

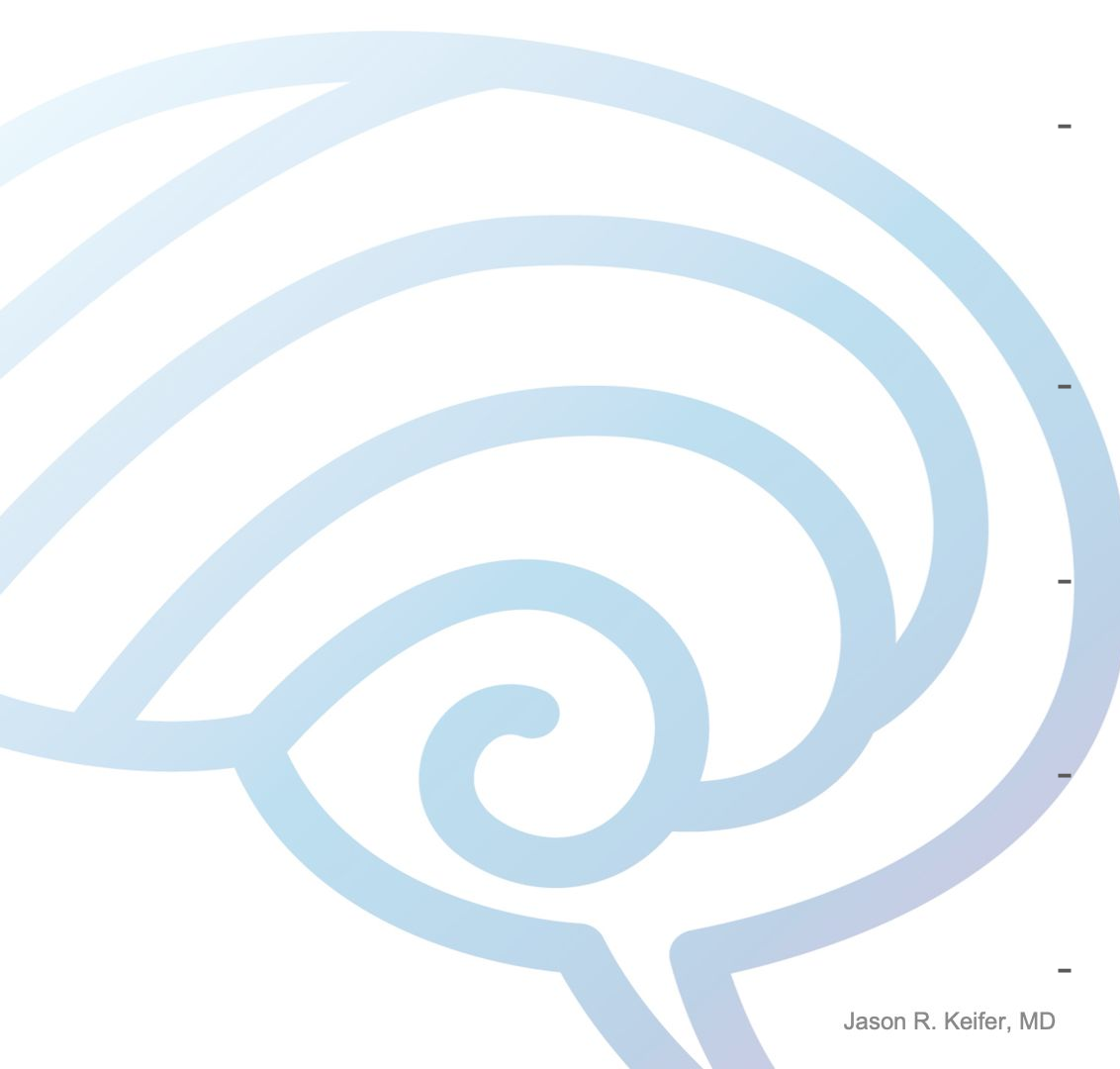


I'll Get to Sleep After This Next Case

Jason Keifer, MD

OBJECTIVES

- Basic understanding of Brain and Brain-Body Connection
- What is Sleep?
- Why we Sleep
- Consequences of Poor Sleep
- Steps you can take to Optimize Your Sleep



Myth: Catching up on sleep ≠ sleeping well nightly

- The day's learning/memories is only consolidated the same evening during sleep.
- Sleeping in on weekends and cutting sleep short on weekdays *cumulatively* impacts physical health, cognition and mood stability, for each night of insufficient rest
- Metabolic conditions, pain syndromes, symptoms of mood disorders (depression or bipolar), anxiety disorders, and ADHD can all be replicated within 1-2 nights of sleep deprivation

Sleep Statistics

- 1/3 of American adults suffer from chronic sleep deprivation
- Lawyers average less sleep than almost any other working professionals
 - 6-7 hours on average, but many less than 5 hours per night
- Sleep deprivation cited as a major problem by ABA
- **“Sleeping Lawyer” Cases**

***“Lack of sleep, particularly over extended periods of time, will certainly have a negative impact on lawyers’ ability to perform crucial job functions and serve clients well.”
(American Bar Association, 2022)***

The Brain - *Master Organ*

3 lbs; 60% Fat and 40% Water, Carbohydrate, Protein, Salt

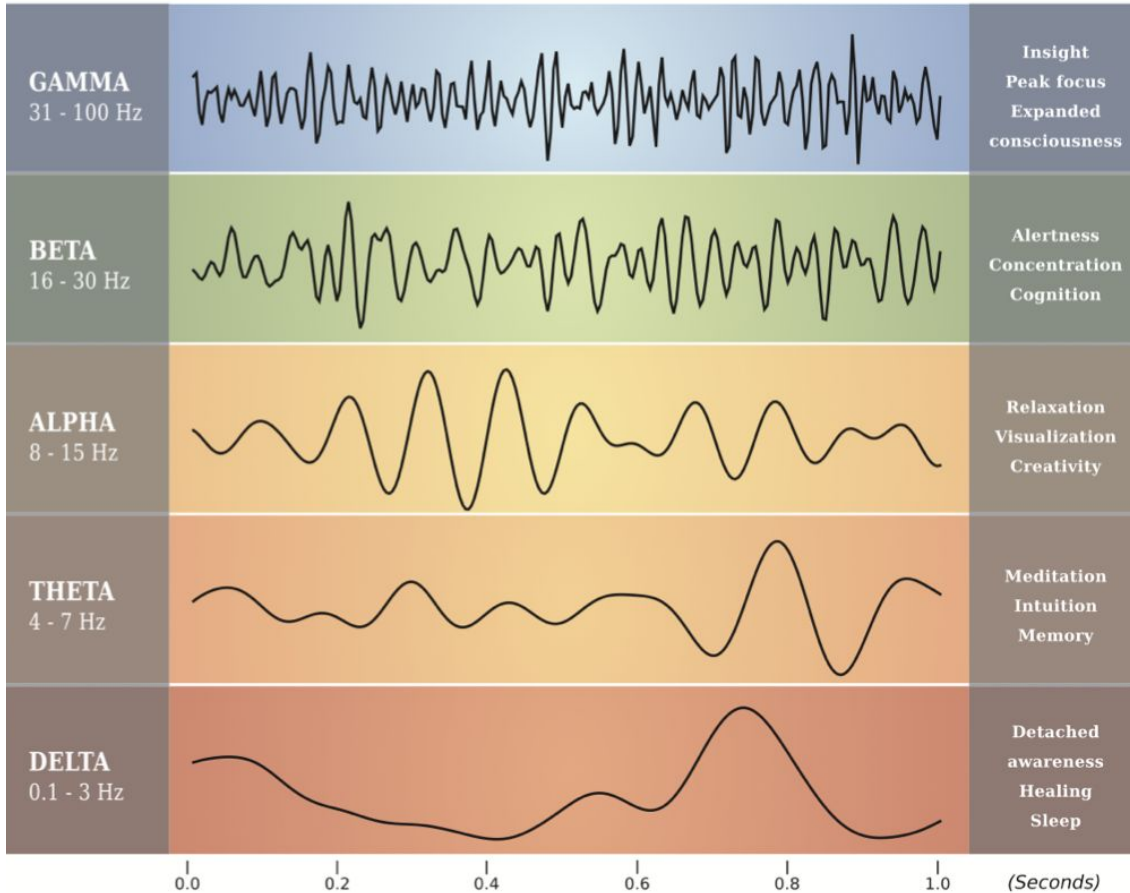
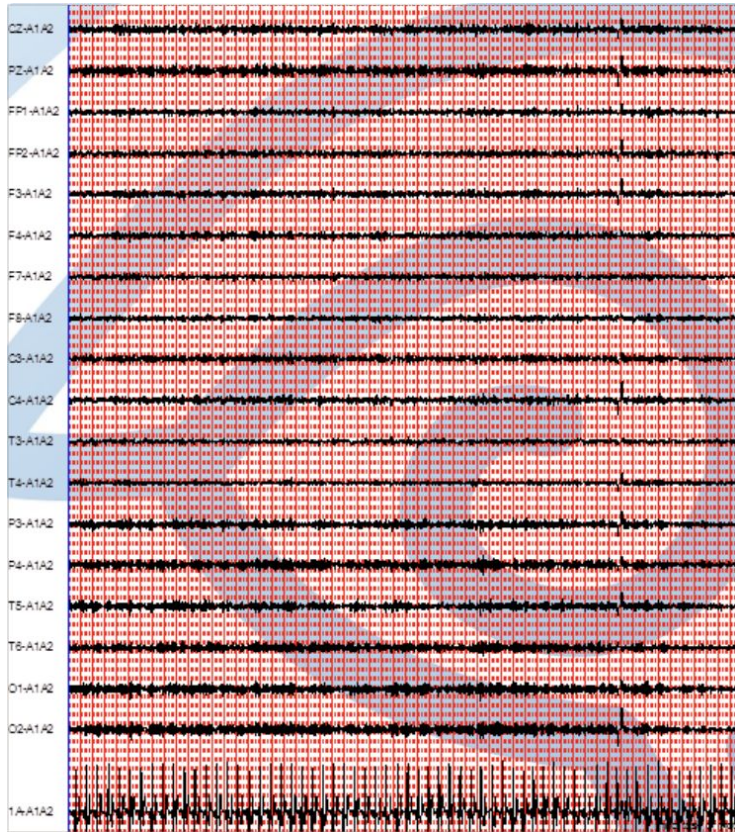
Network of ~100 billion Neurons; each neuron w/1,000 connections

Collects, Processes, Transmits Information 24 hours/day

*Electrical - brainwaves (Delta, Theta, Alpha, Beta, Gamma)

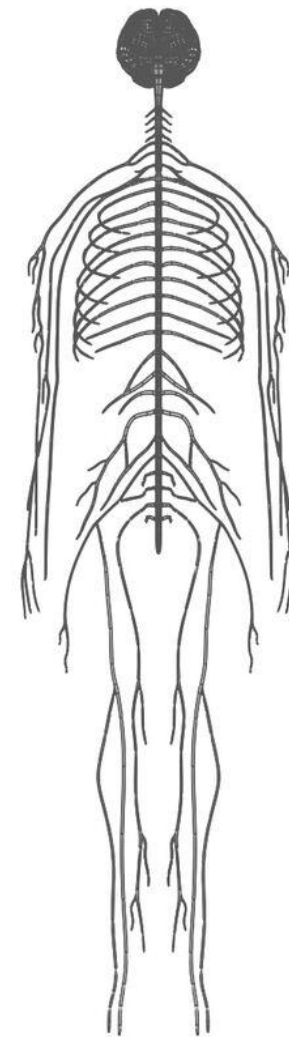
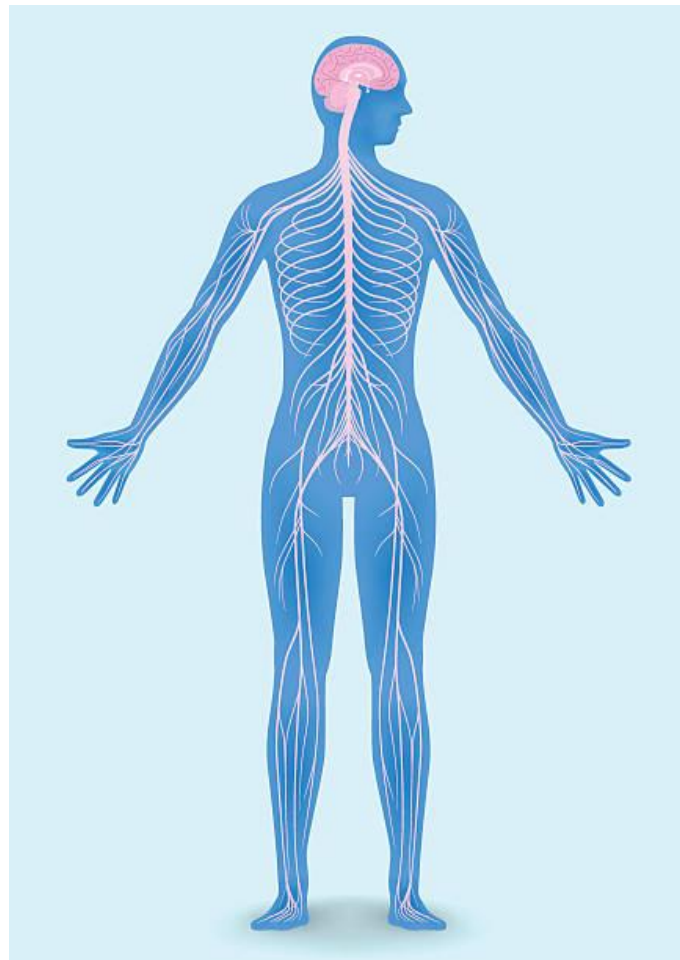
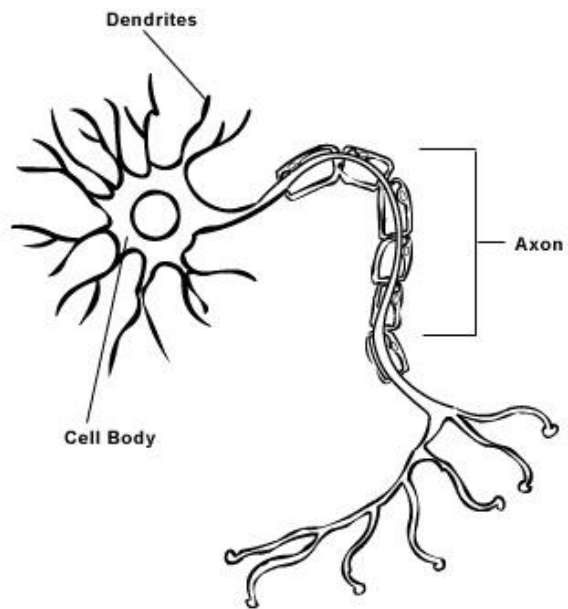
Chemical - neurotransmitters (serotonin, NE, Dopa, GABA,...)

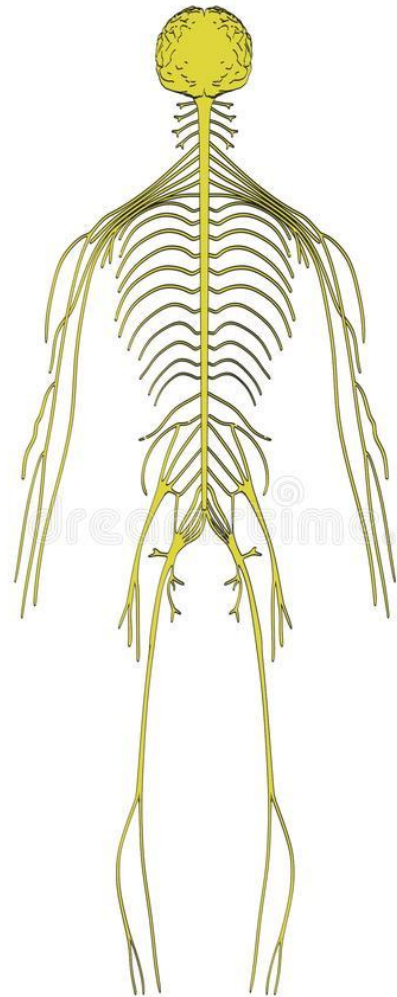
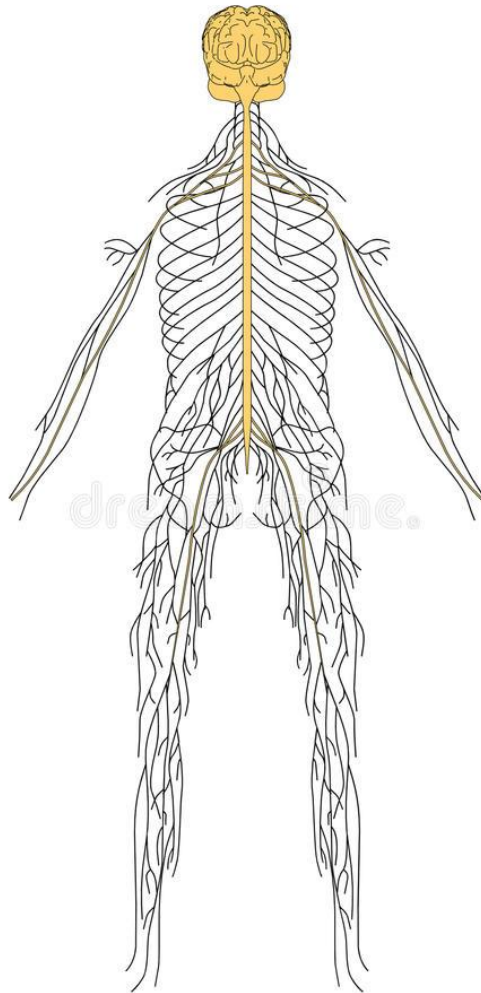
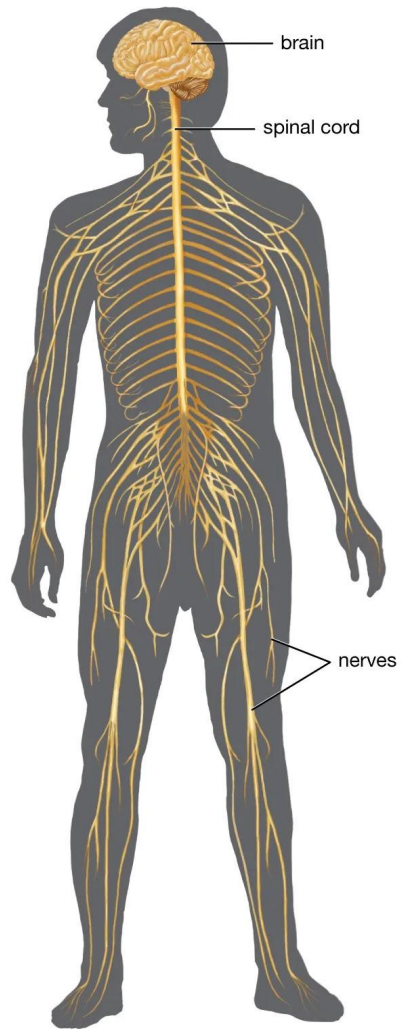
HUMAN BRAIN WAVES



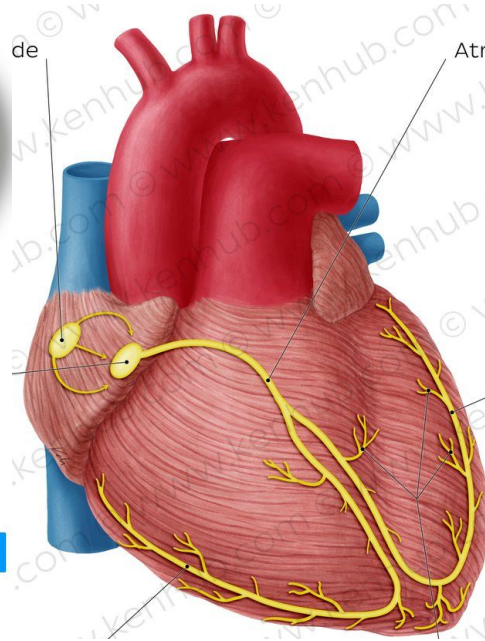
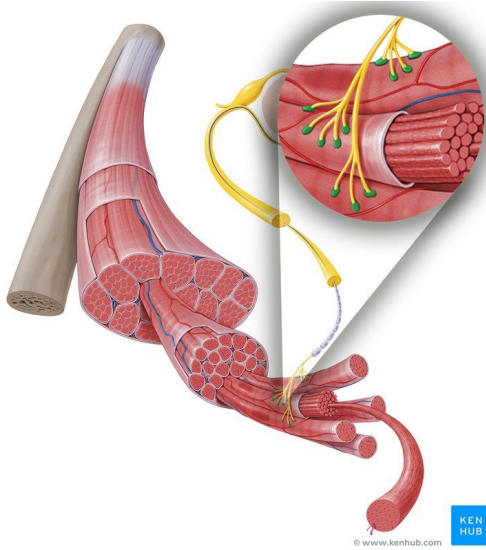
Sleep: Brain - Body Connection

- Neuro-regulation
 - Hunger and satiety - GH relin/leptin
 - Insulin responsiveness
 - Thyroid
 - Testosterone
 - Estrogen
 - Growth hormone
 - Cortisol
 - Immune system functioning
 - Neuromuscular coordination
 - Cognition
 - Attention/Concentration
 - Response to stress/mood regulation
 - **Electrophysiology** - Brain, Heart, Gut





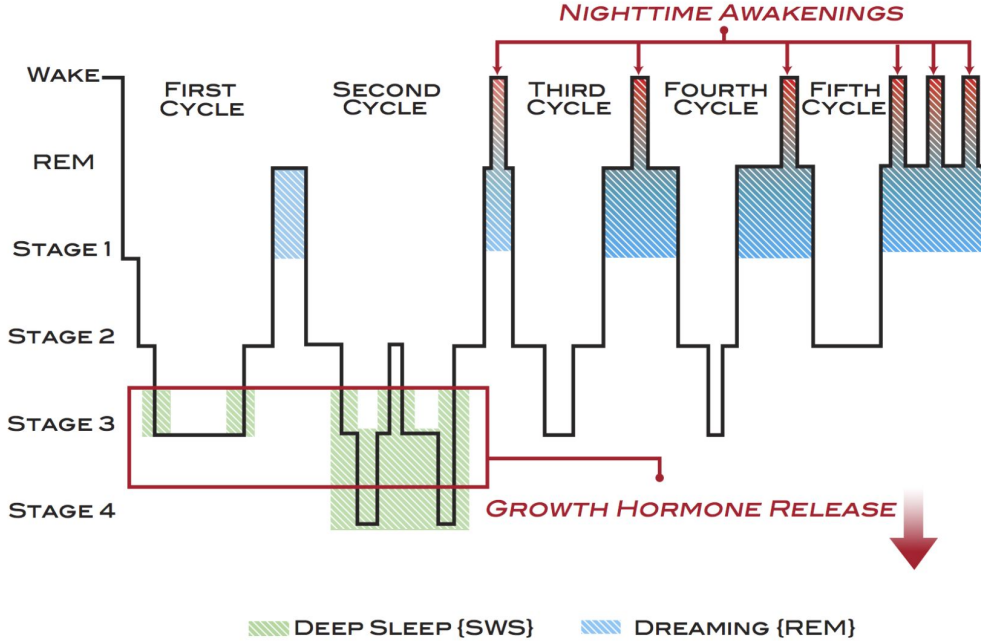
Coordination of neural activity is essential in all organs



What is Sleep?

- Vital biologic process necessary for brain and body health
- Brainwave (HZ) activity and cycles define quality (100-120 min. Cycles; 4-5)
 - “Pre-sleep”- eyes closed alpha wave connected
 - N1 (Alpha waves > theta)
 - N2 (Theta waves > alpha)
 - N3 NREM (Delta Wave, SWS) - body recovery, immune system; insight, creativity.
 - REM (wakeful brain activity) - eyes, breathing;; cognitive, memory, emotional processing

SLEEP STAGES



Awake – low voltage – random, fast



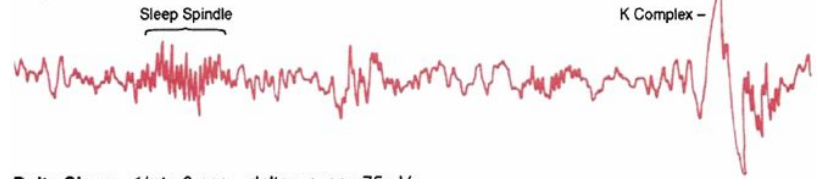
Drowsy – 8 to 12 cps – alpha waves



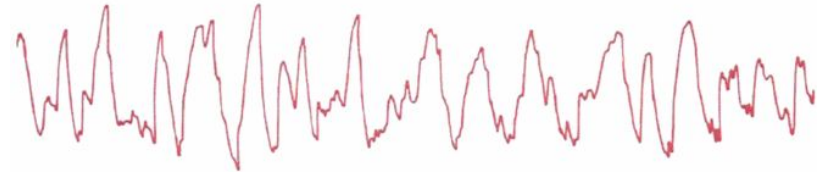
Stage 1 – 3 to 7 cps – theta waves



Stage 2 – 12 to 14 cps – sleep spindles and K complexes



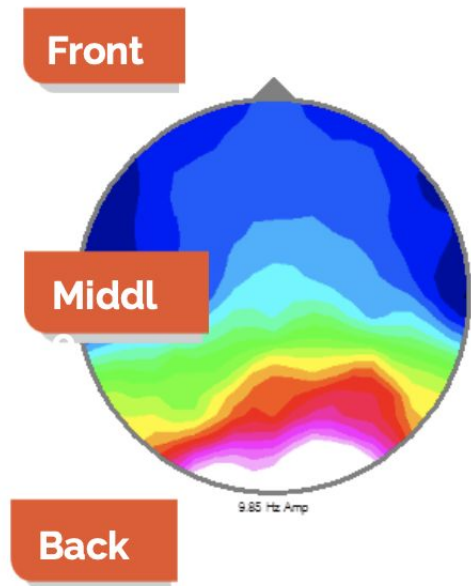
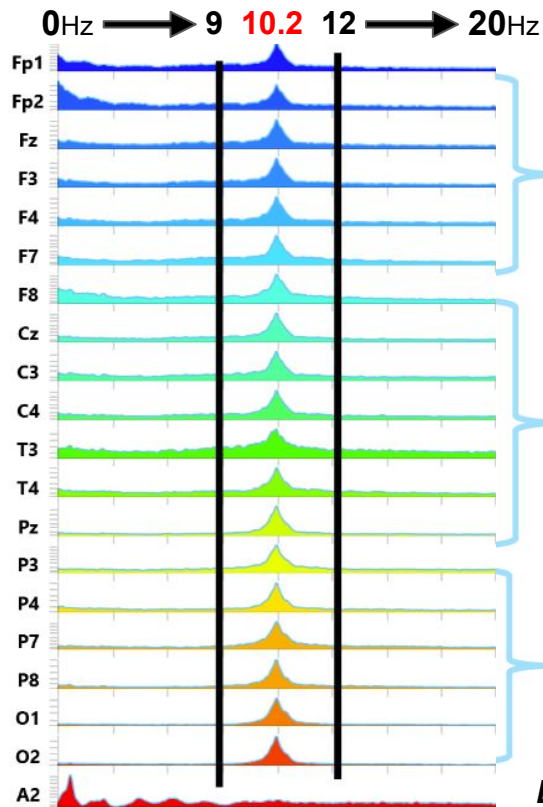
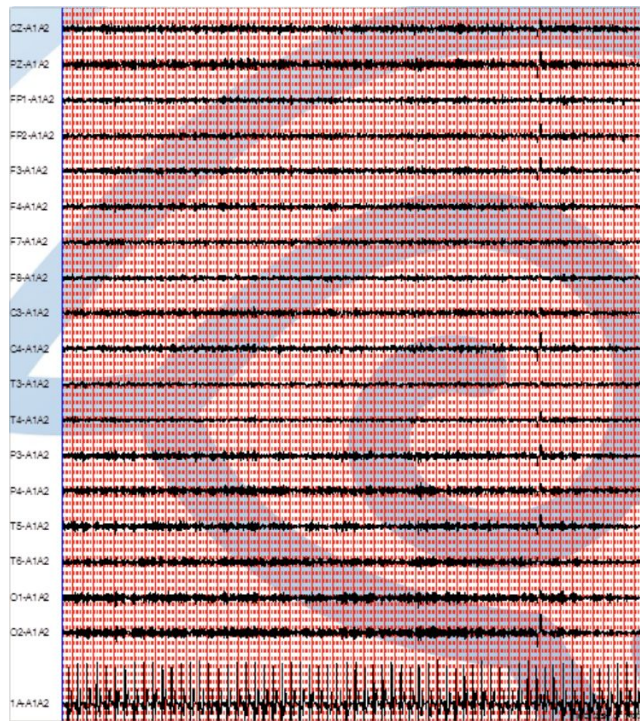
Delta Sleep – 1/2 to 2 cps – delta waves >75 μ V



REM Sleep – low voltage – random, fast with sawtooth waves

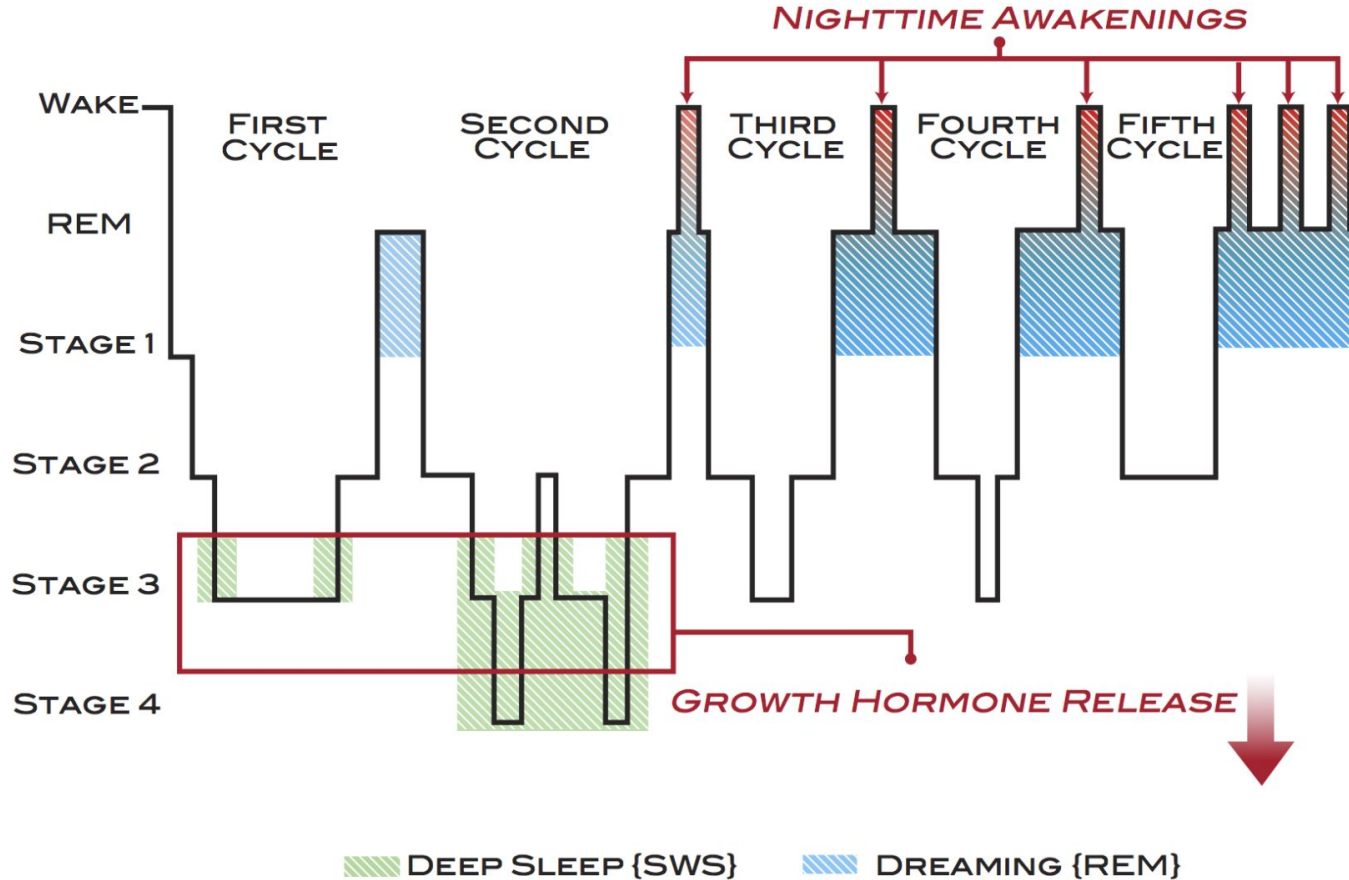


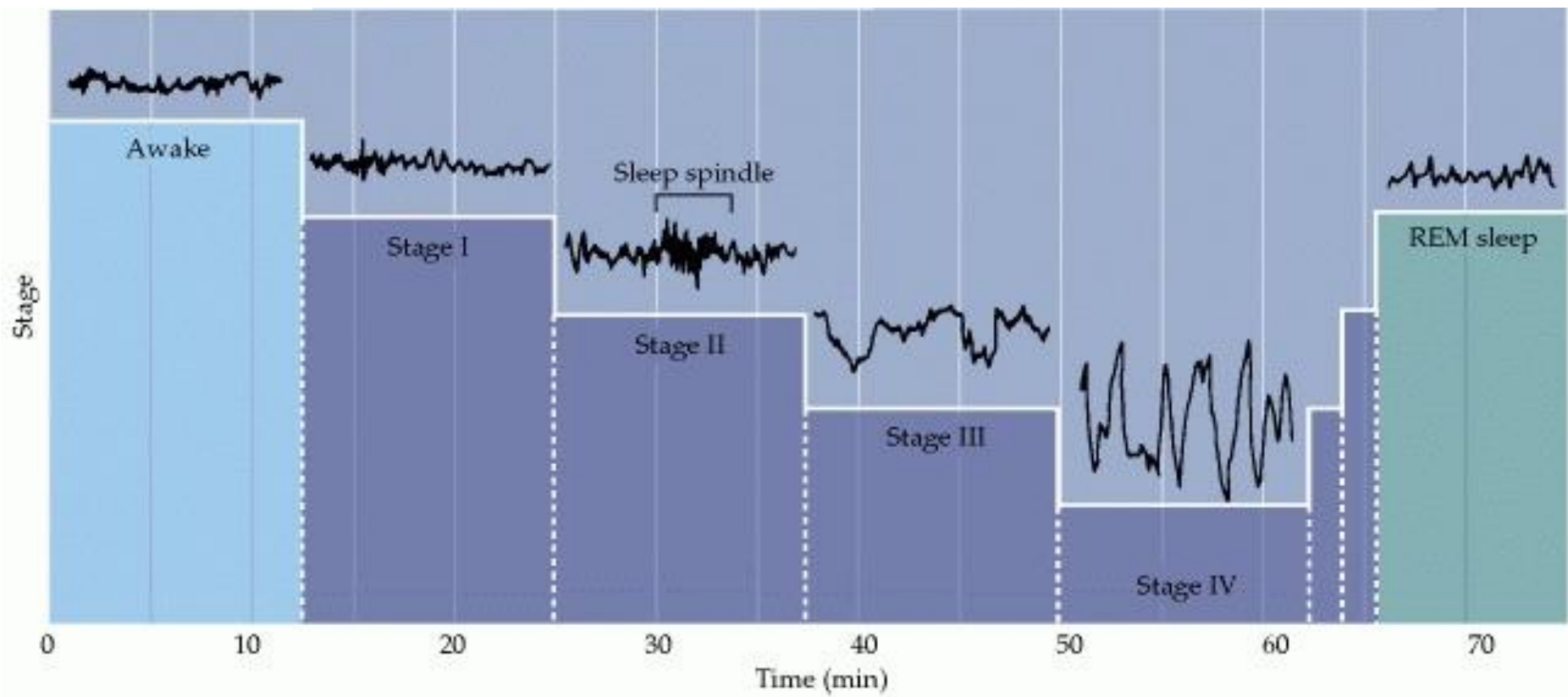
Healthy brain wave activity at rest before sleep = Organized: *Synchronized & Harmonic* *Alpha Wave Dominant*



Each Lead is displayed as an average over time

SLEEP STAGES

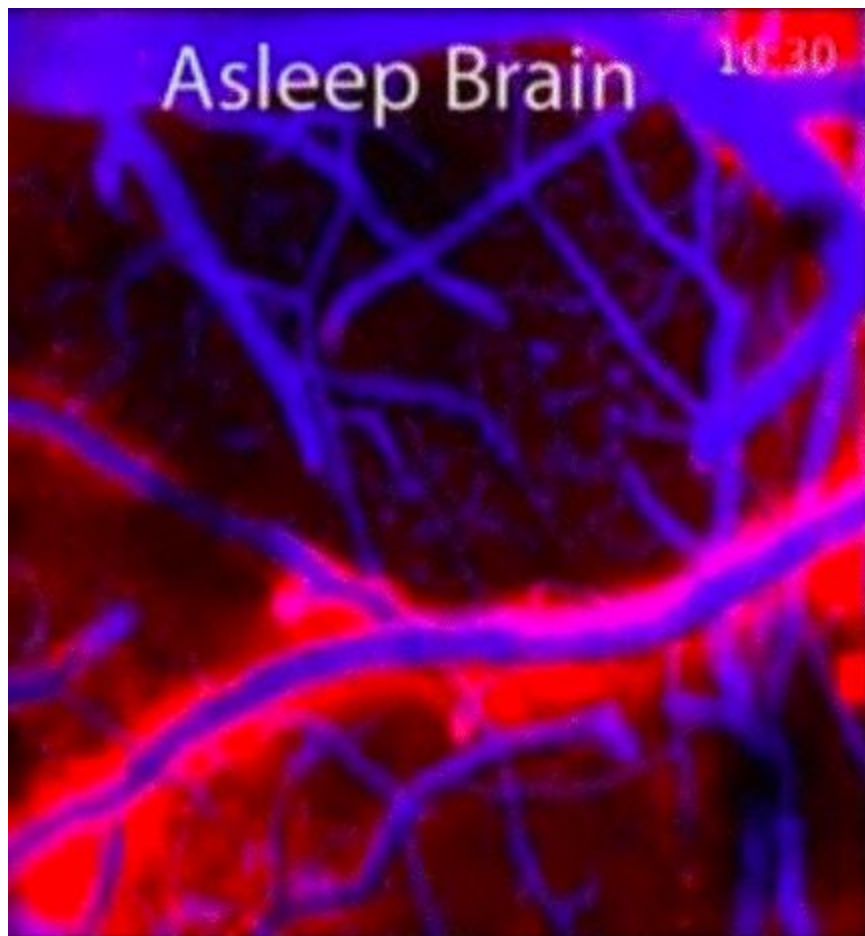




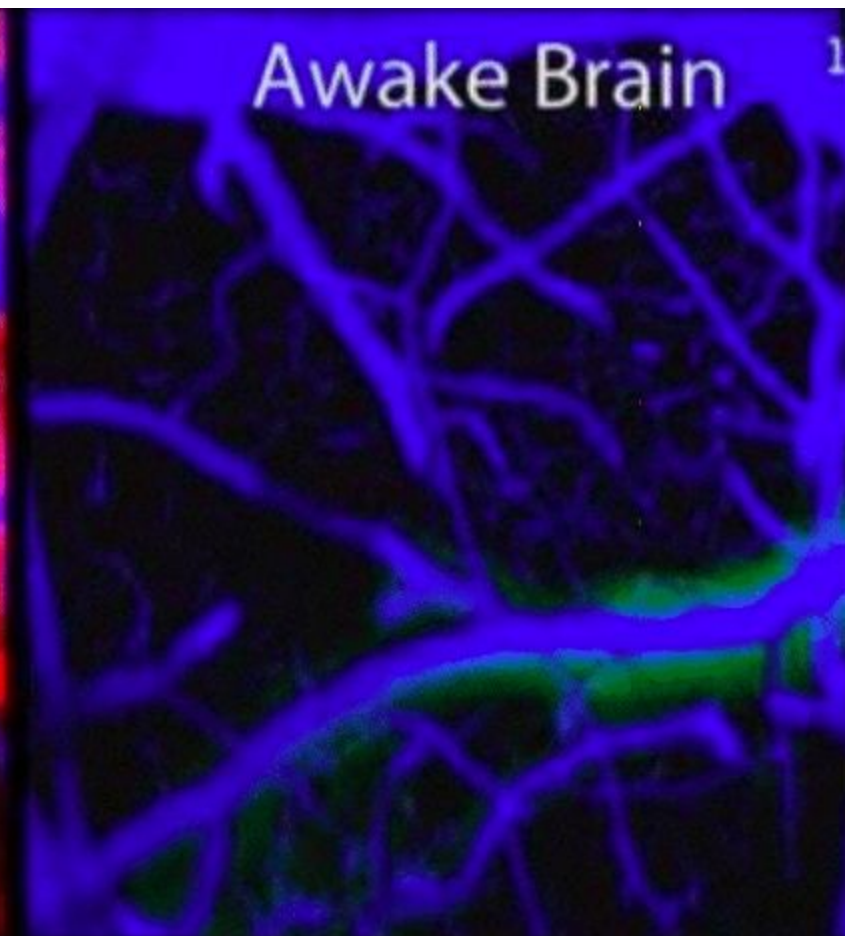
Why do we sleep? Pivotal Events During Quality Sleep:

1. Brain connections are restored and enhanced = Neuroplasticity. Memories (e.g. learning) formed during the daytime are consolidated.
2. Less important information (i.e.: “noise”) is discarded.
3. The waste products of the brain are cleared away. Such as beta-amyloid which is accumulated in dementia brains.
4. Hormones released throughout the body stimulating recovery of muscles (strength), organs (pancreas & heart - diabetes & heart disease), and immune system (infections & chronic inflammation).

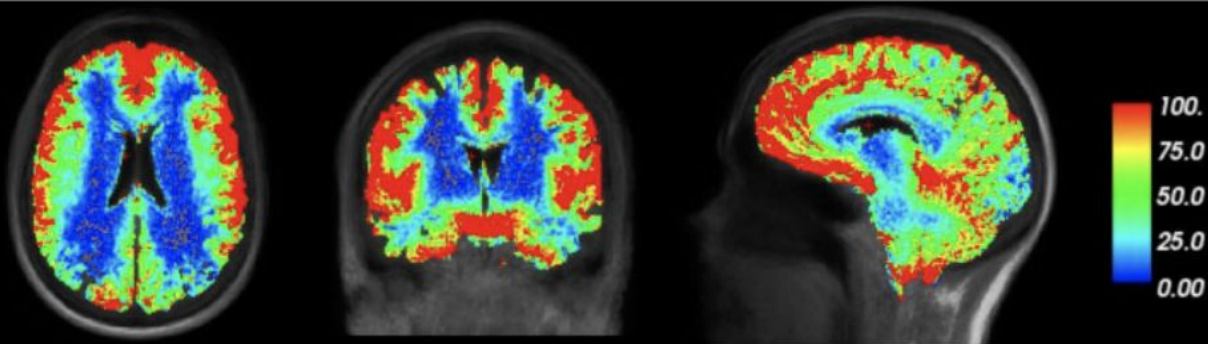
Asleep Brain 10:30



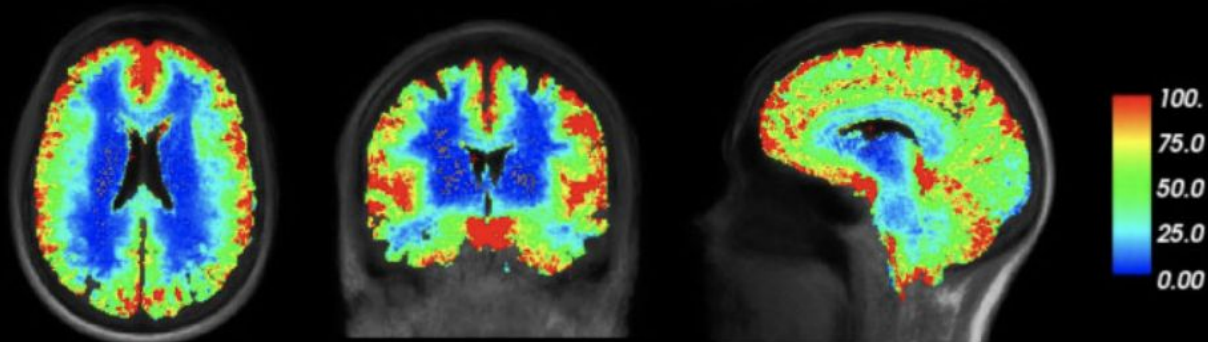
Awake Brain 1



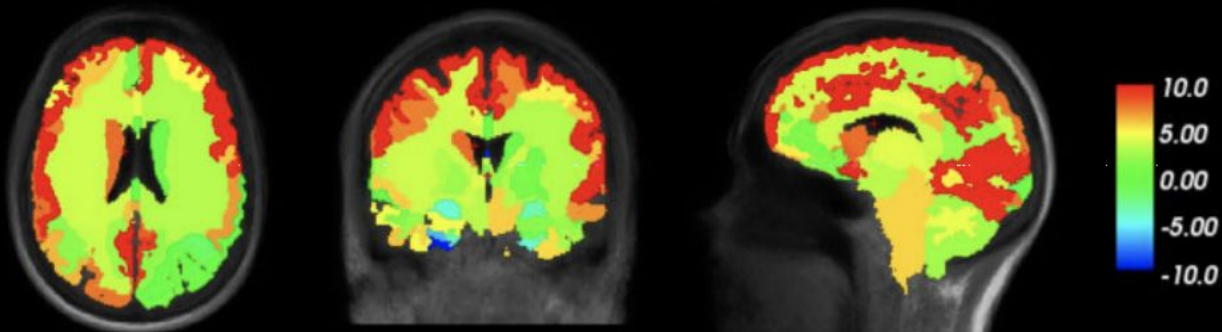
A
Deprivation



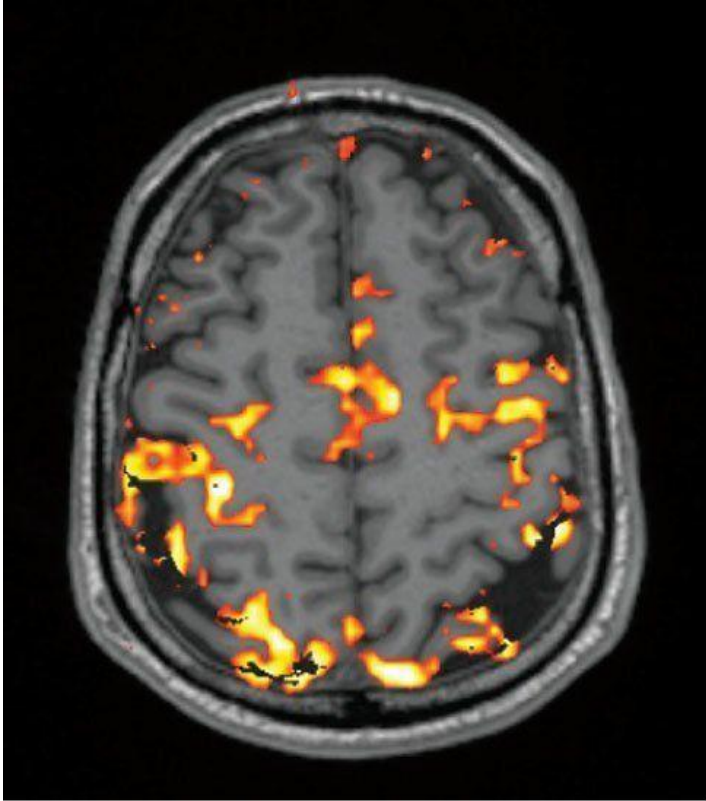
B
Sleep



C
Difference



Brain Activity Comparison



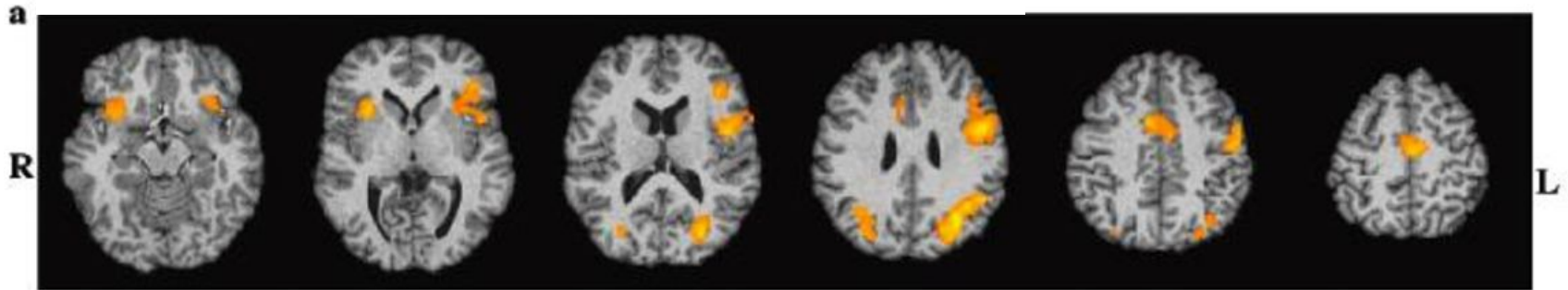
NORMAL SLEEP



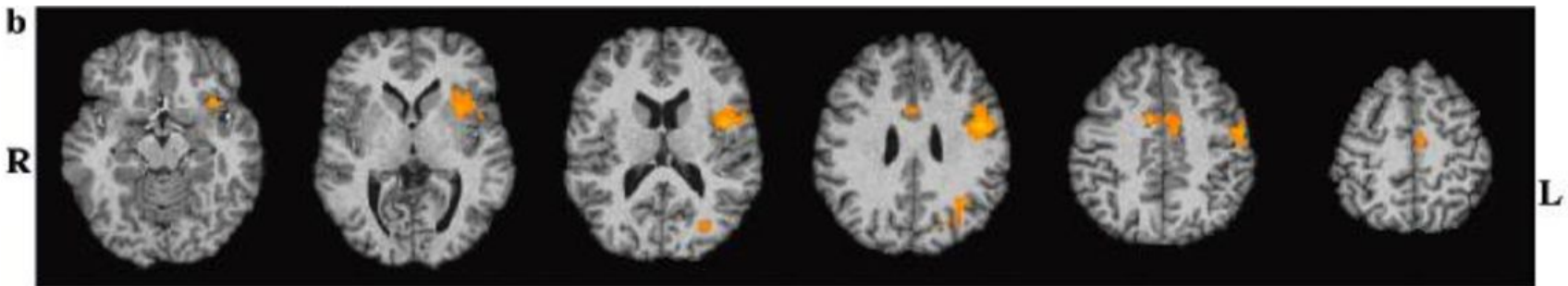
SLEEP DEPRIVED

OWEN LAB, WESTERN

Brain Activation after a normal night of sleep



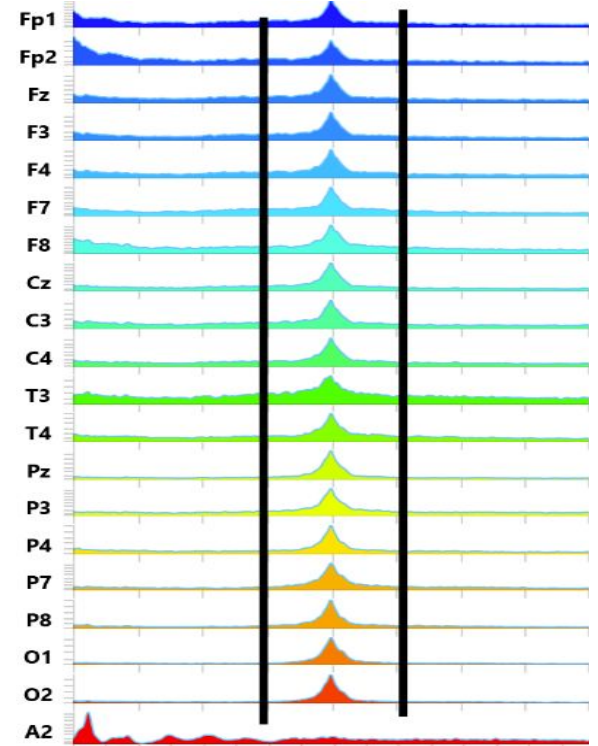
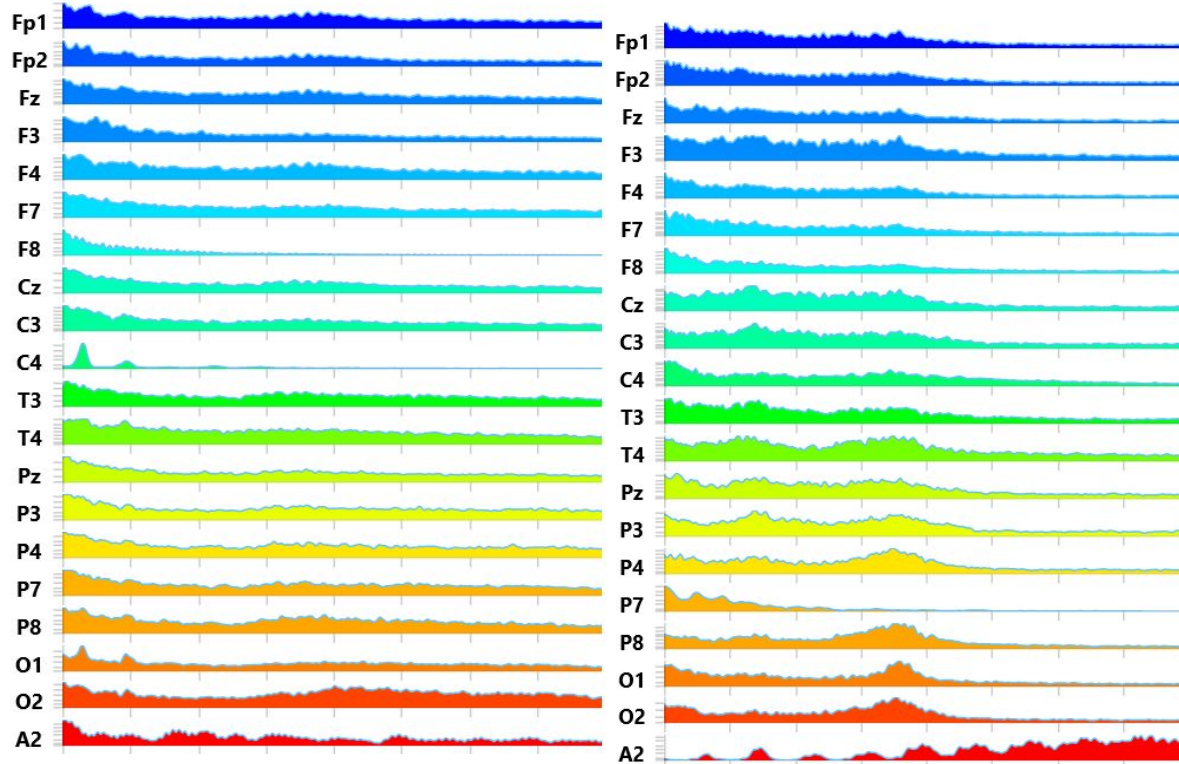
Brain Activation after 30h of sleep deprivation



Sleep Deprived Brain Activity

vs

Rested Brain Activity



Why is sleep important - Productivity & Performance

- Cognitive Performance
 - Focus, concentration, attention
 - Working memory, long-term memory, learning
 - Decision-making & problem solving
 - Executive functioning
- Emotional Stability vs Impairment
 - Irritability & frustration
 - Difficulty controlling emotion & behavior
 - Inability to cope with change
- *Decreased sleep comparable to alcohol impairment (DUS)*

Why Sleep Is Important - Health and Longevity

- Health

- High blood pressure, obesity, coronary heart disease, stroke
- Chronic health diseases (i.e., cardiovascular disease, type 2 diabetes)
- Dementia, Alzheimer's disease, and general cognitive decline

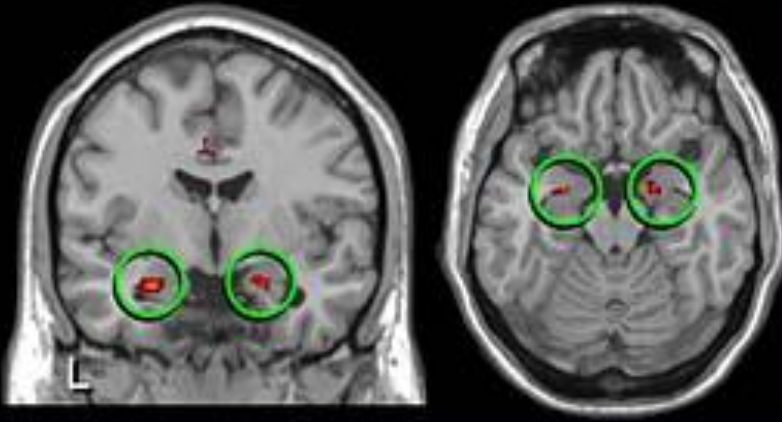
- Addiction

- Bidirectional relationship of sleep and addiction
- Increased risk for substance use disorders

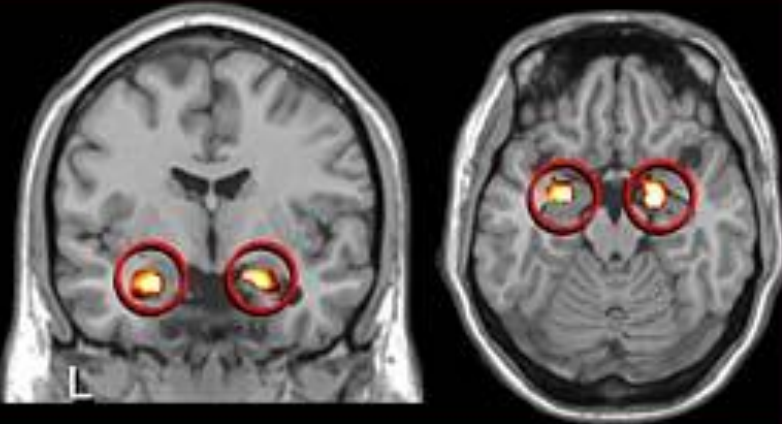
- Mental Health

- Link between abnormal sleep & psychiatric conditions (i.e., depression, anxiety)
- Social withdrawal & social isolation
- Paranoia, psychosis, and hallucinations in healthy people 1-3 days sleep deprived
- 19-28% of lawyers experience depression, anxiety & stress

Sleep Control



Sleep Deprivation

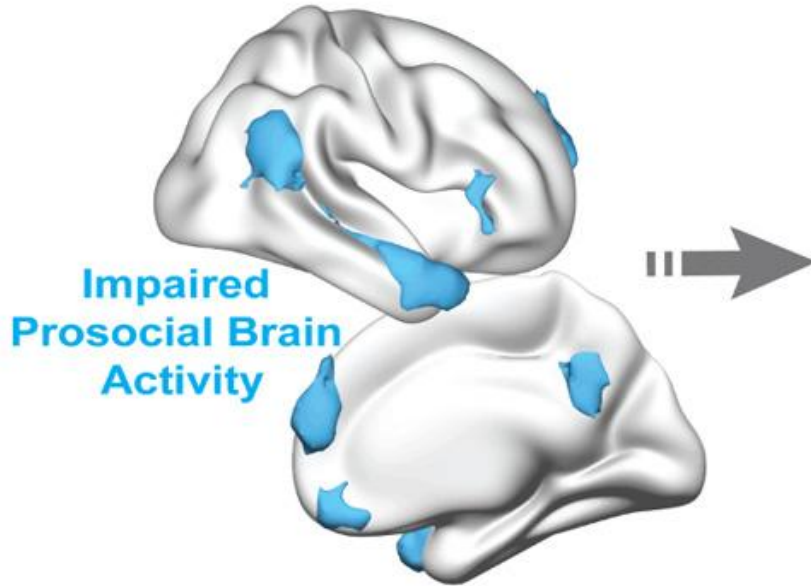


Overactive Amygdala = Threatened

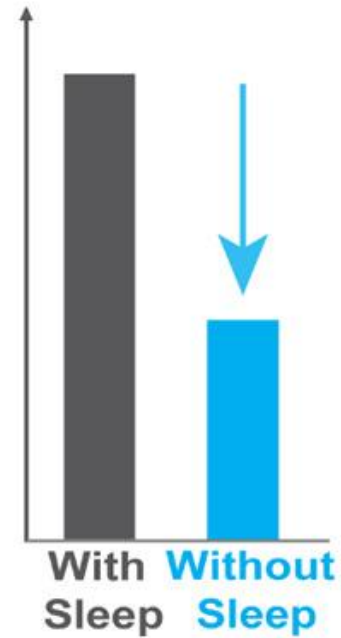
- Emotional Dysregulation
- Decision-making impairment
- Anxiety, fear, stress

Sleepless & Selfish

Insufficient Sleep



Helping Others

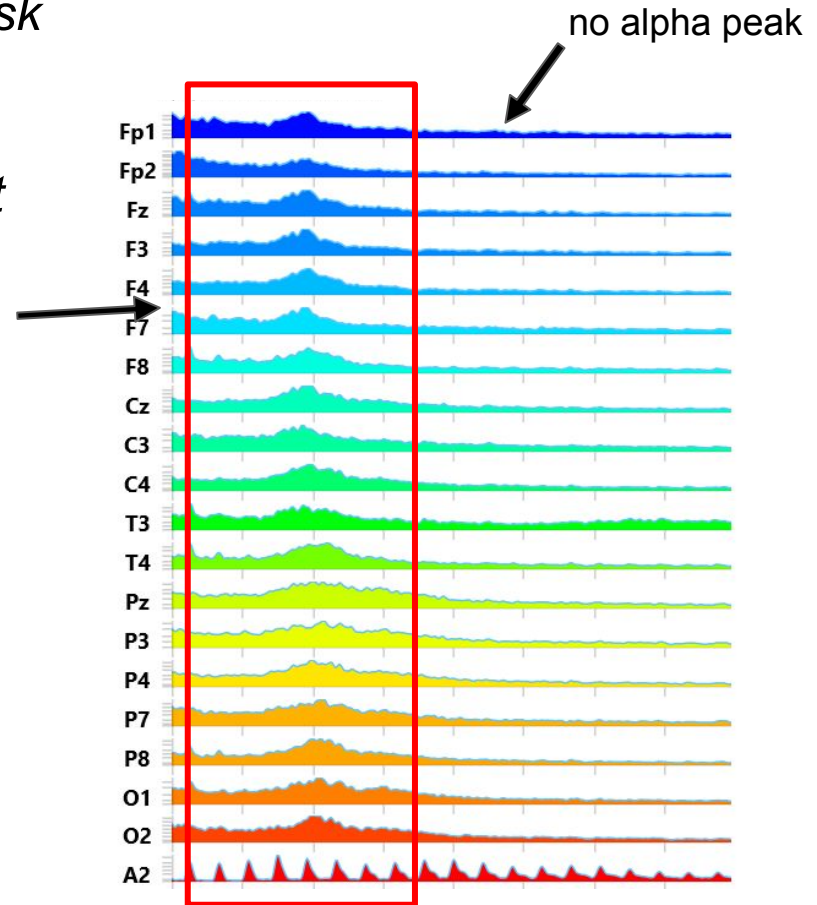
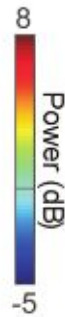
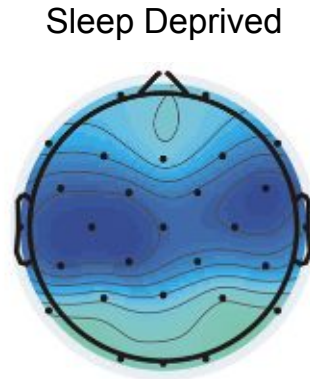
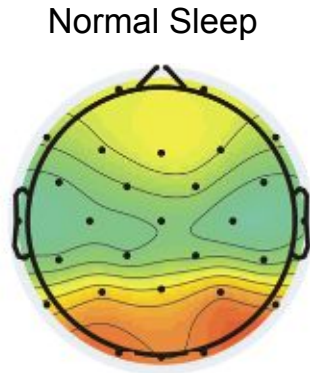


Sleep Deprivation & Cognitive Impairment Can Result in...Professional Consequences

- Lawyer misconduct
- Sixth Amendment claims
- Legal malpractice civil action

Personal Health Consequences of Chronic Sleep Deprivation: *Neurocognitive Disorders - Dementia Risk*

Slow Brain Waves Dominant
Throughout the Brain
(red box)



Quality Sleep May Mitigate Health and Professional Risk

Sleep = Brain focused >>> body.

Clear - disconnect from body

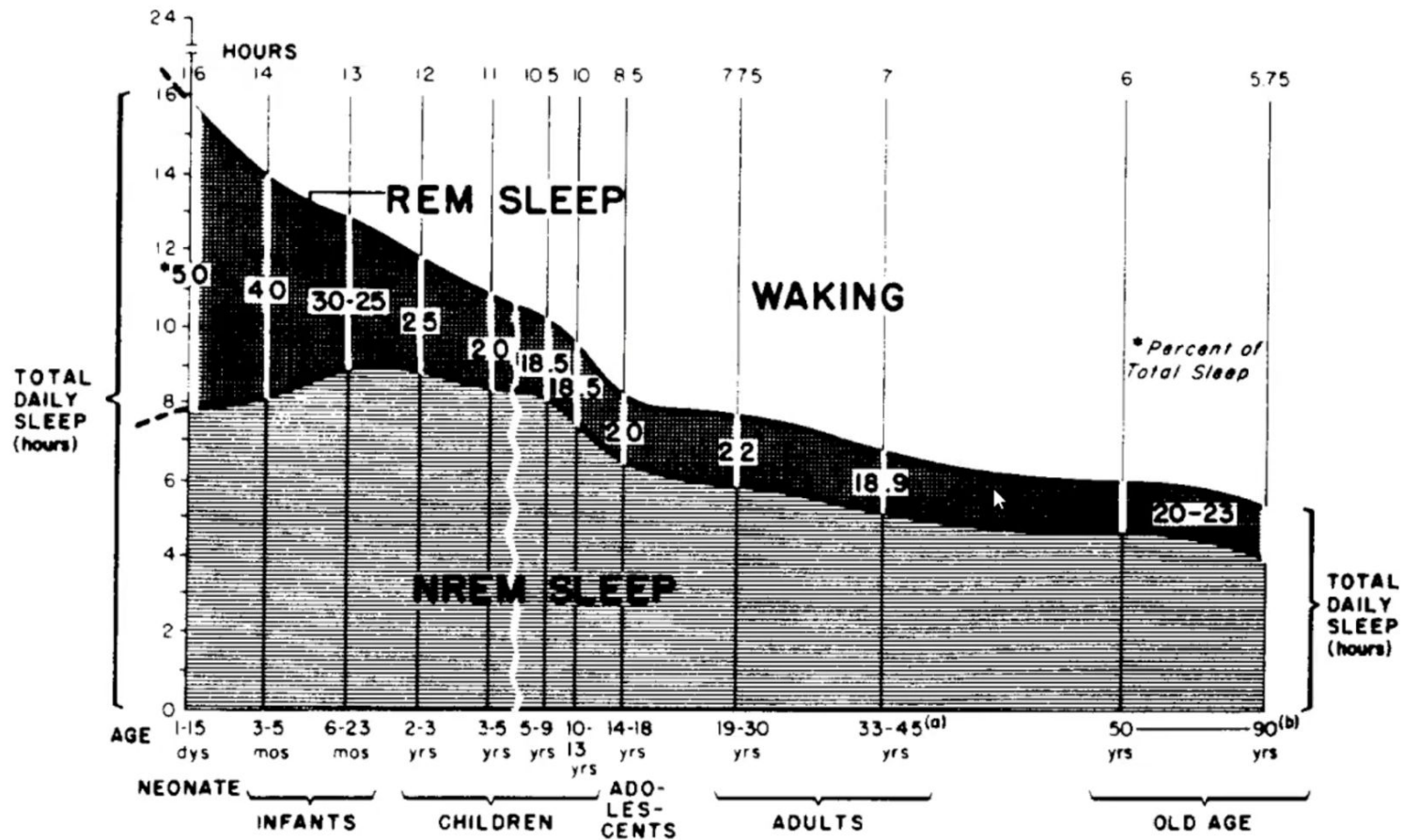
Consolidate - learning; visual, emotional and cognitive memory

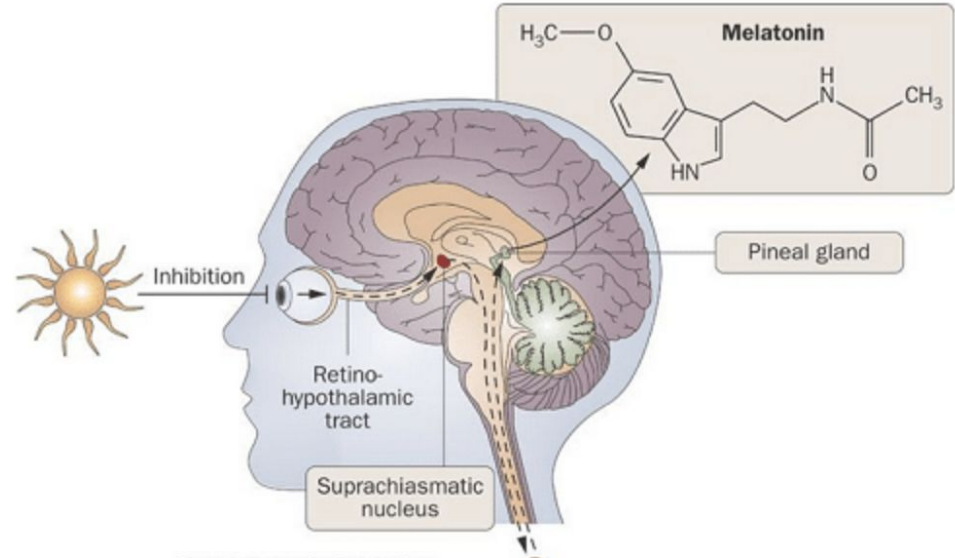
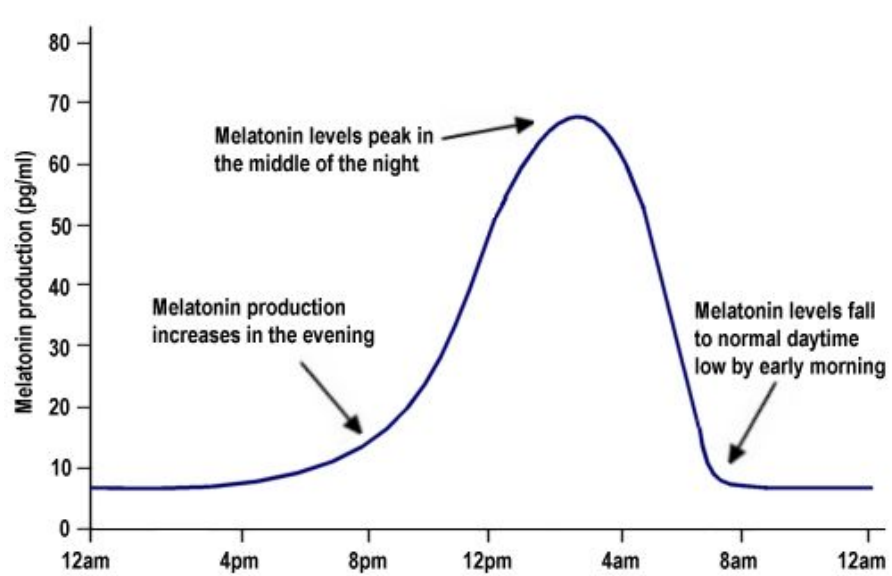
Clean - glymphatics

Quality Sleep = Prevention and Treatment

How Can Sleep Be Optimized?

How much sleep do we need?



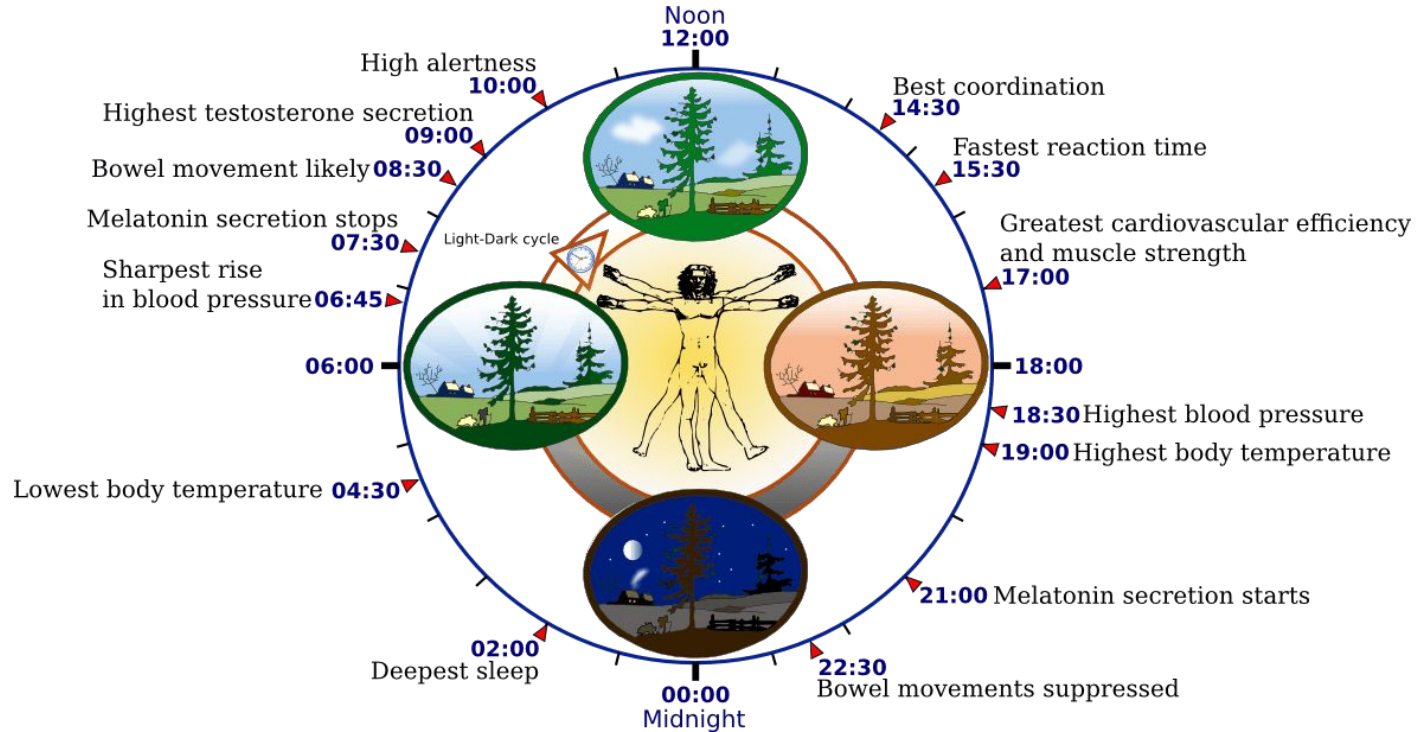


The human wake/sleep schedule (circadian rhythm) is regulated by the production and release of melatonin.

Morning light wavelengths of 450-500 nm help to activate the brain and inhibit melatonin.

Healthy Human Circadian Rhythm

The circadian rhythm controls neuroendocrine functions such as the production of cortisol and melatonin. Disrupted circadian rhythm can impact stress levels, quality of sleep, and physiological functions such as heart rate and metabolism.



Optimize Sleep: Important Factors for Quality Sleep

Duration - getting enough sleep? 6.5 hrs. of sleep (4-5 brain wave cycles)

Optimal Sleep Window

- *8 Hours*
- *Maximize Sleep Between 10pm-2am*

Night to Night Regularity

Fragmentation - mini awakenings, brief (a few minutes) can be normal

Optimize Sleep Steps: Sleep Rhythm - Train Your Brain

The brain is designed to form habits.

A sleep routine will produce better sleep rather than going to bed when tired.

1. Get off screens (2hrs before start of sleep window)
2. Prepare for bedtime (brief warm shower to lower body temp; cool room temperature)
3. Unwind before going to sleep (no stimulating content consumption).
4. Avoid well lit rooms near sleep window - similar to screened devices.

Optimize Sleep: Quality Sleep - Do's and Don'ts

1. Avoid alcohol in the evening - it will make you tired, but disrupts deep sleep.
2. Avoid caffeine 10 hrs before bedtime. Noon should be the last drink - circulates for 12 hours.
3. Don't workout 2hr before bedtime; body heat and neural stimulation.
4. Consistent sleep routine helps the brain "flip the switch" into sleep mode.
5. Remove the bedside clock - if you can't fall asleep, get out of bed and relax (write, read, etc) until tired.

Optimize Sleep: Pro-Sleep Quality Techniques

1. Meditation

- Day
- Night

2. Progressive muscle relaxation

- numerous apps available, Meditio has a good array of guided options for the above.

3. Prayer

4. Exercise

Optimize Sleep: Consistency Tips

1. Set an alarm clock for when you should be getting ready for bed, not for when you need to wake up - with sufficient quality sleep, your neuro-hormonal systems will waken predictably.
2. Learn to identify when you are stressed and how to address it, as opposed to repress it (phones, alcohol, etc.) The brain always keeps count and will impact your sleep.
3. Persuade the household & colleagues- individuals are far more successful when their social context supports & practices their behaviors.



FAQ: Common Sleep Aids

Diphenhydramine (benadryl) - cognitive impairment common for those who break down the medication slowly.

Melatonin - helps to fall asleep and regulate sleep rhythm. Does not maintain sleep.

Rx Hypnotics:

Ambien (zolpidem) - helps to fall asleep, not maintain sleep.

Lunesta (eszopiclone) - helps to fall asleep and maintain sleep.

- Both can develop tolerance, cause bizarre sleep behaviors, rebound insomnia, daytime sedation, and impaired cognition.

FAQ: Consumer Sleep Tech/Wearables

1. May be useful for evaluating consistency, and regularity of sleep window over the longer term.
2. Sleep duration can be inaccurate with these devices.
3. Not consistent for assessing the depth of sleep (light vs deep), breathing, movements, and other phenomena during sleep.

*Tech is advancing rapidly and this will likely change over the next decade.

FAQ: Should I Undergo a Sleep Study?

Difficulty focusing

Forgetful

Depressed mood & Excessive worrying

Not refreshed in the morning

Morning Headache

Frequent awakenings at night

Obesity/overweight

High blood pressure

Diabetes

Snoring

FAQ: Vivid Dreams and Nightmares

This is normal phenomena of brain moving through cycles of REM.

We tend to recall dreams more readily when we are getting quality sleep.