



# How to Overcome Insomnia and Get Better Sleep

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Dr. Charles Hinshaw

# What is sleep?

- Dynamic activity affecting physical and mental health
- Nerve signaling chemicals (neurotransmitters) from brain stem:
  - Wakefulness - serotonin, norepinephrine
  - Sleep - adenosine, and melatonin (from pineal gland)

# Stages of sleep

- **One** - Light sleep, awoken easily, muscles and eyes move slowly, occasional jerks (hypnic jerks)
- **Two** - Eye movements stop and brain waves become slower, with occasional bursts
- **Three** - Extremely slow brain waves (delta waves) deep sleep
- **Four** - Slow delta waves almost exclusively, difficult to awaken—deep sleep
- **REM** - Breathing becomes rapid, irregular, shallow, eyes jerk rapidly, limb muscles paralyzed, pulse and blood pressure increase

# How much sleep do we need?

- Infants 16 hours/day
- Teenagers 9-10 hours/day
- Adults 7-8 hours/day.
- Special circumstances, e.g. pregnancy, sleep deprivation in previous day, medications, age, etc.

# Timing of sleeps stages

- First REM usually 70 to 90 minutes after falling to sleep, complete sleep cycle 90-110 minutes.
- As night progresses, REM sleep periods increase in length, while deep sleep, stages three and four, decrease.
- By morning, people spend nearly all sleep time in stages one, two and REM.
- When awakened after more than a few minutes of sleep usually have amnesia of occurrences immediately before sleep, e.g. telephone calls, conversations, etc.

# For better quality sleep:

- Room temperature 64-70 F
- Room in total darkness vs minute (5 lux): 1 lux=1 candle @ 1 meter. Full moon = 1/10 lux. Twilight =less than 11 lux.
- Mattress selected for personal comfort. Organic cotton and metal best for reduced chemical exposure, e.g. flame retardants and outgassing of foams
- Mattress covers, sheets, pillows best if organic wool or cotton: these are highly flame resistant-will not burn.

# For better quality sleep (cont.):

- Electronic fields often disruptive—electric outlets, clocks, etc. TV and lighting problems.
- Noise
- No caffeine after 4 PM. Alcohol may disrupt deep sleep. Medications, foods may be disruptive.
- “Catchup” on REM sleep several consecutive nights after REM disrupted for one night.



# Negative impact of sleep deprivation:

- Major disasters: Chernobyl, Three-mile Island, Challenger Explosion, Exxon Valdez Oil Spill.
- Diagnostic errors by doctors up 400% after working for 24 consecutive hours
- Drowsy drivers estimated to cause more than 100,000 accidents/year resulting in 71,000 injuries and 1,550 deaths, etc.



# Health consequences of sleep deprivation:

- During sleep brain cells shrink by about 60%, allowing for efficient waste removal
- Disrupts hormone levels including melatonin which inhibits proliferation of a wide range of cancer cell types and triggers cancer cell apoptosis (self-destruction)
- Decreases levels of fat-regulating hormone leptin, increases hunger hormone ghrelin leading to weight gain and obesity
- Increases activity in genes associated with inflammation
- Immune excitability
- Diabetes and insulin resistance leading to weight gain

# Health consequences of sleep deprivation(cont.):

- Increases of risk of heart disease
- Halts new neuron production
- Increases levels of corticosterone (a stress hormone)
- Fewer new brain cells in hippocampus (important brain structure)
- Insulin resistance leading to weight gain
- Contributes to premature aging
- Increases your risk of dying from any cause

# Know when to turn off the lights to reduce or avoid:

- Reduced secretion of melatonin
- Delayed circadian rhythm of more than one hour
- Feeling less sleepy before bedtime
- Feeling sleepier and less alert the next morning, even after eight hours of sleep
- Spending less time in REM sleep

# Short wave length enriched light (blue light from electronic devices):

- Emitted from electronic devices such as cell phones, tablets, TV's and computers
- AVOID for two hours before bed time
- If necessary, special screens available to filter out blue light
- Light bulbs emitting red, orange or yellow light available
- AVOID blue light at night, including while brushing teeth or using bathroom in middle of night
- Get at least 30 to 60 minutes of outdoor light exposure during daylight hours in order to “anchor” your master clock rhythm. If outdoor exposure not doable, set indoor light exposure to ambient brightness of sunrise.
- After sunset avoid light as much as possible in order for your body to secrete melatonin, which helps you feel sleepy. In evening when watching TV, etc., yellow or amber tinted sunglasses may be used to screen out the blue rays.

# More about melatonin & the pineal gland:

- Melatonin is a hormone produced by the pineal gland
- This tiny gland was called the heart of the soul by Descartes, while others opined that it is the remnant of a third eye.
- Not until 1975 was melatonin isolated and described.
- It is lightly referred to as the vampire substance since it comes out at night, in darkness, and goes away or is banished by light.
- Interestingly, although located deep within the brain, the pineal gland is not protected by the blood-brain barrier.

# More about melatonin & the pineal gland (cont.):

- It is pinecone shaped and 3X5 mm in maximum dimensions.
- It is very prone to calcification, which may be at least partly caused by fluoride exposure and partly by not being protected by the blood brain barrier.
- Heavy calcification of the pineal gland will cause a low excretion of melatonin.
- Decalcification has been achieved by using chelating agents and boron, with limited success in raising low melatonin levels. The gland, microscopically, is densely cellular, which may lead to an incorrect diagnosis of cancer if the pathologist is not wary.

# Adenosine

- Adenosine is a chemical produced in our bodies.
- It plays a role in energy production (ATP) and also may act as a neuromodulator (AMP) which may affect wakefulness as it rises during daylight hours, and diminishes during darkness, sleep hours.



# 24 Hour Syndrome

- Has been identified in blind people who cannot develop a normal circadian rhythm because of their inability to distinguish light and darkness.
- Why hasn't this been known and described over the past 2,000 years?
- Why do unicellular organisms or other living organisms which have no eyes react to light and darkness like we do?
- The light and dark signals to the pineal gland now appear to be detected by specialized cells in the retina, cells which are not associated with signals to the visual cortex where signals from the retina are received and translated by the brain into visual images,
- The newly identified specialized cells in the retina transmit signals to the suprachiasmatic nucleus SCN, (actually they are a pair—should be nuclei) which is located close to the pineal gland.



(316) 682-3100  
3100 N Hillside St,  
Wichita, KS 67219, 67220

[riordanclinic.org](http://riordanclinic.org)

