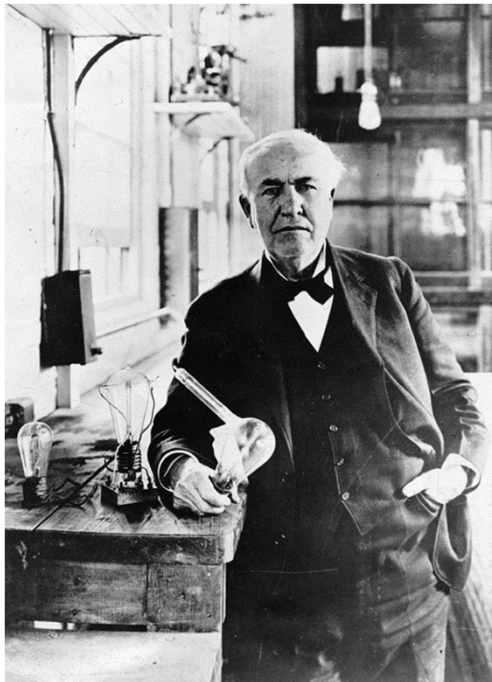


# The sleep you're missing: Where you lost it and how to get it back



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October 4, 2012



Sleep is an acquired habit. Cells don't sleep. Fish swim in the water all night. Even a horse doesn't sleep. A man doesn't need any sleep.

-Thomas Edison

Now, blessings light on him  
that first invented sleep! It  
covers a man all over,  
thoughts and all, like a cloak;  
it is meat for the hungry,  
drink for the thirsty, heat for  
the cold, and cold for the  
hot. It is the current coin that  
purchases all the pleasures  
of the world cheap, and the  
balance that sets the king  
and the shepherd, the fool  
and the wise man, even.

~Cervantes, *Don Quixote*



## Our culture of Somnorexia



As a society, we get 20% less  
sleep than our ancestors only  
100 years ago.

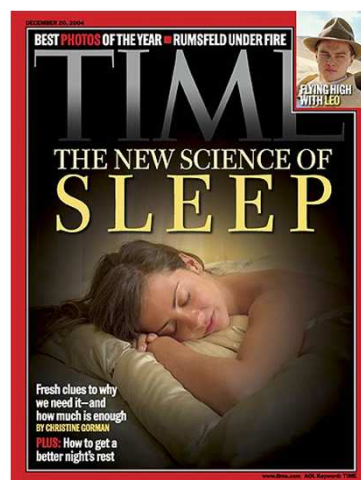


## How much sleep are you missing?

<b>Newborns/Infants</b>	0 - 2 months: 2 - 12 months:	15-18 hours 14-15 hours
<b>Toddlers/Children</b>	12 mo - 18 mo: 18 mo - 3 years: 3 - 5 years: 5 - 12 years:	13-15 hours 12-14 hours 11-13 hours 10-11 hours
<b>Adolescents</b>	On Average:	9.25 hours
<b>Adults</b>	On Average:	7-9 hours

- Science of Sleep
  - Your brain on sleep
  - Sleep across the lifespan
- Sleep for Health
  - Accidents
  - Mental Health
  - Physical Health
- Sleep Thieves
  - Disorders
  - Zeitgebers
  - Stress
- Solutions
  - Motivation to Change
  - Sleep Environment
  - Remember the Ingalls

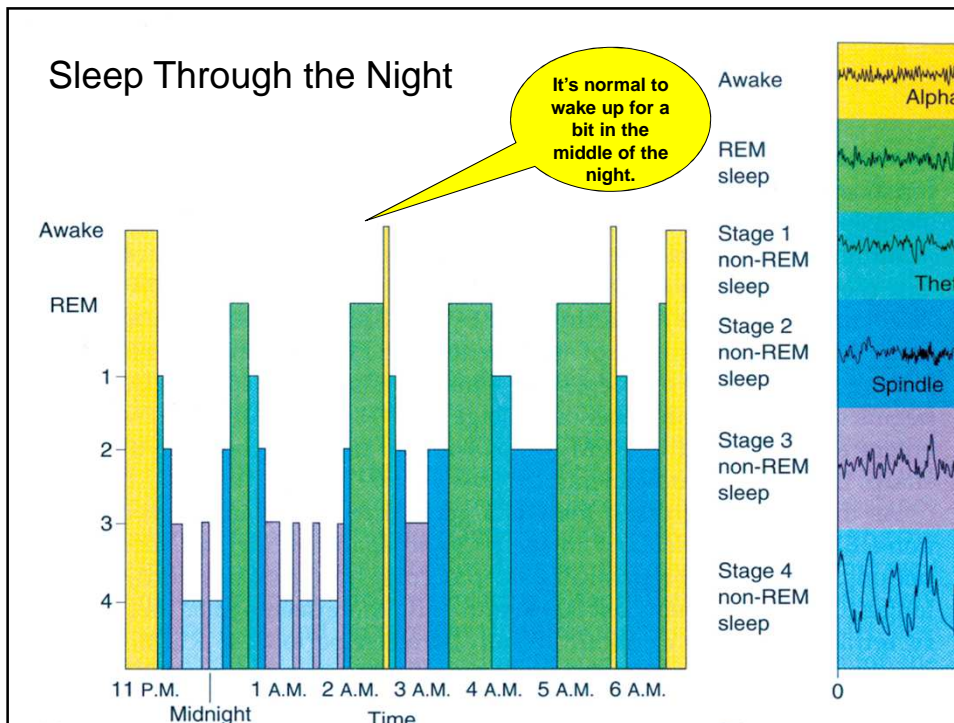
## Outline



# SCIENCE OF SLEEP

## Sleep Stages

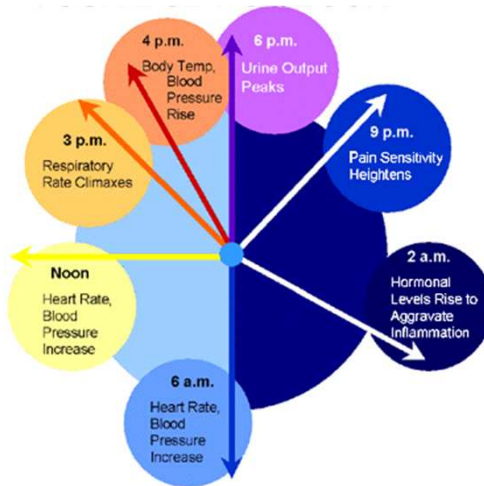
	Awake	NREM	REM
EEG	Fast, asynch	Slow, synch	Fast, asynch
Sensation	Vivid, external	Dull, Absent	Vivid, internal
Thought	Voluntary	Idle	Vivid, illogical
Movement	Voluntary	Rare, involuntary	Muscle paralysis
Eye moves	Often	Rare	Often



The 99c Sleep Cycle App measures your movement and wakes you up gradually during REM sleep for a more natural wake up.



Most body processes are influenced by the 24 hour Circadian Rhythm.



When we sleep is controlled by multiple internal and external factors.



Circadian Rhythms



Sleep Homeostat



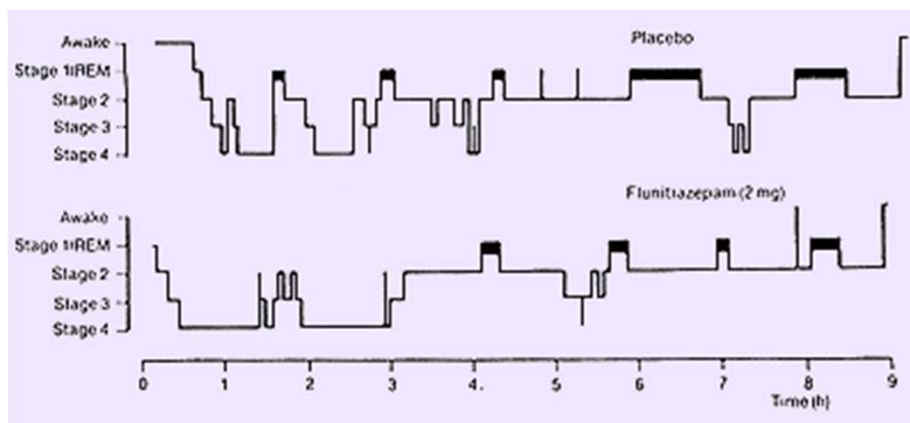
Zeitgebers



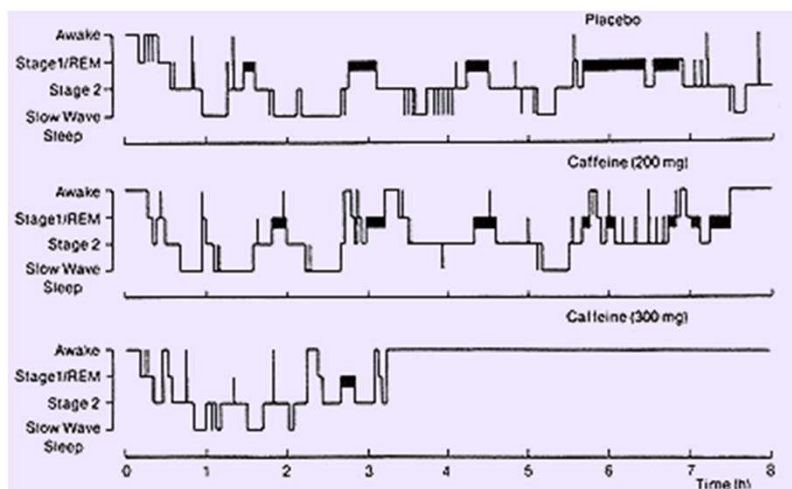
Drugs



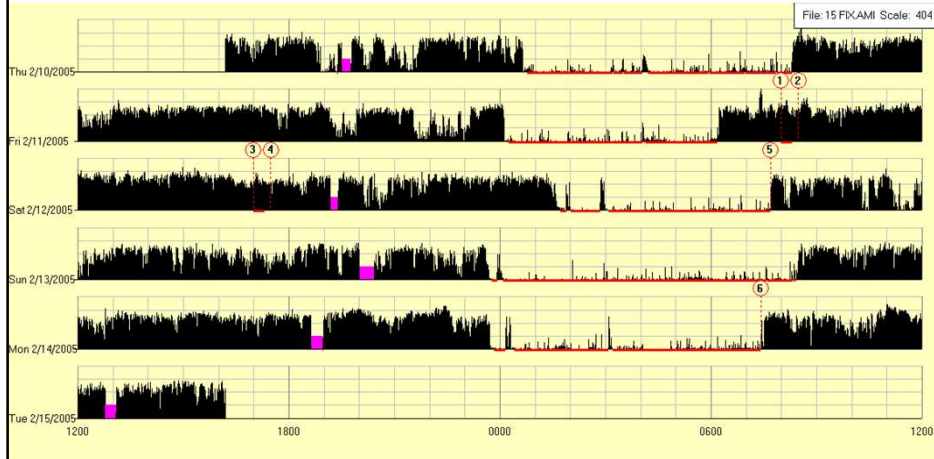
Depressants like alcohol and anti-anxiety drugs inhibit REM sleep.



Stimulants like caffeine increase the time it takes us to fall asleep and the number of times we wake up during the night.

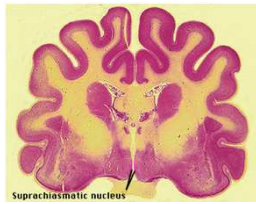


## Actigraphy: Behavioral method of studying circadian rhythm

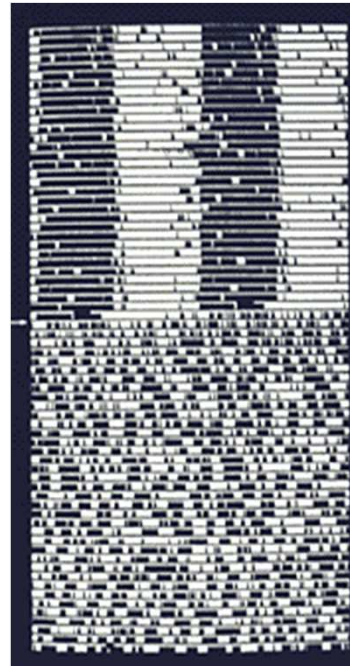
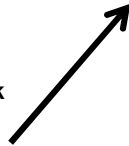


Dark bars indicate wake, red lines indicate sleep. This person has a regular sleep cycle.

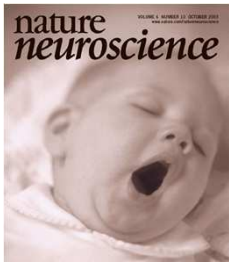
## Hypothalamus contains “Master-clock” cells



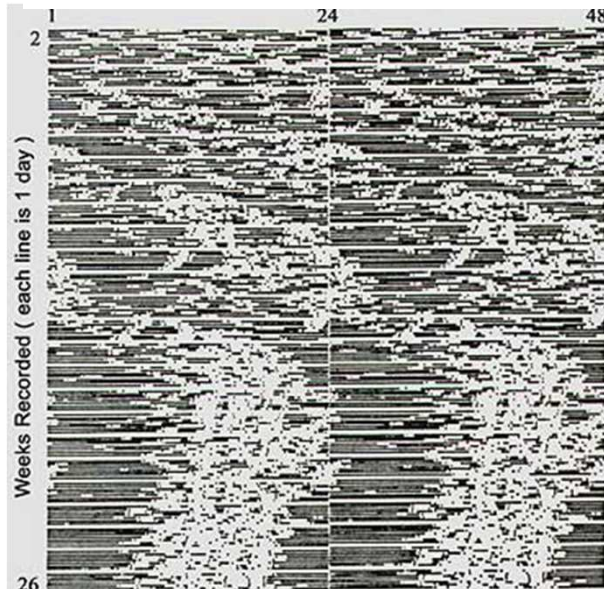
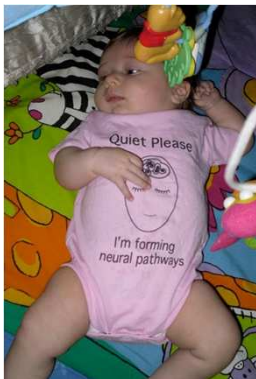
Damage to the SCN master clock cells results in irregular sleep patterns.



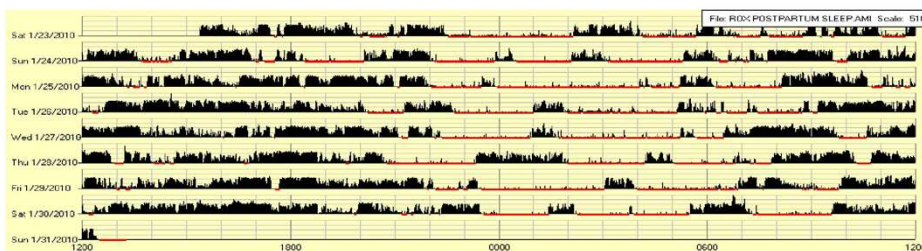
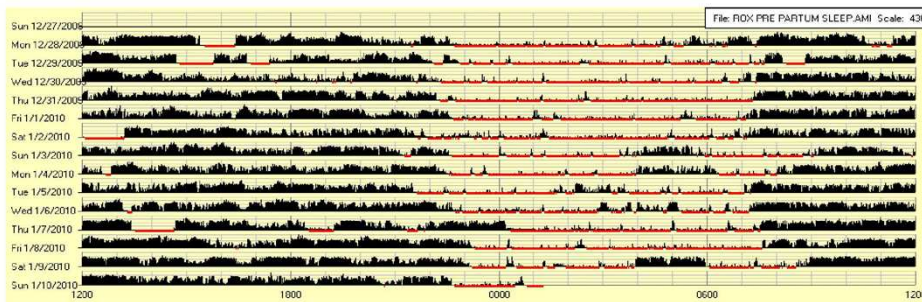




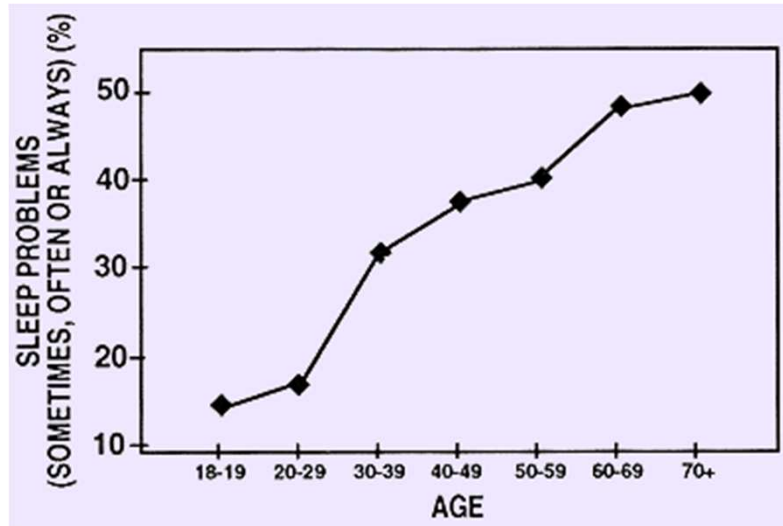
## Circadian Rhythms develop over the first few months of life..



## My own sleep suffered after our daughter was born.



Sleep Problems Increase Across the Lifespan for biological, cultural, and psychological reasons.



**SLEEP FOR  
HEALTH**

## Sleep deprivation leads to many negative consequences.

Decreased job performance

Increased Depression

Insulin Resistance

Inc. Risk-Taking Behavior

Increased Anxiety

Increased BP

Increased Accident Risk

Increased Irritability

Weight Gain

Increased Reaction Time

Decreased Immunity

Increased Cancer Risk

## Sleep deprivation has immediate behavioral effects

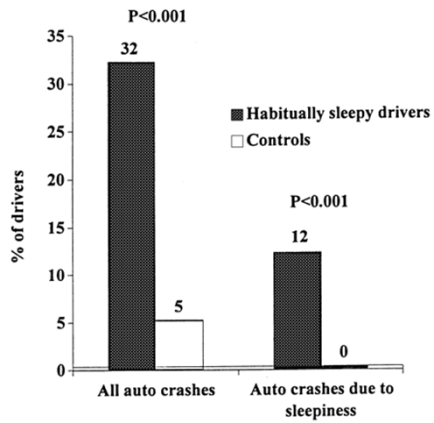
- Microsleep
- Poor decision making
- Difficulty communicating
- Forgetfulness
- Fixation
- Lethargy
- Bad mood
- Paranoia



## Sleeping Behind the wheel is particularly dangerous for sleepy drivers.

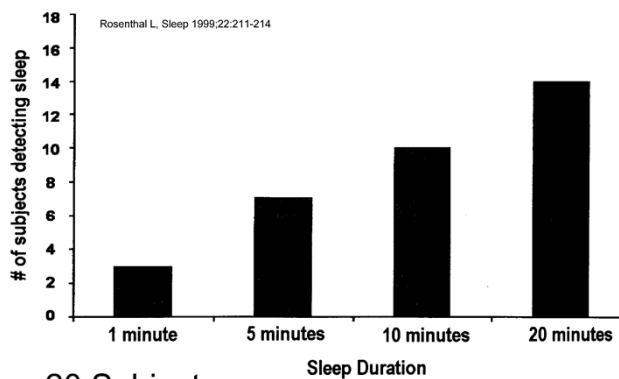


People who drive after being awake for 17 to 19 hours performed worse than those with a blood alcohol level of .05.



Masa et al. 2000

## Most people don't realize they're asleep even after 5 minutes of sleep.



20 Subjects

**Figure 1.**—The number of subjects accurately detecting sleep during each nap length tallied and analyzed for differences in sleep detection as a function of sleep length shows an increase in the number of individuals correctly detecting sleep as a function of the duration of sleep.

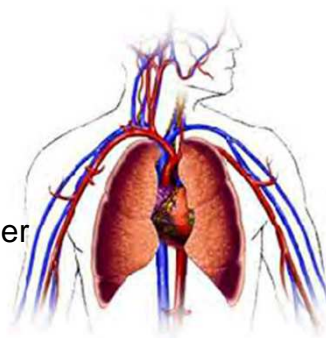
## Sleep deprivation compromises the Immune System

- Sleep deprivation is correlated with a significant reduction in cellular immunity (reductions in T-cells)
- Men who received just four hours of sleep a night for four straight nights after receiving a flu shot produced half the antibodies as the control group (Weintraub, 2004)
- In lab rats, total sleep deprivation for four weeks can cause death by infection (Stapleton, 2001)



## Sleep deprivation taxes the Cardiovascular System

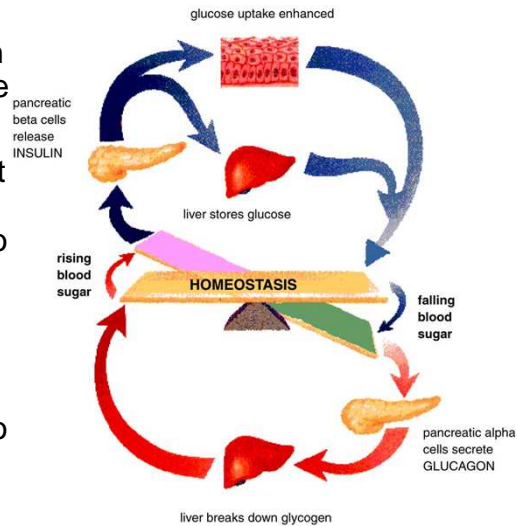
- Sleep deprivation increases concentrations of cytokines & C-reactive proteins
- This inflammation can damage the inner walls of the arteries, leading to possible stroke or heart disease
- Blood pressure and heart rate are higher following sleep deprived nights
- Men who sleep 5 hours or less a night have 2x as many heart attacks as men who sleep 8 hours or more



■ (Voelker, 1999)

## Sleep Deprivation is associated with blood sugar management problems.

- Chronic sleep deprivation leads to insulin resistance
- This resistance can result in high blood glucose concentrations, leading to diabetes
- Men who sleep 4 hours a night for 6 straight nights lose 30% of their ability to respond to insulin



Gottlieb et al, 2005

## Sleep Deprivation enhances hunger and cravings for junk food.

- Healthy young men were forced to sleep 4 hours a night or 9 hours a night for 4 days straight.
- Short sleepers had a 18% drop in leptin, the fat satiety signal (equivalent drop to subtracting 1100 calorie a day diet).
- 25% Increase in hunger, 45% in appetite for junk foods



(Van Cauter, 2004)

# SLEEP THEIVES

## #1 Insomnia

### Symptoms

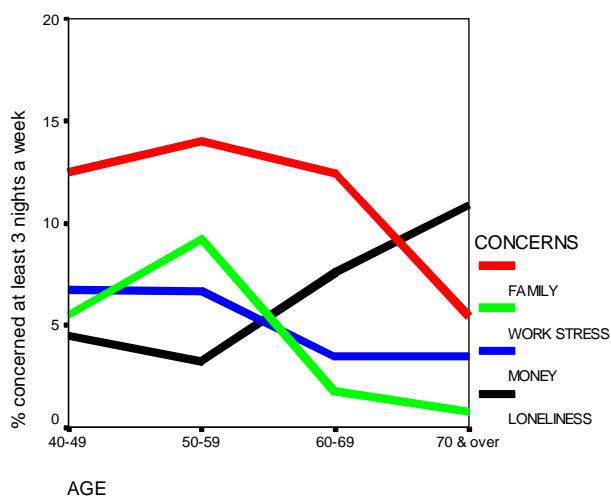
- Inability to sleep despite being tired
- Waking up frequently throughout the night and having trouble going back to sleep
- Waking up too early in the morning
- Sleep that is not refreshing
- Excessive daytime sleepiness

### Potential Triggers

- Stress
- Environmental noise
- Extreme temperatures
- Change in environment
- Jet lag
- Medication side effects



## Sleep disturbance\* from worries about the family, work, loneliness, and money by age



Source: Women's Sleep in the UK Survey

## #2 Sleep Disordered Breathing

- Presents with loud snoring, morning headaches, and dry mouth on awakening.
- Profoundly associated with hypertension independent of all other risk factors.
- Six time increased motor vehicle accident rate as compared to the general population.
- **Most common disorder seen at sleep centers and is responsible for more mortality and morbidity than any other sleep disorder.**



Normal Unobstructed Breathing



Partial Obstruction - Snoring

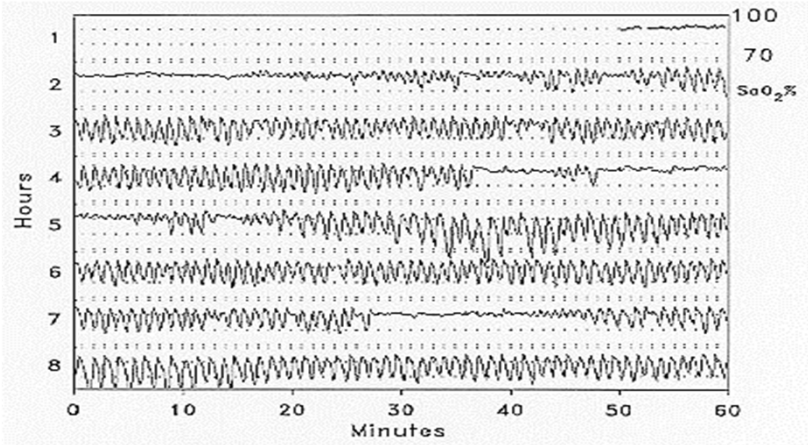


Complete Obstruction - OSA

OSA:

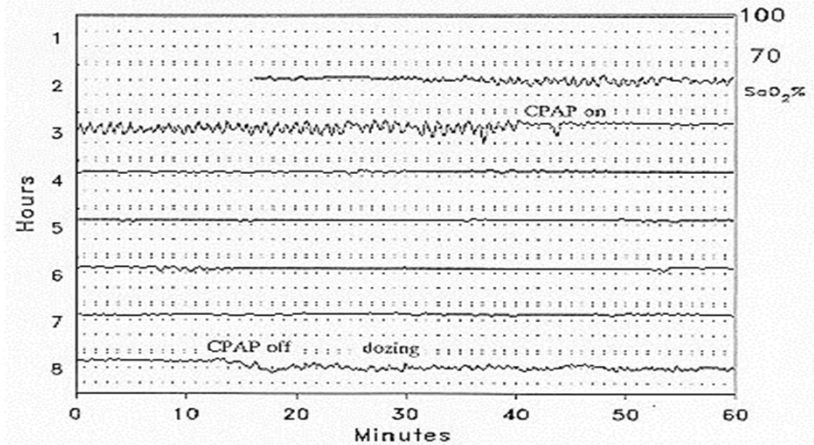


### Overnight O2: Pre CPAP



Overnight arterial oxygen saturation monitoring.  
*A patient with severe obstructive sleep apnea.*

### Overnight O2: Post CPAP



Overnight arterial oxygen saturation monitoring.

## #3 Restless Legs Syndrome

- Characterized by an irresistible urge to move legs
- Caused by an unpleasant and uncomfortable “creepy crawly” sensation in the legs during sleep onset, inactivity and relaxation
- Kicking relieves sensation immediately
- Results in sleep onset insomnia & excessive movements during sleep



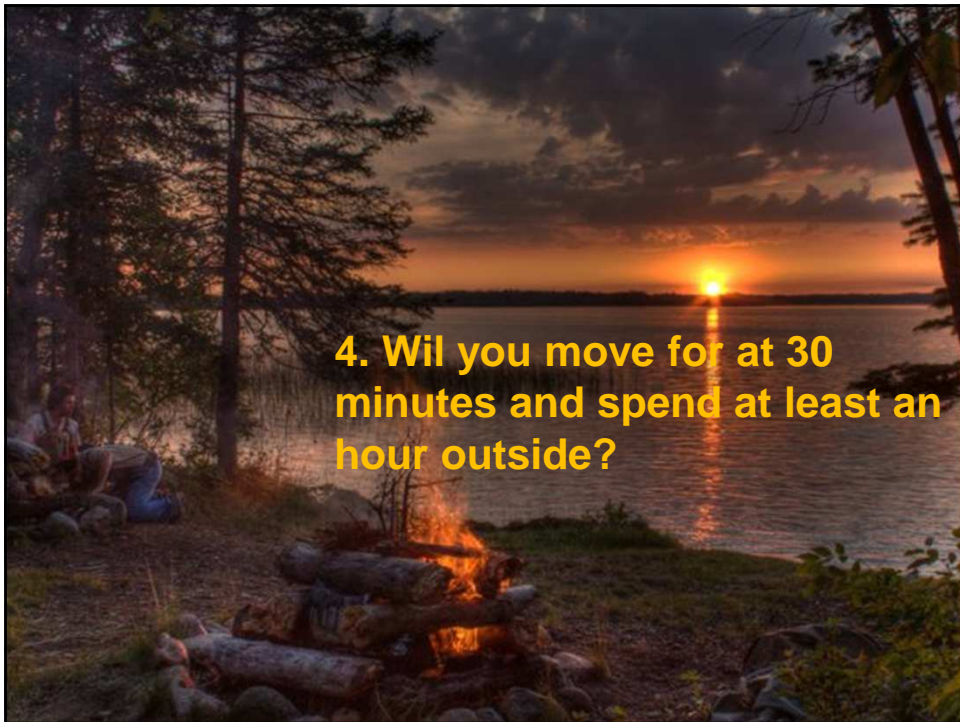
## SLEEP SOLUTIONS



How to get back the sleep  
you've been missing

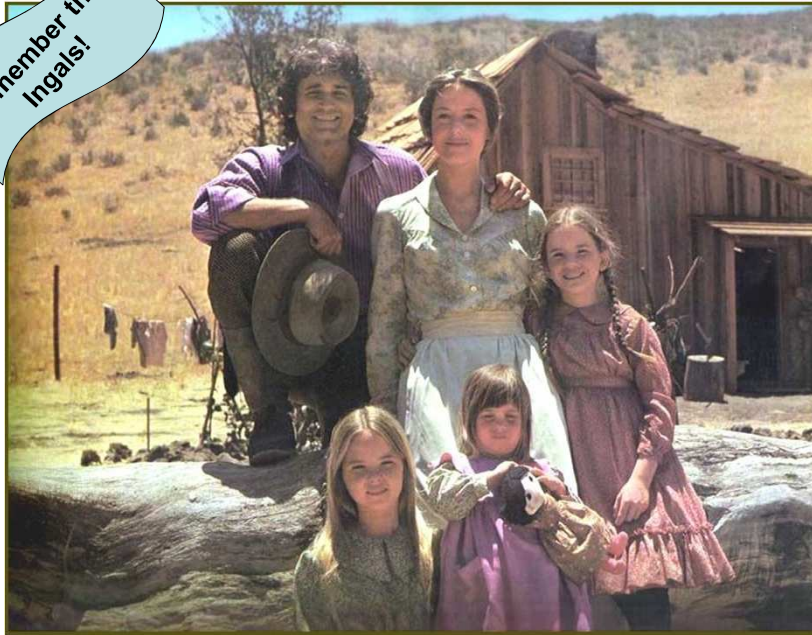
## **Four essential questions for improving sleep**

1. Are you motivated to improve your sleep?
2. Do you have a treatable condition that is interfering with your sleep?
3. What are your zeitgebers?



**4. Will you move for at least 30 minutes and spend at least an hour outside?**

Remember the Ingalls!

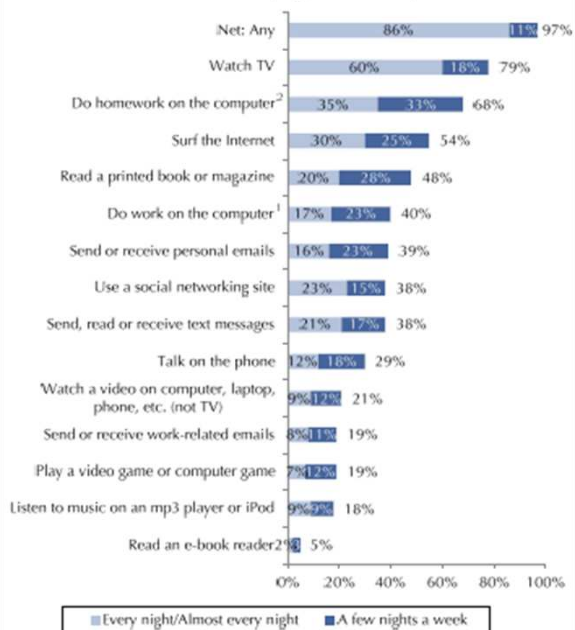


How are you telling your brain it's time to go to sleep?

What do you do an hour before bed?

2011 NSF  
Sleep in America Poll

Activities Performed in the Hour Before Trying to Go to Sleep



**What are the zietgebers in your bedroom telling you about sleep?**



Ideally, a bedroom should be cool, dark, simple, and with a minimum of electronic devices.





## SLEEP SQUAD SLEEP SAVERS



1. Create a sleeping environment is cool, dark, simple and comfortable with minimal electronic devices.
2. Be intentional about your sleep and consistent with your sleep schedule; keep a sleep journal, fitbit, or sleep cycle app.
3. Avoid caffeine 6 – 8 hours and alcohol 3 hours before bed.
4. Make sure your brain knows when it's day (lights & physical activity) and when it's night (darkness & calm).
5. **Unplug** an hour before sleep.

