaks at night after the sun has gone down to help you fall asleep. Be careful, exposure to indoor lights and light from smartphones, tablets, computer screens, and TVs can interfere with melatonin production and disrupt your sleep.



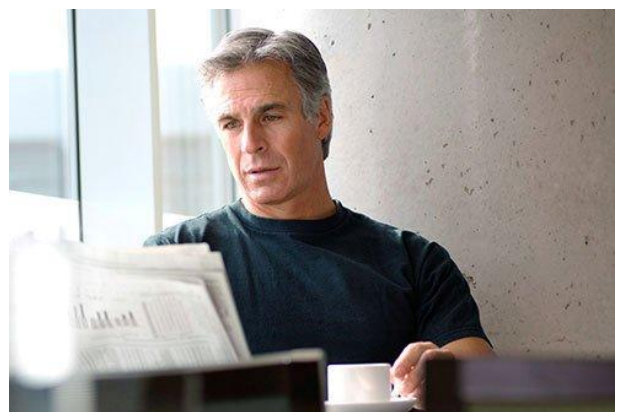
Night Owl vs Morning Lark

Most people have body clocks that run on a fairly typical schedule. Some people have body clocks that lie outside the normal range. So-called morning larks get up early, bright and alert, ready to tackle the day. Night owls are slow to rise in the morning and they are alert and productive at night. Genetic differences between larks and owls are likely responsible for the differences between larks and owls. Experts agree that it is best to try to work with your natural body clock and biology, not against it, if possible.



Body Clock Over Time

The body clock undergoes many changes as a person ages. The clocks of newborn babies induce them to sleep approximately 16 to 20 hours per day. Between the ages of 1 and 4, the need for sleep decreases to approximately 11 to 12 hours per day. Teenagers need approximately 9 to 10 hours of sleep daily. A typical adult will feel well rested by getting 7 to 9 hours of sleep per night. Older adults over the age of 65 may need up to 8 hours of sleep per night but may suffer from sleep problems like frequent nighttime awakening or waking up too early in the morning.



Can You Catch Up on Sleep?

Contrary to what some people believe, there really is no way to catch up on lost sleep. Science says habitual late nights and skimping on sleep catch up with you and there is no way to make up for the lost sleep. Try to maintain a regular sleep schedule as much as possible. Keep your bedroom cool, dark, and quiet to best support good-quality sleep. Use ear plugs and an eye mask if you have to sleep during the daytime. Nap if you must, but limit yourself to no more than 1 to 2 hours to avoid throwing your sleep schedule off further.



Jet Lag Is a Drag

Jet lag occurs when you travel to different time zones, but your body clock is still on the schedule of the time zone where you normally live. Symptoms of jet lag may include

- trouble with digestion,
- reduced physical and mental performance,
- mood disturbance (anxiety, depression, irritability),
- fatigue, and
- sleep problems (difficulty falling asleep or staying asleep, fractured sleep, waking up too early).

Jet lag is worse the more time zones you cross. It may be more severe if you fly east.



Health Consequences

When your body clock is off, your whole system suffers. Your sleep is affected, yes, but so are your hormone levels, digestive system, and immune system. Circadian rhythm disturbance increases the risk of cancer, obesity, heart disease, diabetes, high blood pressure, anxiety, depression, and alcohol use. Having a healthy circadian rhythm benefits your entire body, so it makes sense to make sticking to a regular schedule a priority.



Nap Smart

Napping can increase your wakefulness and boost performance and your ability to learn, but only if you nap smartly. The ideal nap is between 20 and 30 minutes long in the early to mid-afternoon. Set an alarm on your clock so you do not oversleep. If you nap longer than that, you will not receive any additional benefits. In fact, habitually taking longer naps is associated with a higher risk of death and disease, especially in elderly people. Longer naps may also interfere with your ability to sleep at night.



Keep a Consistent Sleep Schedule

One way to keep your biological clock on track is to maintain a consistent sleep schedule. Try to go to bed and wake up at the same time every day, even on the weekends. You want your body to get used to a routine. When you do this, you support a healthy circadian clock. Your bedtime and wake time should deviate by no more than half an hour earlier or later every day. Do this to support a healthy sleep-wake cycle.



Reset Your Clock

If you would like to start going to bed earlier, shift your bedtime gradually until you get to the desired time you would like to sleep. If you try to reset your clock too drastically from the get-go, you may just end up lying awake for hours feeling frustrated. Gradually set your bedtime back by 15-minute increments until you reach your desired bedtime. Stay at the new bedtime for several days before setting your bedtime back by another 15 minutes. This will help your body get used to the new schedule you are trying to establish.



Lights Out

Indoor lighting and electronic devices that emit light like computers, tablets, smartphones, and TVs are relatively new to the realm of human experience. For the vast majority of time in history, humans were not exposed to these amenities. Historically, humans got up when the sun rose and went to bed when the sun set. Now, we live largely indoors and are exposed to many sources of artificial light that interfere with our internal clock. Turn off or limit your exposure to devices for several hours before bed so they do not affect your internal clock. Dim indoor lighting in the evening so it is less likely to affect your biological rhythms. Establish a relaxing bedtime routine with light reading, taking a warm bath, or listening to soothing music to help you wind down.



Light Up Your Day

If you wake up feeling groggy or are a slow starter in the morning, use natural sunlight to energize yourself. Expose your eyes to sunlight as soon as you wake up. Open your curtains or pull the shades all the way up. Go for a stroll outdoors. Sunlight turns certain genes on or off that affect the molecular function of biological clocks. As you get ready for your day, turn on bright lights. Exposing yourself to as much light as possible turns off production of melatonin, the hormone that promotes sleepiness. The master clock in the brain, the suprachiasmatic nucleus (SCN), controls melatonin production. Light exposure helps regulate your internal physiological day-night cycle.



Get Physical

Exercise improves sleep quality and helps you sleep longer. Getting as little as 10 minutes of aerobic activity daily is enough to produce the benefits. Physical activity alleviates stress and makes you tired, so it is easier to fall asleep. The best times to exercise are in the early morning and afternoon. Body temperature is higher in the afternoon, so this helps your muscles when you are active. When body temperature drops in the subsequent hours, this can help you fall asleep more easily. Exposure to natural sunlight outdoors is helpful for maintaining your circadian rhythm.



Mind Nighttime Eating

Eating late at night may interfere with sleep. If you suffer from acid reflux, eating too close to bedtime sets the stage for nighttime heartburn. Eat dinner at the same time every evening, making sure to eat several hours before bedtime. Avoid heavy, greasy meals and spicy food. Skip caffeine in the late afternoon and evening. Caffeine consumption late in the day may interfere with sleep. If you have the munchies before bed, have a small snack, like an apple with a few tablespoons of peanut butter or some cheese and crackers.



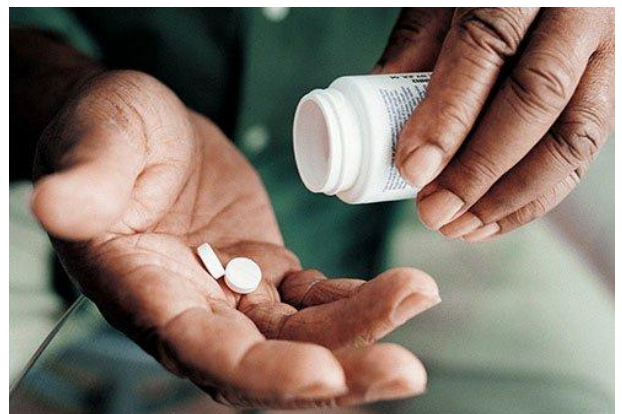
Sleep Stealers

Indoor lights and screens from computers, tablets, smartphones, and TVs emit blue light. Blue light interferes with circadian rhythms and harms your eyes and interferes with sleep. Blue light also instructs your brain to stop making melatonin, the hormone that helps you drift off at night. Dim the lights in the late afternoon and evening so your brain produces melatonin as it should. Take a bath with candlelight or listen to relaxing music in the evening instead of exposing yourself to more blue light that will interfere with sleep.



Seek Help

Sometimes your circadian rhythm can become so irregular that you need professional help. See a sleep specialist if that is the case. The practitioner may prescribe you bright-light therapy to try to reset your body clock. This involves exposing yourself to a device that emits very bright light for 1 to 2 hours at specific times every day. It may also be suggested that you take melatonin. The specialist may also suggest you try chronotherapy, which involves moving bedtimes and wake up times later every day until you achieve a more normal sleep schedule.



Shift Work Challenges

Shift workers who work at night and sleep during the day may suffer from circadian rhythm disturbance. To make things easier, shift workers should turn on bright lights as soon as they get up at night for work. Doing a little exercise can be invigorating as well. Exposure to bright lights during the shift will help a shift worker stay awake. After the shift is over, the person should wear sunglasses to block out the sunlight on the way home. Complete darkness in the bedroom, including blackout curtains that block out the maximum amount of light possible, will also help a shift worker sleep better during the day.



Meal Timing

When you eat may have an impact on cardiometabolic risk markers including insulin, total cholesterol, and LDL cholesterol. Some studies have shown that when people eat meals at regular times during the day, these markers are in a healthier range compared to when people eat at more irregular intervals. Regularity is best when it comes to maintaining good health. That includes eating meals at approximately the same time every day.



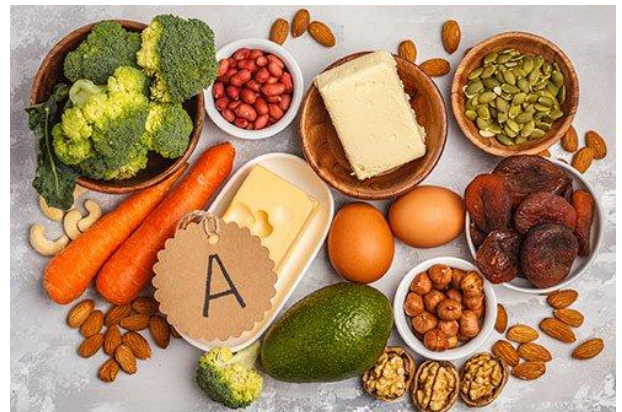
Alcohol and Drugs

Clock genes alter the expression of genes that are involved in the circadian cycle. Results of some studies suggest that consumption of alcohol, amphetamines, and opioids shifts or alters clock genes. Clock genes affect the way we handle stressors (physical, emotional, and mental), which in turn, may trigger alcohol and drug use. See your doctor if you need help managing stress or are having trouble with alcohol or drug use.



Vitamin A

Studies suggest that a deficiency in vitamin A negatively affects the circadian rhythm. Vitamin A is a fat-soluble vitamin, so any excess gets stored in your tissues for later use. Good sources of vitamin A include sweet potato, beef liver, spinach, carrots, pumpkin, cantaloupe, red peppers, and mangoes. Vitamin A is also critical for maintaining healthy eyes, immunity, cells, and organs. Men between the ages of 19 and 50 need 900 micrograms of retinol activity equivalents (RAE) of vitamin A per day. Women of the same age need 700 micrograms of RAE of vitamin A per day. Women who are pregnant or lactating need more.



Reviewed by Melissa Conrad Stöppler, MD on 11/13/2018

Sources: https://www.medicinenet.com/sleep_health_biological_body_clock_facts/article.htm