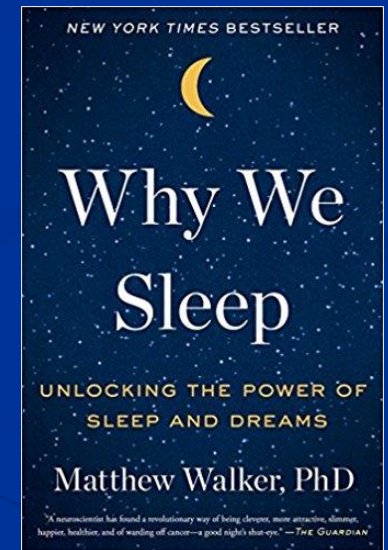


# Sleep: Is important to your health!

<https://abcnews.go.com/GMA/video/sleep-deprivation-effects-body-34909695>

Matthew Walker Sleep Researcher



- Week 1 : Stages of sleep 1, 2 3 &4 then 90 min REM
- Week 2: **Do dreams have meaning REM sleep?**
- Week 3: Did you dream? Keep dream diary to share
- Week 4: **Understanding your sleep habits & sleep disorders**
- Week 5: Identifying sleep thieves  
a few tips for dealing with sleep thieves like caffeine and alcohol, computer screen, lights
- Week 6: **“Managing stress”**  
create a sleep friendly bedroom that helps them to de-stress.
- Week 7: **“What if I still can’t sleep?” Are sleeping pills safe?**

•Week 8 : What did you learn about sleep?

•Week 9: **Matthew Walker revisits**

•Week 10: Jeopardy

•**Fill out questionnaires online!**



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•**Thank you for participating!**

# Alter State of Consciousness

- What are Circadian Rhythms?
- Sleep
  - Why do we need to sleep?
  - Are you a night owl or early bird?
  - Sleep disorders
    - Genetics & Stress

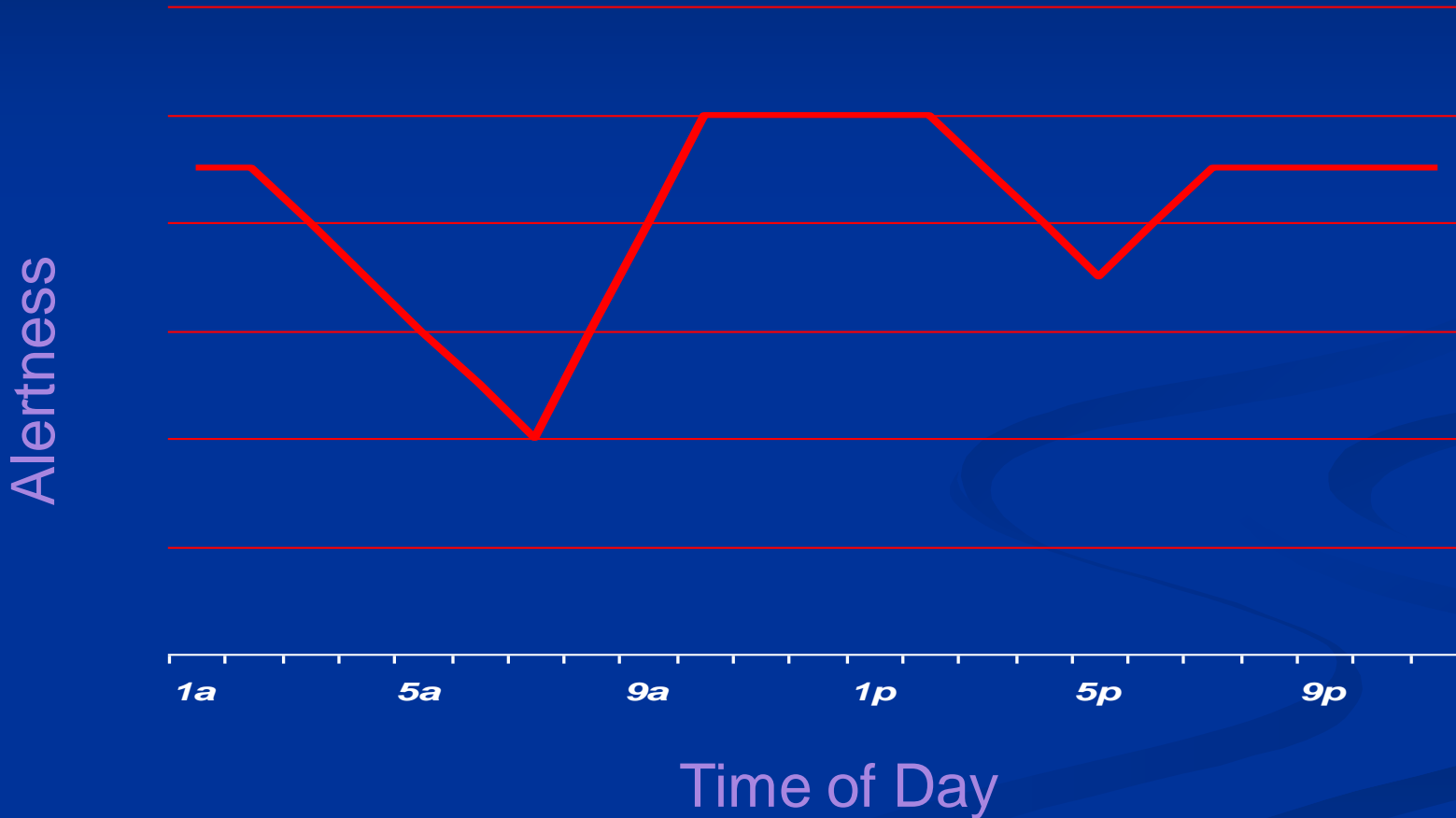


# Circadian Rhythms

- ▣ Changes in energy level, mood, & efficiency through the day
- ▣ Controlled by the hypothalamus
- ▣ In the absence of outside cues, people fall into a 25 hour rhythm
- ▣ Outside cues draw us into a 24 hr. rhythm
- ▣ Jet Lag: Results from changing time zones too quickly for the circadian rhythms to change



# Alertness Rhythm



Draw a chart indicating when you are most alert in am to pm & complete questionnaire! Are you a night or morning owl?

# Night owl or Early bird

- What time would you get up if you were entirely free to plan your own day?
  - A. 5 to 6:30 a.m. (5 points)
  - B. 6:30 to 7:45 a.m. (4 points)
  - C. 7:45 to 9:45 a.m. (3 points)
  - D. 9:45 to 11 a.m. (2 points)
  - E. 11 a.m. to noon (1 point)

# How dependent are you on being woken up by an alarm clock?

- A. Not at all (4 points)
- B. Slightly dependent (3 points)
- C. Fairly dependent (2 points)
- D. Very dependent (1 point)

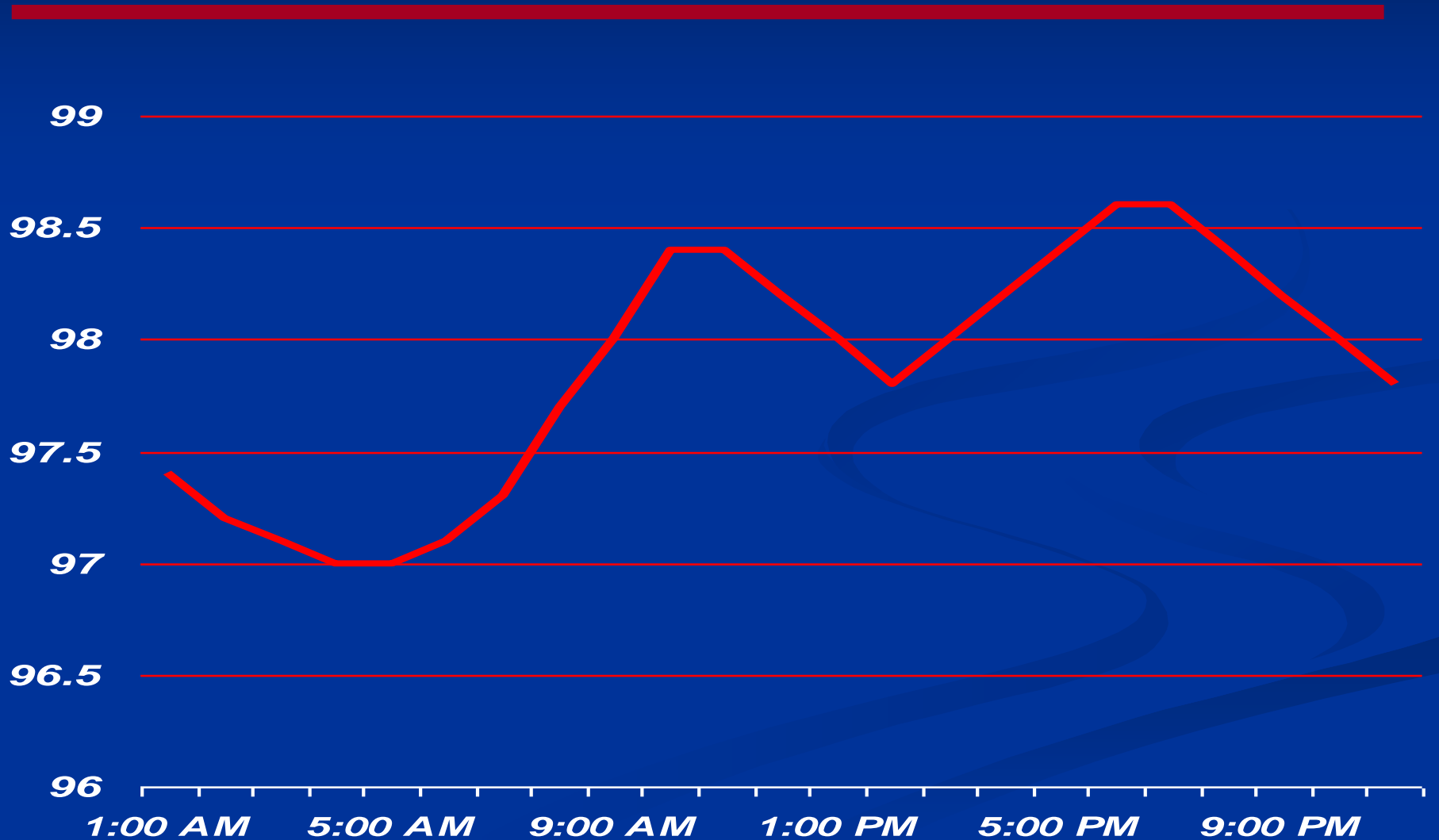
## How easy do you find getting up in the mornings?

- A. Not at all (1 point)
- B. Not very easy (2 points)
- C. Fairly easy (3 points)
- D. Very easy (4 points)

# first half-hour after having woken in the morning?

- A. Very poor (1 point)
  - B. Fairly poor (2 points)
  - C. Fairly good (3 points)
  - D. Very good (4 points)
- **How is your appetite during the first half-hour after having woken in the morning?**
- A. Very poor (1 point)
  - B. Fairly poor (2 points)
  - C. Fairly good (3 points)
  - D. Very good (4 points)

# Temperature Rhythm





having woken in the morning,  
how tired do you feel?

- A. Very tired (1 point)
- B. Fairly tired (2 points)
- C. Fairly refreshed (3 points)
- D. Very refreshed (4 points)

■ How is your appetite during the first half-hour after having woken in the morning?

- A. Very poor (1 point)
- B. Fairly poor (2 points)
- C. Fairly good (3 points)
- D. Very good (4 points)



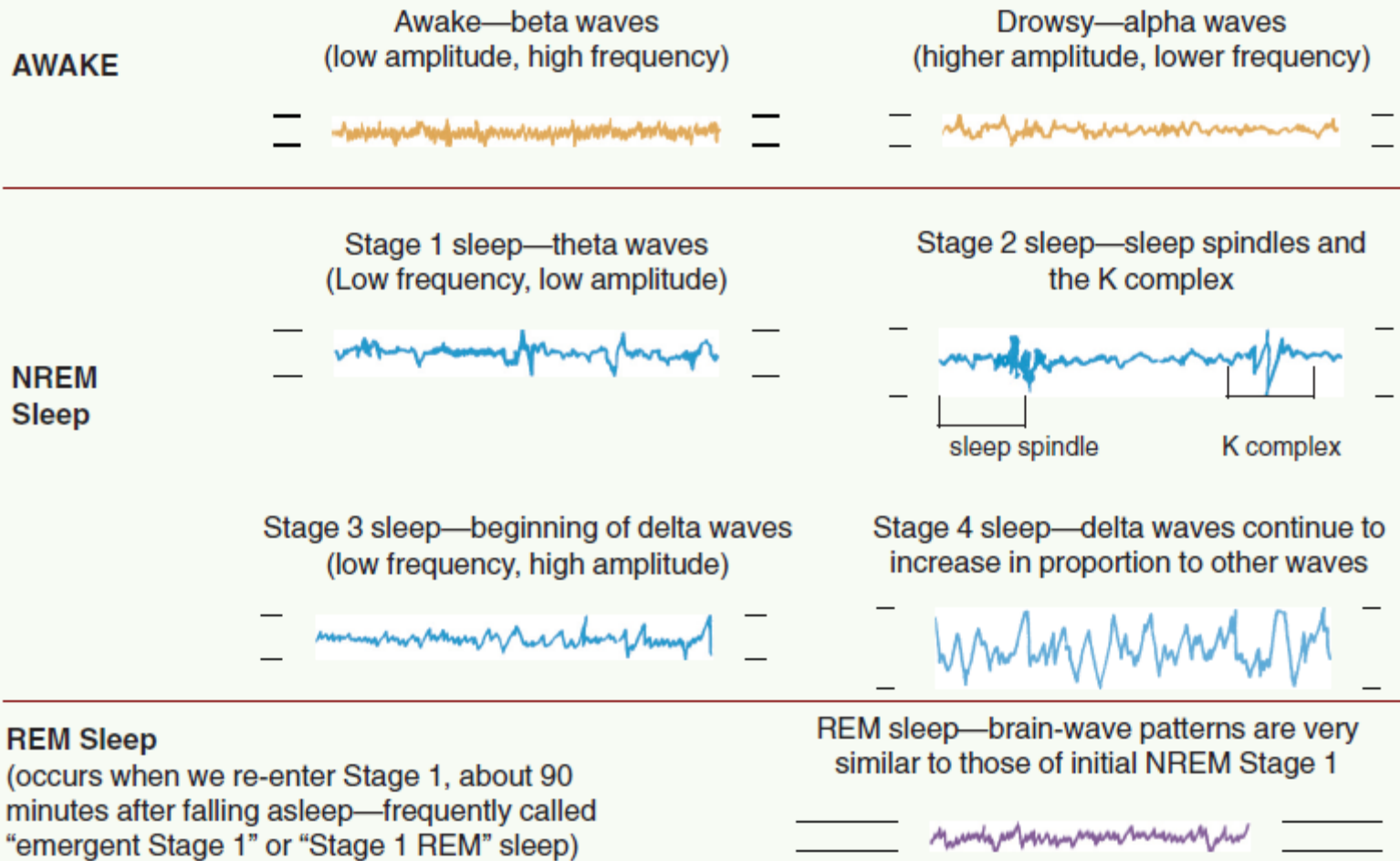
# Your scores!

- Score 6-10 Night owl
- Score 11-16 Mid-day
- Score 17-28 Morning owl

# Characteristics of Waking and Sleep Cycles

- **Stage 1 sleep** – Light sleep that occurs just after dozing off, characterized by brain waves called theta waves
- **Stage 2 sleep** – Typically follows stage 1 sleep, characterized by brief bursts of brain activity called sleep spindles as well as K-complex responses to stimuli such as noises
- **Stage 3 sleep** – Typically follows stage 2 sleep, characterized by an EEG tracing 20 to 50% of which consists of delta waves—virtually no eye movements during stage 3 sleep
- **Stage 4 sleep** – Deepest level of sleep, characterized by an EEG tracing exceeding 50% delta waves and virtually no eye movements

## ■ Different stages of Sleep and Characteristic Brain Patterns



# Sleep

---

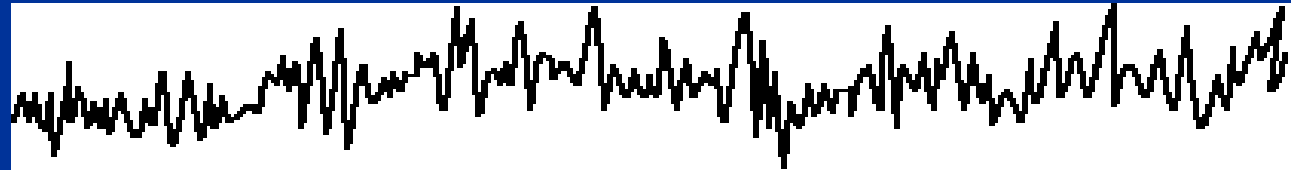
- 4 successive stages of non-REM sleep plus REM sleep
- Each has a distinctive EEG

# Stage 1

---

- Very light sleep
- Alpha waves are replaced with random activity
- Hypnagogic images may appear

Alert:



Relaxed:



Stage 1:

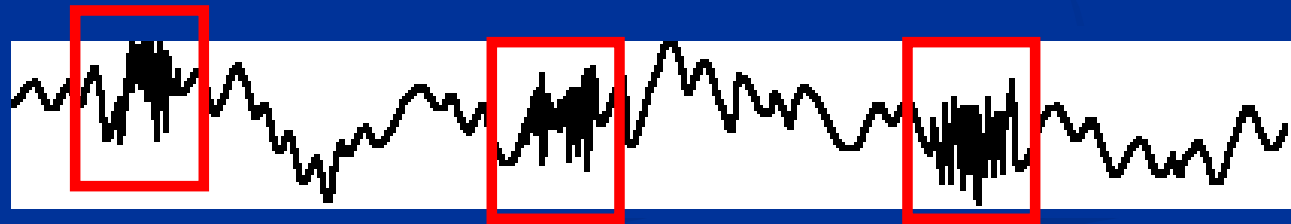


# Stage 2

---

- Sleep is deeper.

Stage 2:



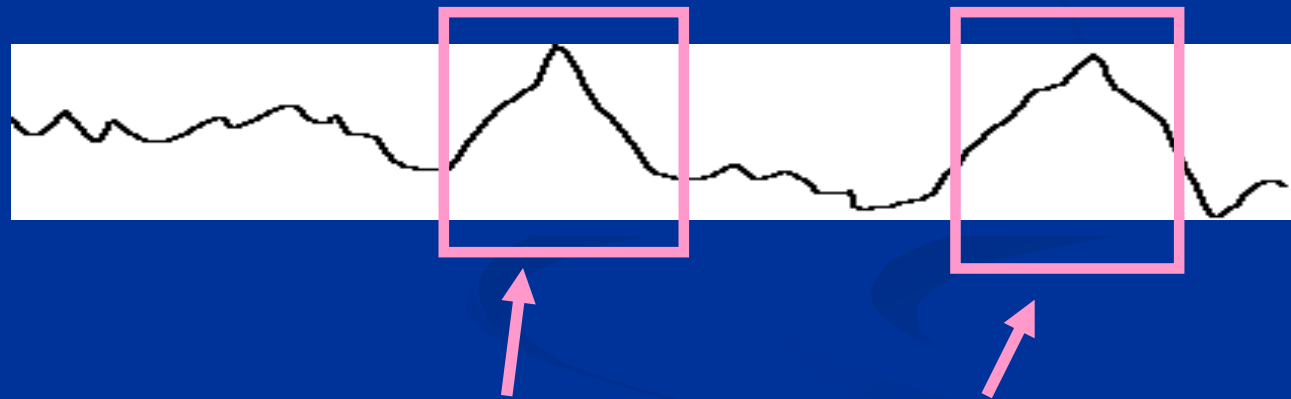
- Spindles appear in EEG

# Stage 3

---

- Sleep is deeper yet.

Stage 3:



- Spindles disappear, delta waves appear

# Stage 4

---

- Very deep sleep

Stage 4:



- Continuous delta waves
- Children produce growth hormone primarily in stages 3 & 4



# REM Sleep

---

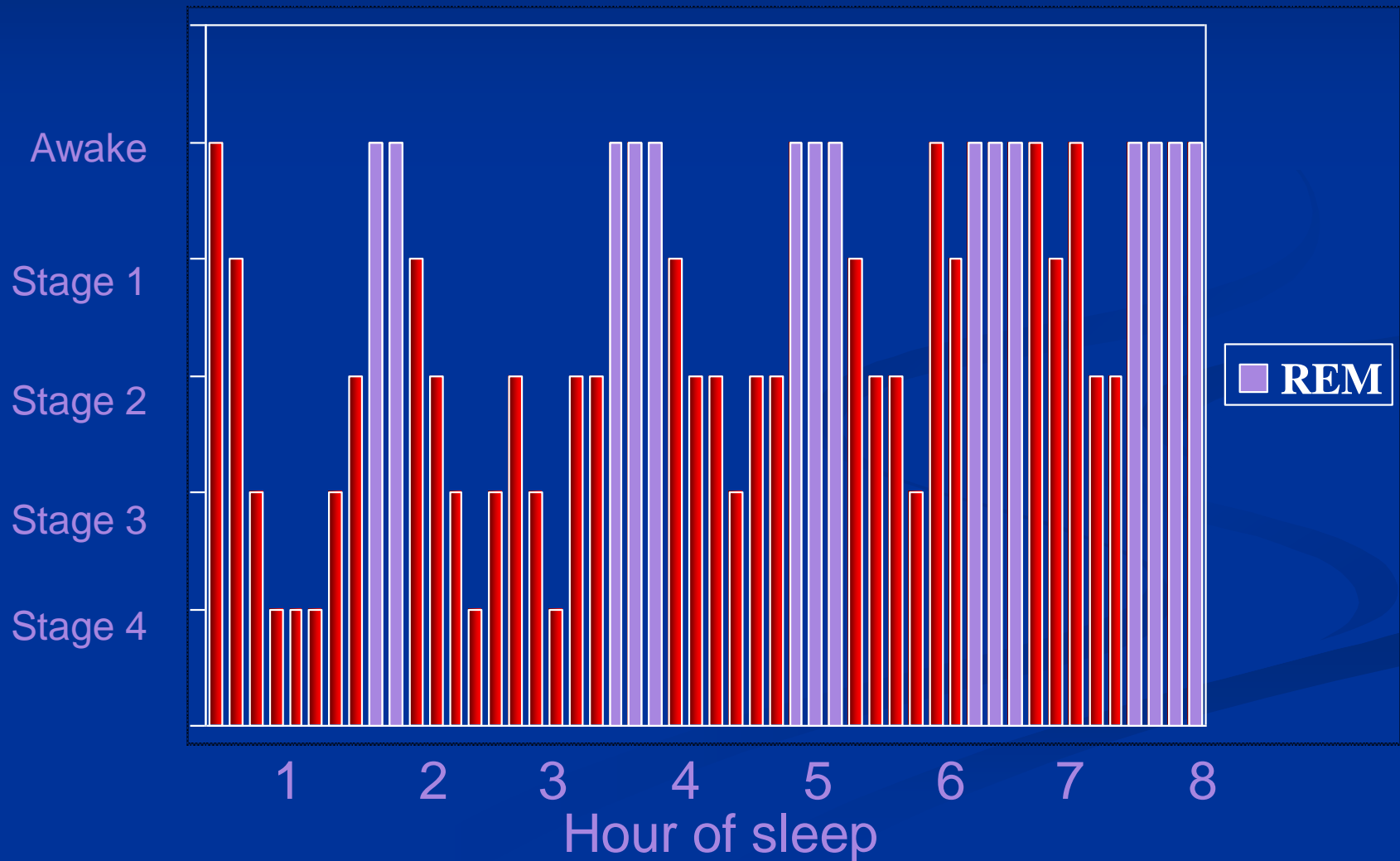
- Rapid eye movements take place here
- EEG resembles waking pattern
- Signals from the motor cortex to the body are blocked
- Dreaming occurs

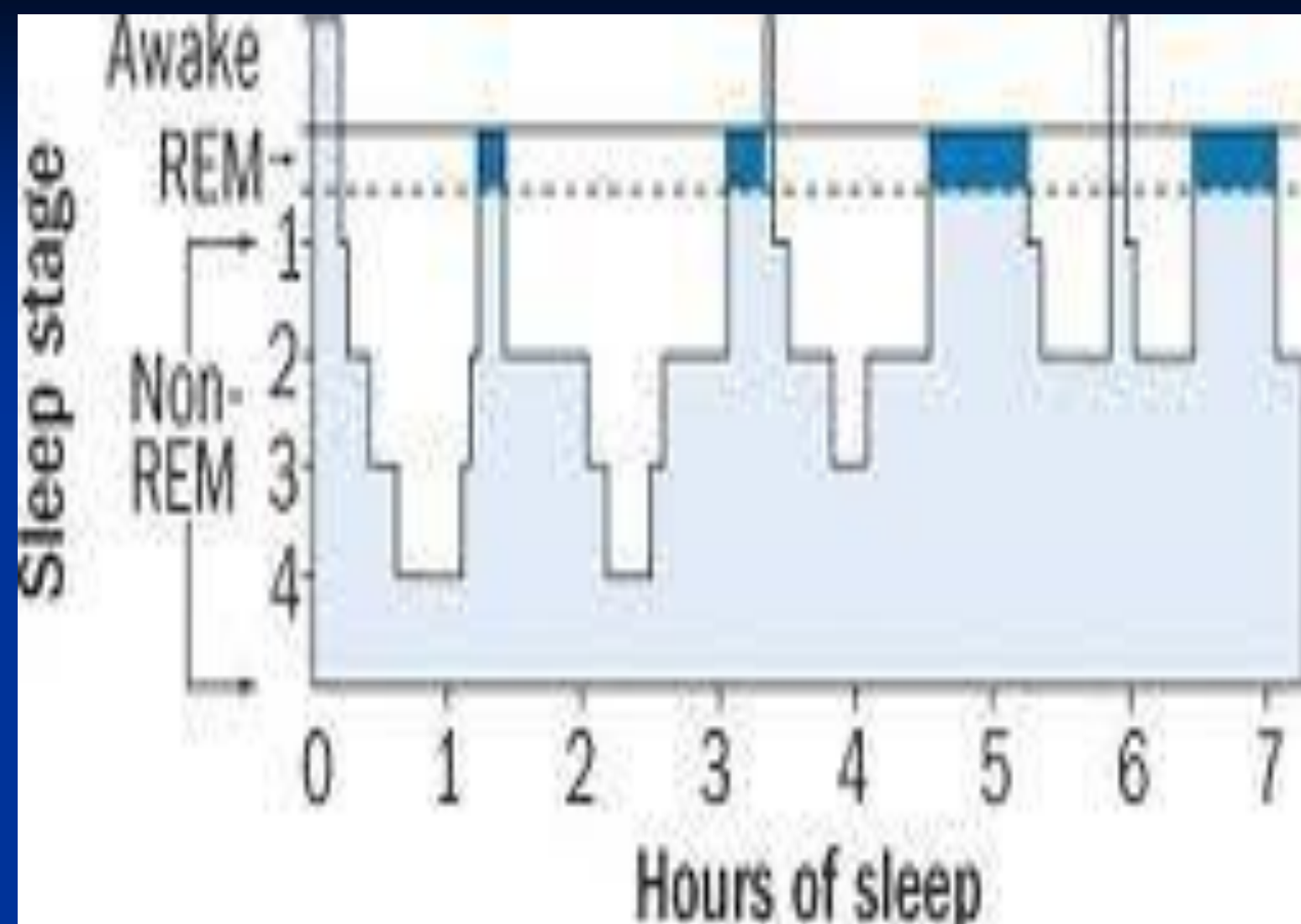
# Sleep Cycles

---

- For the first two cycles, people progress down to stage 4, remain there awhile, then return to stage 2 & enter REM
- In later cycles:
  - Stage 4 seldom occurs
  - Amount of REM steadily increases
  - Most get 1 1/2 hours of REM & Stage 4 per night

# Sleep Cycles





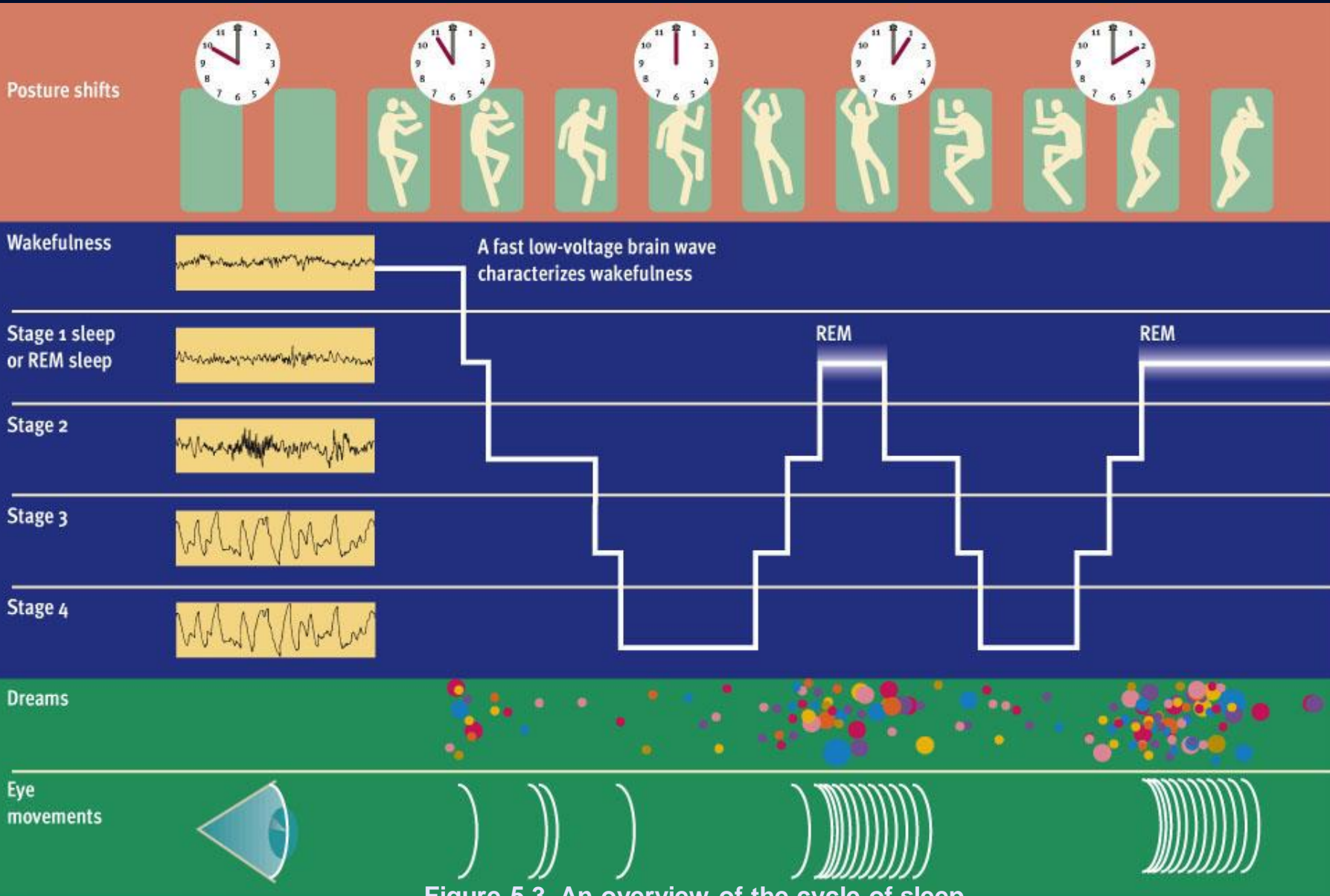


Figure 5.3 An overview of the cycle of sleep

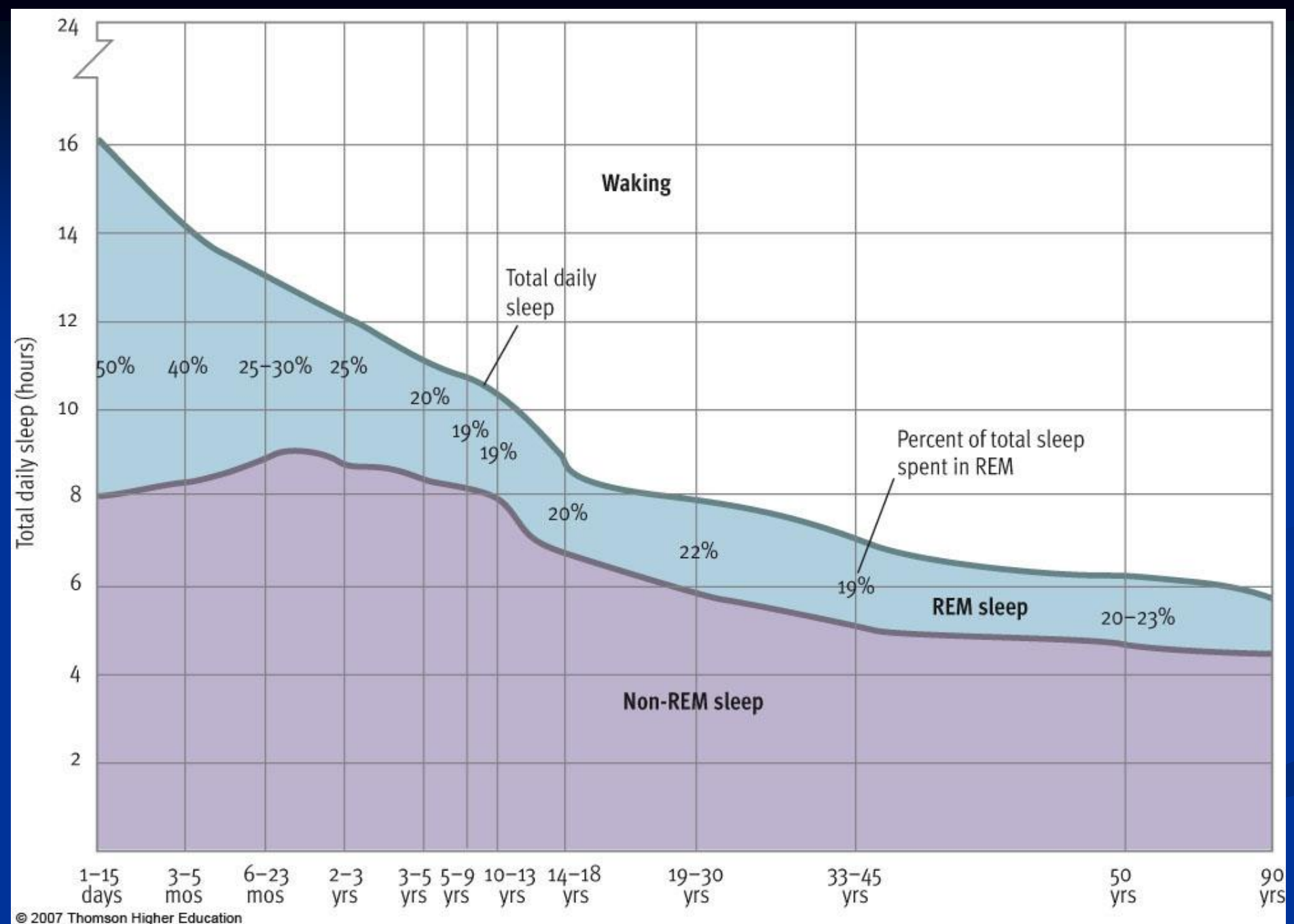
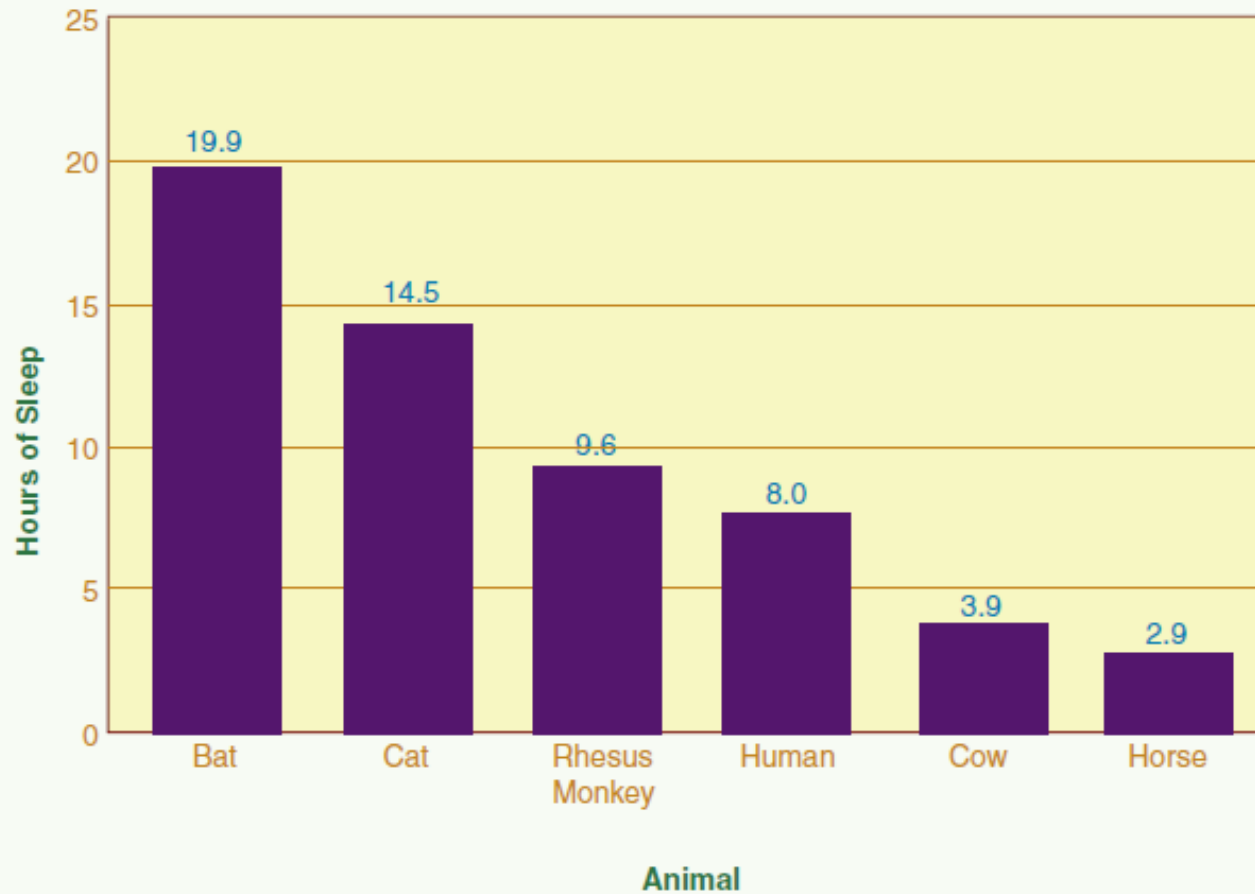
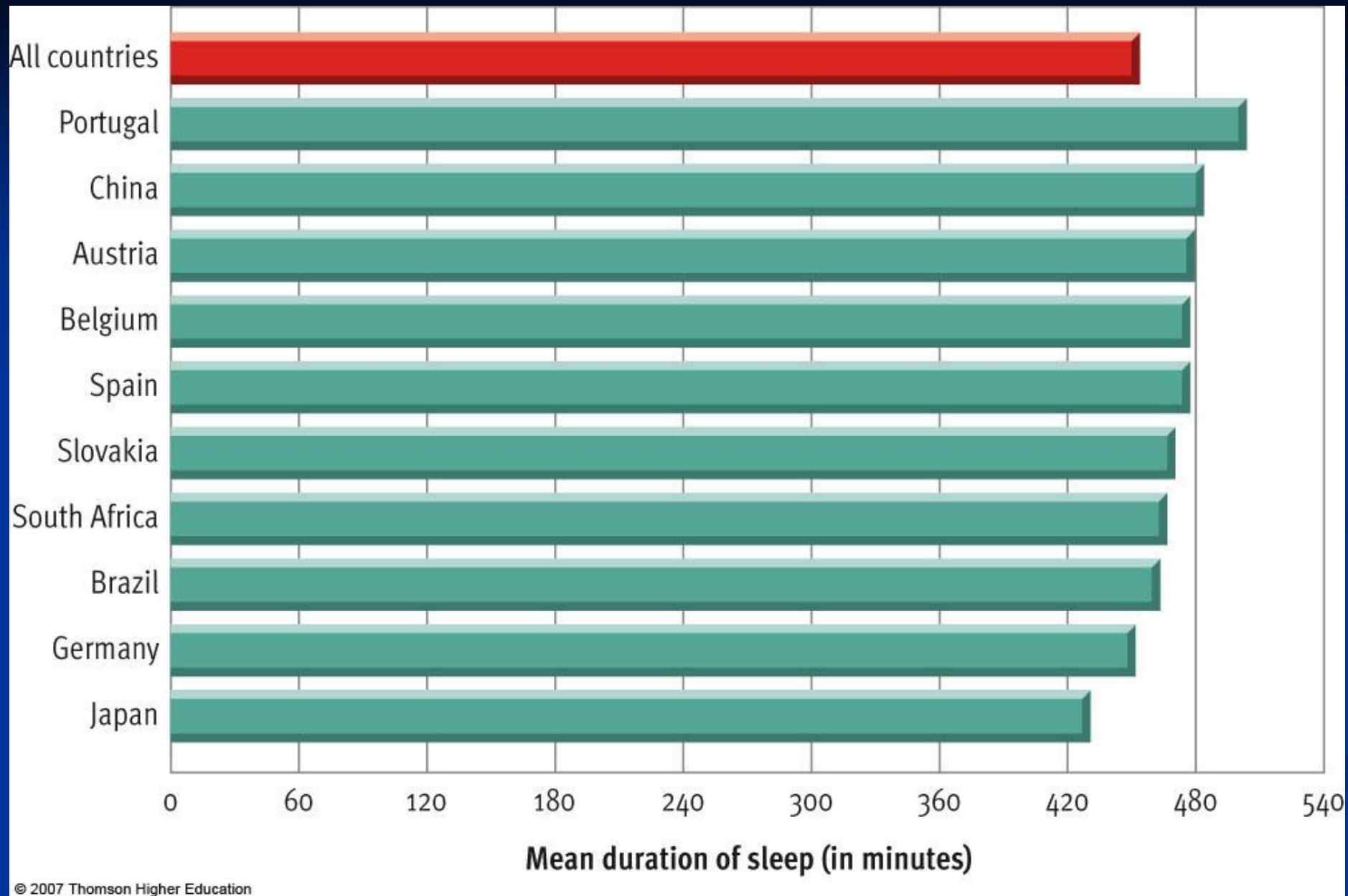


Figure 5.4 Changes in sleep patterns over the life span

## ■ Comparison of Sleep Duration for Different Animals





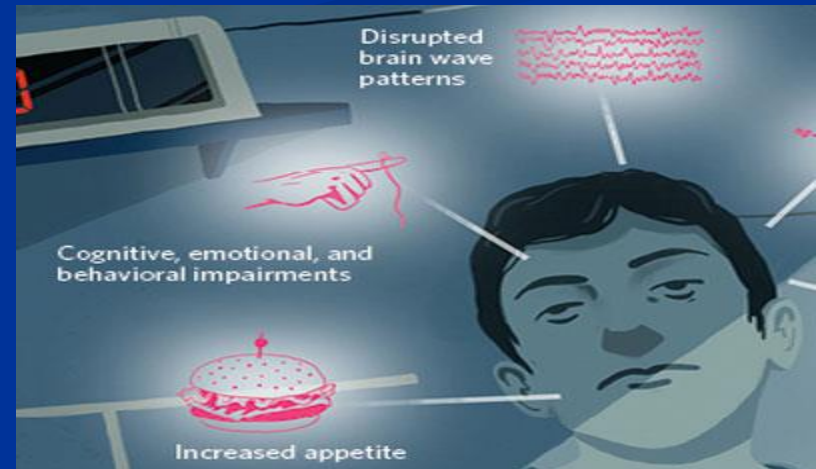
© 2007 Thomson Higher Education

Figure 5.5 Cultural variations in how long people tend to sleep

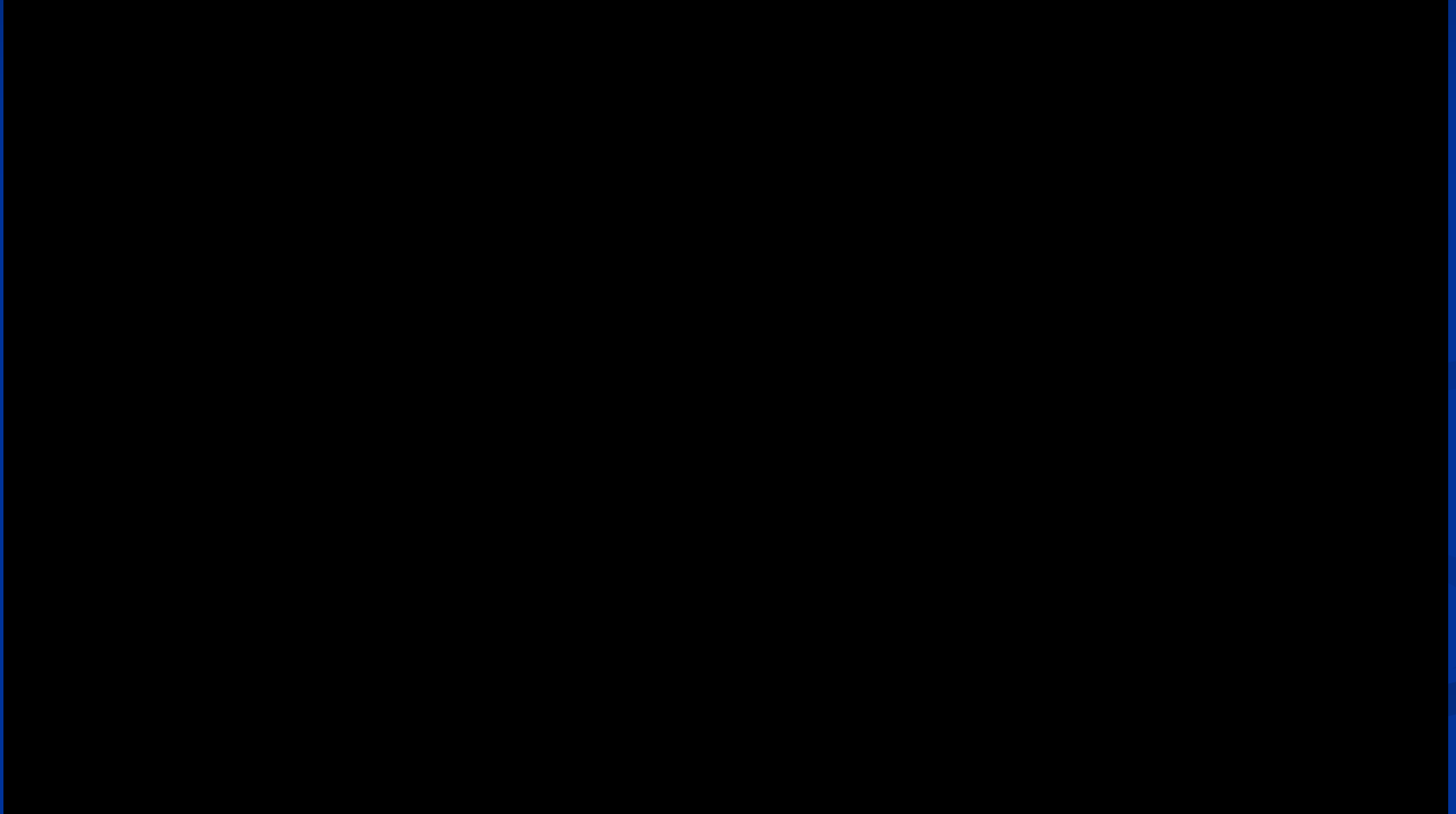


# Sleep & your Health

- “In the studies we’ve done, almost every variable we measured was affected. There’s not a system in the body that’s not affected by sleep,” says University of Chicago sleep researcher [Eve Van Cauter](#).



# Mathew Walker PhD





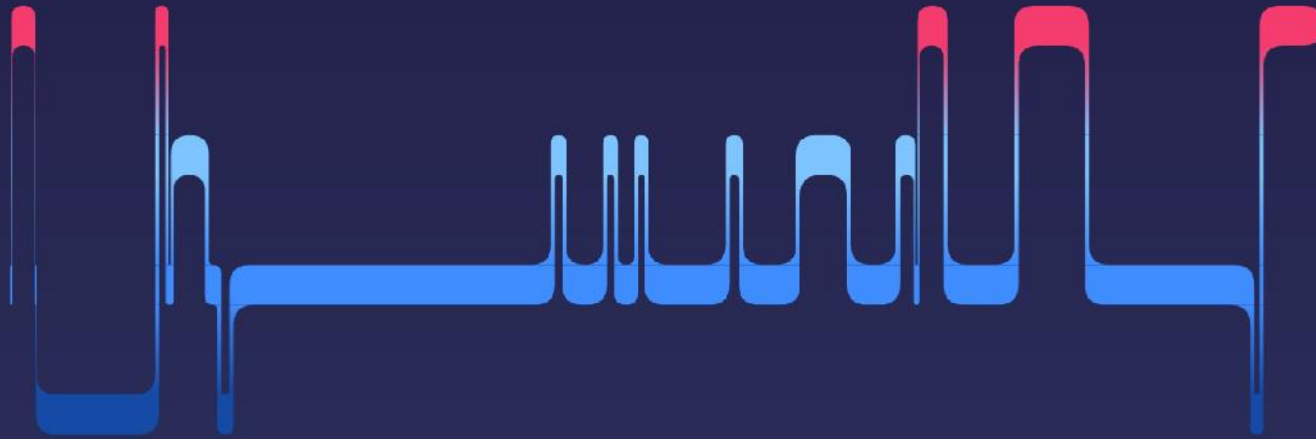
Relationship Problems? Try Getting More Sleep

# Sleep

Dec 6, 9:16 pm - 7:47 am



★ 8hr 40min



9:16 pm

7:47 am

1h 51m  
Awake

1h 11m  
REM

6h 19m  
Light

1h 10m  
Deep

# Sleep Deprivation

- Poor memories
- Gain weight
- Increase stress hormone cortisol
- Depression
- Deprived 11 days may cause death ☹️

# REM Sleep

---

## ■ Functions of REM:

- Memory Consolidation
- Clearing of unnecessary memories

■ **Story-like dreams** occur in REM sleep; dreams appear to unfold in real time

■ Everyone dreams, even if they don't recall doing so; we tend to remember only the dreams that occur just before waking

# What Happens if we are deprived of REM?

- Poor memory & performance
- Increases stress hormone Cortisol
- REM Rebound- have more dreams

Microsleeps

- Drugs that block REM

Alcohol, Valium & sleeping pills

# REM & Dreaming

- 80% recall dreams following REM
- 7% recall during other stages
- Dream in real time
- External stimuli influences dreams



# Dream Content

- Usually of common events
- Reoccurring Dream- Unresolved problem
- Lucid Dreams- Vivid dreams

# Dream Meaning

---

- Freud: Dreams reflect the unconscious

*Manifest content:* Events in the dream

*Latent Content:* Unconscious Wishes

# More Recent Theories of Dreams

## ■ Information Processing

Crick: *Erase unimportant information to free space*

## • Activation Synthesis Hypothesis

Hobson's Theory- *Random Neural*

*Firing- Pons-Geniculilate-Occipital lobe*

# REM Facilitates Memory

- **Consolidate learned Information**

NO REM poor memory

- **Theta Rhythms**

During REM Stimulate the **Hippocampus**

**Dreams as wish fulfillment  
(Freud)**



The day residue shapes dreams that satisfy unconscious needs.

**The problem-solving view  
(Cartwright)**



We think through major problems in our lives.

**Activation-synthesis model  
(Hobson & McCarley)**



A story is created to make sense of internal signals.



**Figure 5.8 Three theories of dreaming**

# Sleep Problems





# Sleep Disturbances

---

## Sleep Walking

- Occurs in Stage 4 sleep
- Person is not conscious
- It is not dangerous to awake a sleepwalker
- Strong genetic component



- <http://www.funnyordie.com/videos/3e024b10db/bizket-the-sleepwalking-dog>

# Sleep Disturbances

---

## Nightmares

- Vivid, disturbing dreams that occur in REM sleep
- More frequent when people are under emotional stress



# Sleep Disturbances

---

## Sleep Talking

- Common, esp. among children
- The talker often makes no sense, but sometimes speaks or even shouts intelligible phrases



# Sleep Disturbances

---

## Narcolepsy

- Involves brain abnormality
- Person may suddenly fall into REM sleep without warning
- Cataplexy- Loss of muscle tone
- Treatment- Amphetamines

# Cause of Narcolepsy (cont)

## Dogs!

[http://www.metacafe.com/watch/yt-I.bmbQkX7czo/skeeter\\_the\\_narcoleptic\\_poodle/](http://www.metacafe.com/watch/yt-I.bmbQkX7czo/skeeter_the_narcoleptic_poodle/)

Siegel and colleagues found considerable damage to the basal forebrain and the **amygdala**

- Basal forebrain: group of structures in the brain that is associated with learning, and when stimulated gives rise to sleep.

[http://www.youtube.com/watch?v=wN1\\_yS6\\_5T4](http://www.youtube.com/watch?v=wN1_yS6_5T4)

Dog-sheep below

[http://www.youtube.com/watch?v=we9\\_CdNPuJg&list=RD02wN1\\_yS6\\_5T4](http://www.youtube.com/watch?v=we9_CdNPuJg&list=RD02wN1_yS6_5T4)

# Sleep Disturbances

---

## Sleep Apnea sleep apnea video

- A dangerous condition where the person stops breathing while asleep
- Treated with devices that keep airways open

[http://www.youtube.com/watch?v=mtPwbi\\_SeWA](http://www.youtube.com/watch?v=mtPwbi_SeWA)

# Treatment for Sleep apnea



Change Diet  
Or Surgery!

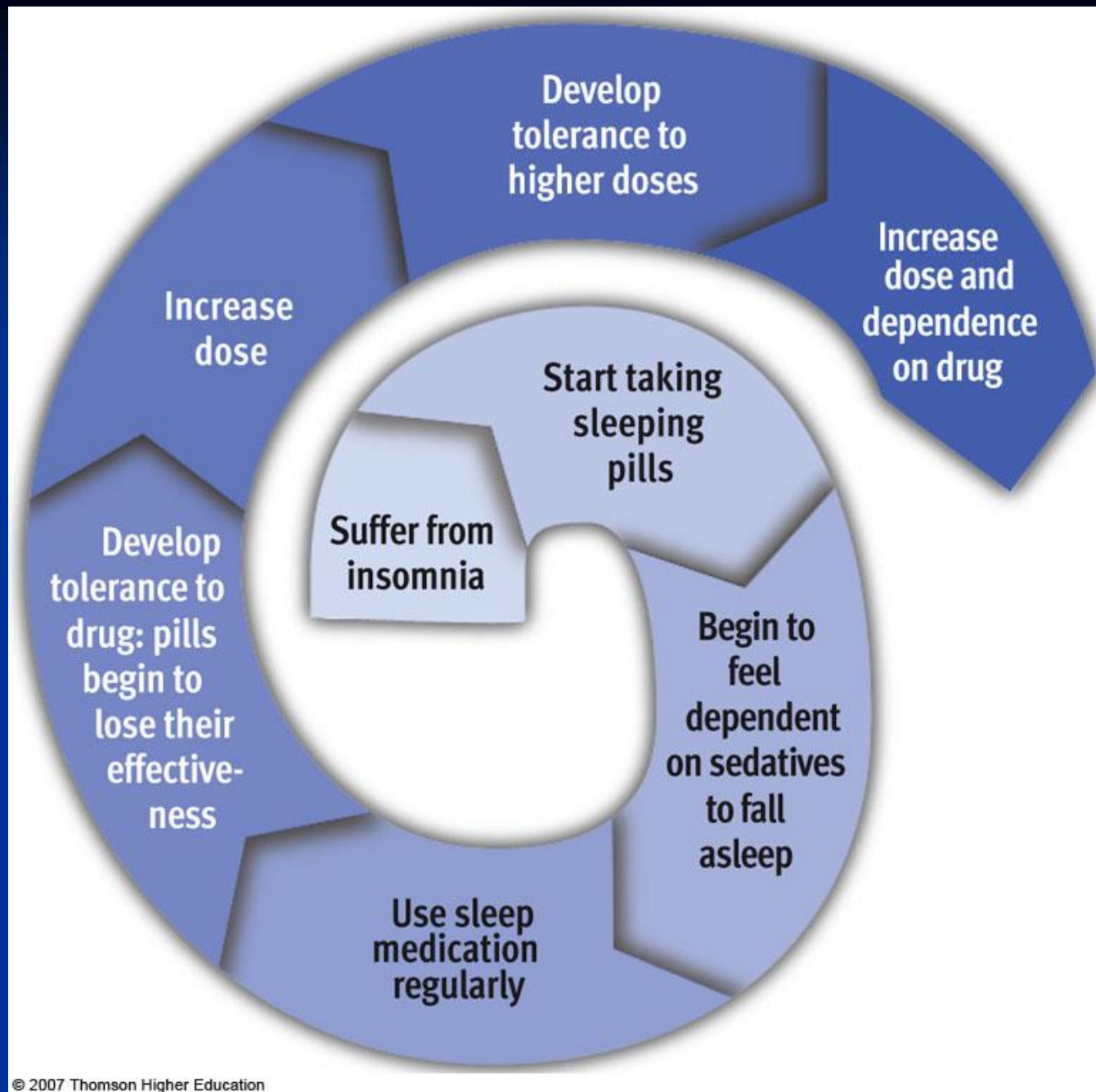
# Sleep Disturbances- most common

---



## Insomnia

- Impairment in functioning due to inability to sleep
- One major cause is worry about having insomnia
- Treatment Ambien or over the counter pills



© 2007 Thomson Higher Education

Figure 5.6 The vicious cycle of dependence on sleeping pills



# Kleine-Levin Syndrome

- **Sleep for Days**
- When a wake, patient appears to be in a trancelike state
- **More common in Young Females**





# 'Sleeping Beauty' syndrome

- Teen with sleeps for days
- Kaitlyn Terrana diagnosed with mysterious **Kleine-Levin syndrome**
- Posted: Oct 8, 2012 5:19 PM ET
- [http://www.youtube.com/watch?v=i3RJos0Ax\\_o](http://www.youtube.com/watch?v=i3RJos0Ax_o)



# Fatal Familial Insomnia

- Genetic component but rare found in 50 200,000 families dominant allele
- Onset occurs in their 40's or 50's
- Their children have a 50% of developing it
  
- Video fatal Familial insomnia (genetic)
  - <http://www.youtube.com/watch?v=IJzZcFoT-1A>
  - <https://www.youtube.com/watch?v=IJzZcFoT-1A>

# Sleep and Sleep Disorder Statistics

50 to 70 million US adults have a sleep disorder.

48.0% report snoring.

37.9% reported unintentionally falling asleep during the day at least once in the preceding month.

4.7% reported nodding off or falling asleep while driving at least once in the preceding month.

Drowsy driving is responsible for 1,500 fatalities and 40,000 nonfatal injuries annually in the United States.

Insomnia is the most common specific sleep disorder, with short term issues reported by about 30% of adults and chronic insomnia by 10%

25 Million U.S. adults have obstructive sleep apnea

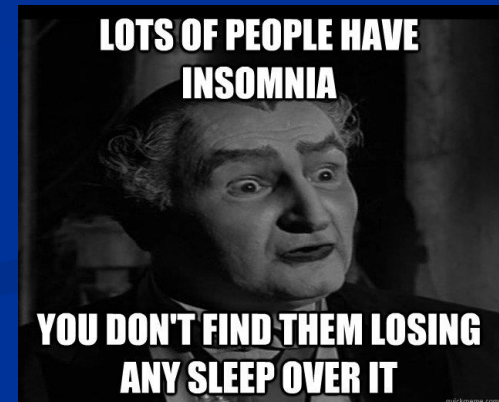
9 to 21% of women have obstructive sleep apnea

24 to 31% of men have obstructive sleep apnea



**Insomnia** is the most common specific sleep disorder,

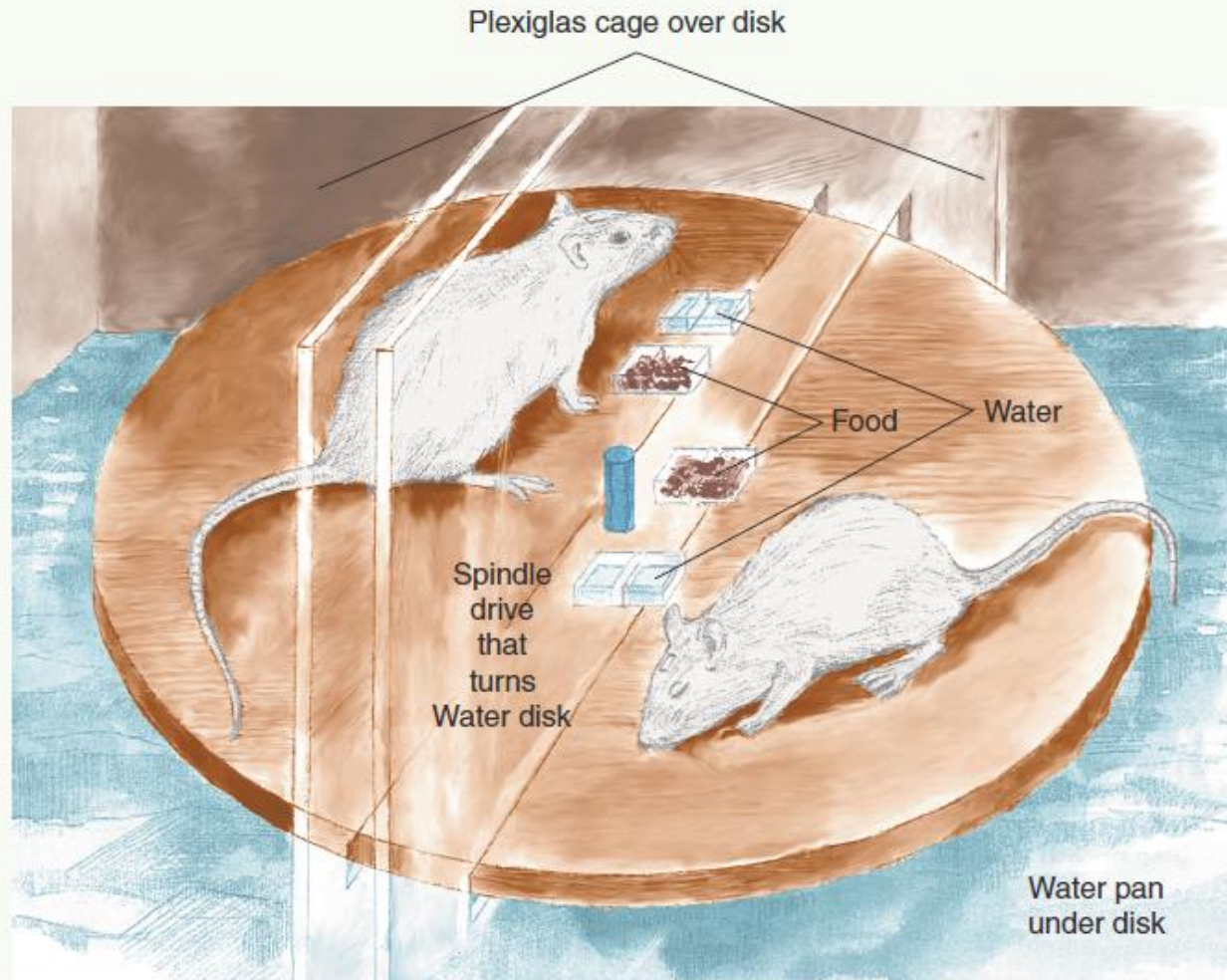
- Short term issues reported by about 30% of adults and
- Chronic insomnia by 10%





## ■ Experimental Apparatus for Producing Sleep Deprivation in Animals

Rats are placed on the platform located above a tub of water. As the platform rotates, the animals must keep moving to avoid being pushed into the water by the plastic divider. Brain waves of the animals are constantly recorded by an EEG to determine their sleep/wake state. Whenever a sleep-deprived rat falls asleep, the rotation of the platform forces them into the water.



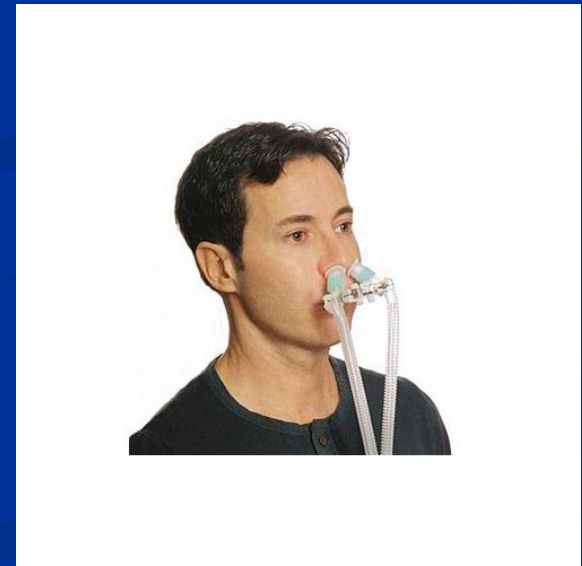
# Sleep Apnea

- 25 Million U.S. adults have **obstructive sleep apnea**
- 9-21% of **women** have **obstructive sleep apnea**
- 24-31% of **men** have **obstructive sleep apnea**



# Treatment

- Continuous Positive Airway Pressure (CPAP) is the leading therapy for sleep apnea
- <https://www.youtube.com/watch?v=GzrJCqHCx8U> (3min good)



<https://www.youtube.com/watch?v=QL-lBcQuYAg>

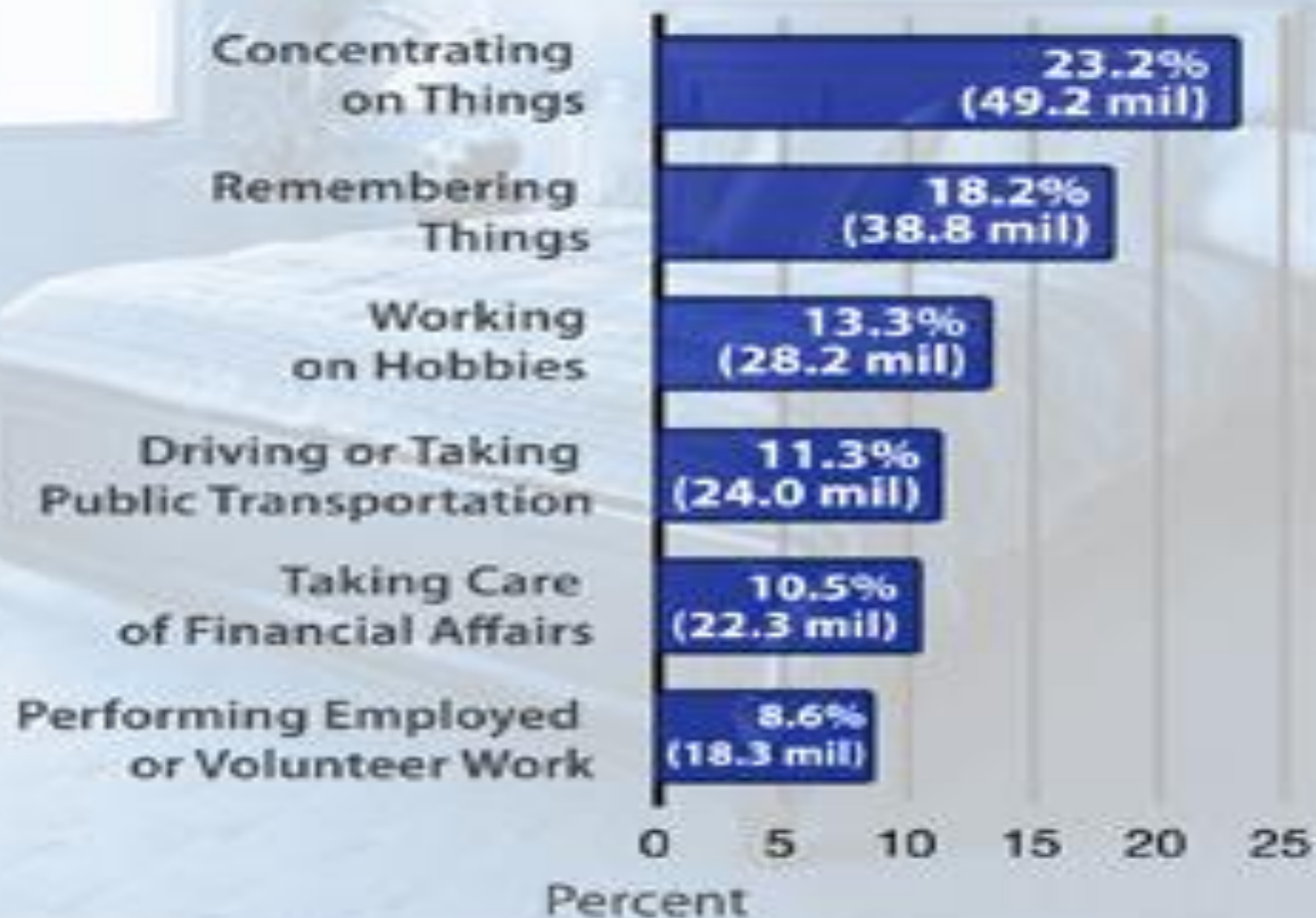
Examples

# Sleep Deprivation Statistics:

- 37% of 20-39 year-olds report short sleep duration
- 40% of 40-59 year-olds report short sleep duration
- 35.3% adults report <7 hours of sleep during a typical 24-hour period.
- 100,000 deaths occur each year in US hospitals due to medical errors and sleep deprivation



## Self-reported Sleep-related Difficulties Among Adults $\geq 20$ Years, 2005-2006 & 2007-2008



# Circadian Rhythm Sleep-Wake Disorders

- A patient with one of these disorders does not follow the normal sleep times at night.
- follow the normal sleep times at night.
- Delayed Sleep-Wake stays up later & wakes up later
- Advanced Sleep-Wake wake up hours earlier than most people 3 or 4 am
- Shift work
- Jet lag

# Amount of sleep you need!

- **Adult:** 7 – 9 hours
- **Teenager:** 8 – 10 hours
- **Child 6 – 12 years:** 9- 12 hours
- **Child 3 – 5 years:** 10 – 13 hours (including naps)
- **Child 1 – 2 years:** 11 – 14 hours (including naps)
- **Infants 4 -12 months:** 12 – 16 hours (including naps)

# Healthy Sleep Habits

- Go to bed at the same time every night!
- Do not drink caffeine after 3 pm!
- Do not drink excessive alcohol (reduces REM)
- Do not take sleeping pills if possible!
- If you cannot fall asleep within 1.5 hours leave your bedroom & read until you can fall asleep
- Try NOT to exercise too late it may increase your heart rate!!!!

# Do not stress before you sleep!

- Don't think about work in bed!
- Don't worry about issues you cannot control!
- Recycled thoughts need to be stopped! Yes, distract yourself by thinking of something positive!



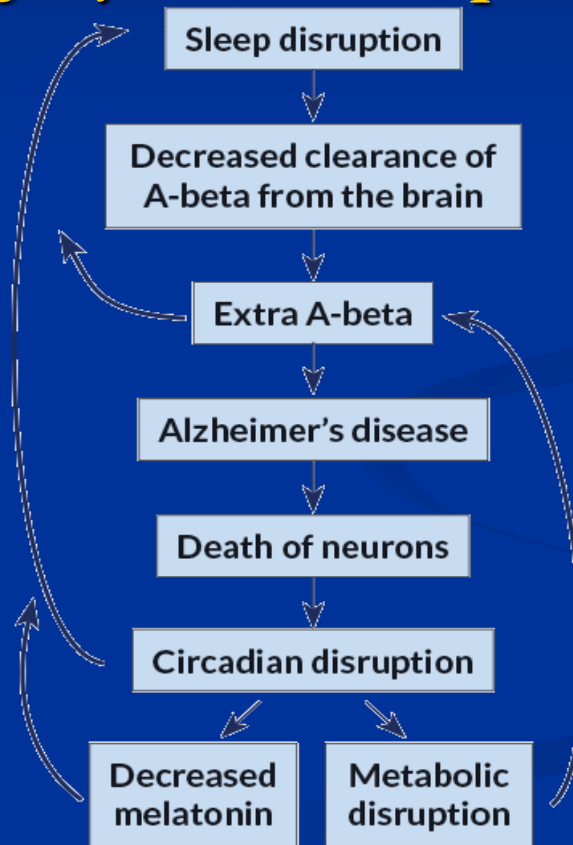
# Matthew Walker

## ■ Why we sleep?

- <https://www.youtube.com/watch?v=d583swchPA>  
14 min Ted talks
- <https://www.youtube.com/watch?v=KpyoDML2eUI>
- (5min) news good

# The brain may clean out Alzheimer's plaques during sleep

- [Vol. 194, No. 2, July 21, 2018, p. 22](#)

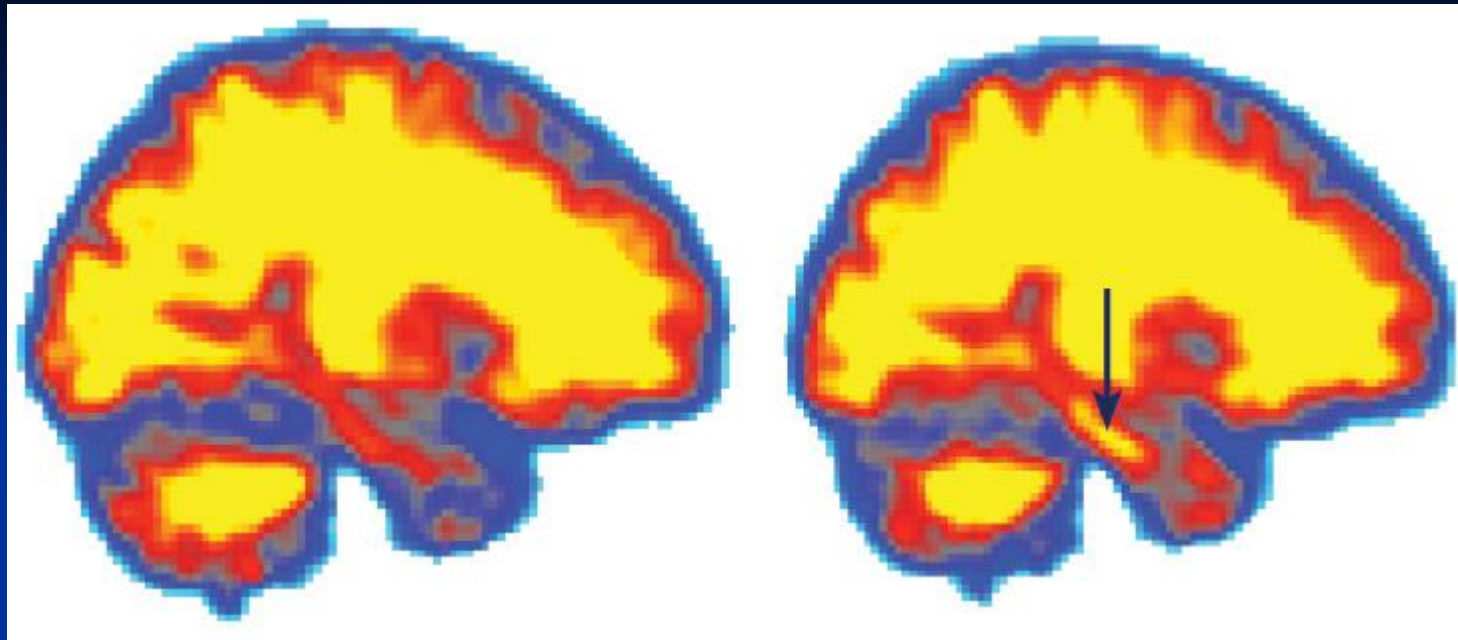




# New Evidence Mice & Humans

- To Holtzman's surprise, time of day mattered — a lot. A-beta levels were highest when the animals were awake but fell when the mice were sleeping (*SN: 10/24/09, p. 11*).





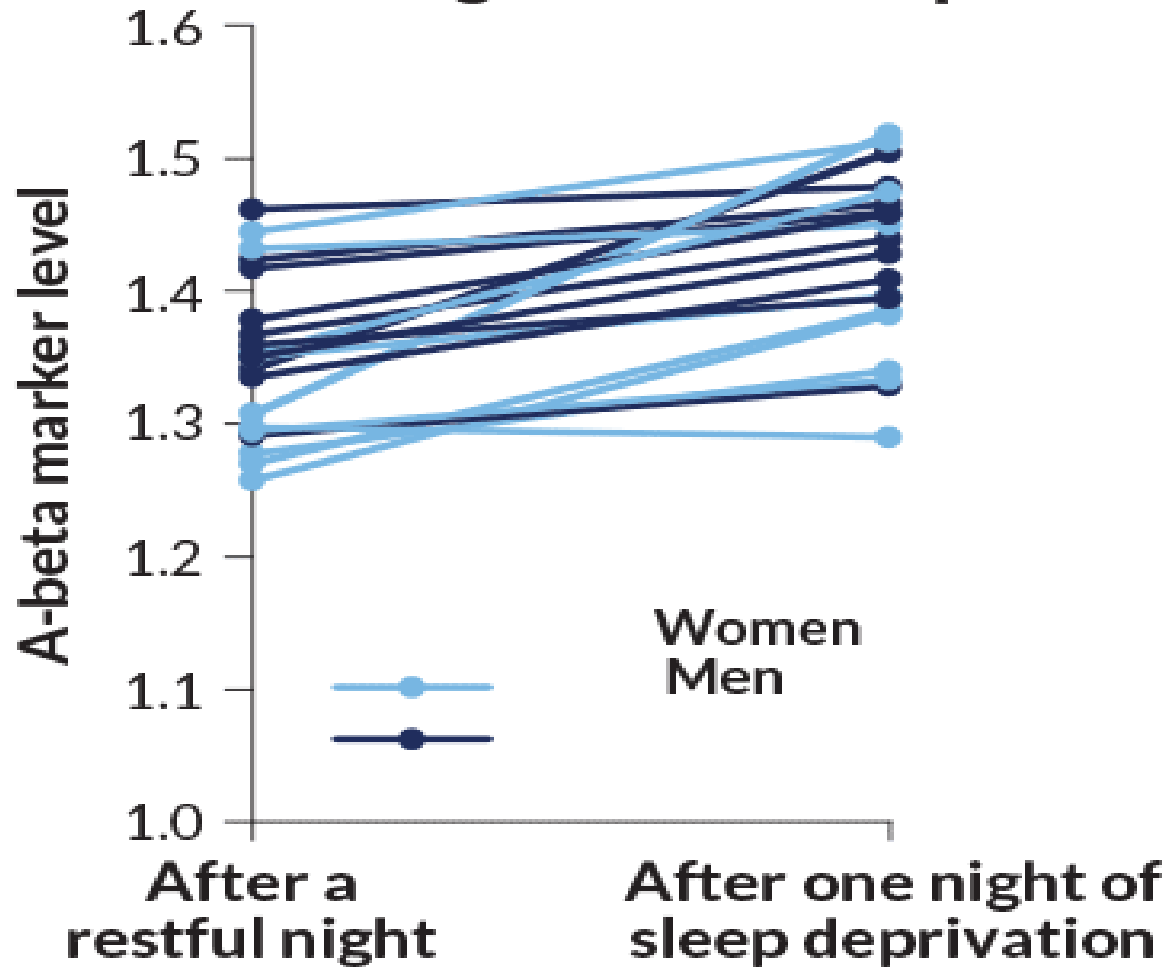
**HARD DAY'S NIGHT** Scientists measured accumulation of amyloid-beta

in people who were rested (left)

and then again after 31 hours without sleep (right).

In this PET scan of one volunteer's brain, levels of A-beta, which is linked to Alzheimer's, rose in the hippocampus (yellow at arrow) after sleep deprivation.

## A-beta in the brain after one night of bad sleep



# Foods that help you sleep!

## ■ **Walnuts**

The walnut is one of the best foods you can eat right before bed. That's because eating walnuts causes the human brain to secrete melatonin, the chemical responsible for regulating the body's internal clock.

## ■ **Cherries**- Help with sleep

## ■ **You workout while you sleep**

- Another reason to get a full 8 hours

# Dr. Axe's Food Recommendations

## ■ Food Is Medicine!

### ■ Foods high in the amino acid tryptophan

- Milk, Turkey

- A study published in *Sports Medicine* out of France was conducted to improve the sleep of elite soccer players *The study found that by consuming carbohydrates — such as honey and whole grain bread — and some forms of protein, especially those that contain serotonin-producing tryptophan etc*

### ■ Calcium for Relaxation

*European Neurology Journal*, calcium levels are at their highest during our deep rapid eye movement (REM) sleep periods

# Foods continue..

- **Magnesium May Help You Get the Slumber You Need- induces deep sleep & reduces leg cramps!**
  - Half a banana with a few almonds
  - Crackers with almond butter
  - Gluten-free oatmeal with honey and dark cherries
  - Small glass of warm goat's milk kefir with turmeric and a dash of cinnamon
  - Small glass of tart cherry juice

# Sleep Well naturally

- **Essential Oils for Sleep**
- **Passion Flower for Calming and Restful Sleep**
  - Clinical trials have shown that passion flower can reduce anxiety as effectively as the prescribed drug known as benzodiazepine Xanax..
- **St. John's Wort May Help Provide Sleep Through Less Depression**

# Problems with Sleeping Pills

- Valium (benzodiazepine) Barbiturates (dangerous) Ambien (reduces REM)
  - Changes in appetite
  - Gas, constipation and/or diarrhea
  - Dizziness and problems with balance
  - Drowsiness during the day
  - Dryness in the mouth or throat area
  - Headache
  - Feelings of weakness



# Summary

- Stay away from synthetics and stimulants, and try the following natural sleep aids instead:
  - Tryptophan and serotonin foods
  - Calcium (yogurt Milk)
  - Magnesium (walnuts, cherries, bananas)
  - Essential oils
  - Passion flower
  - Melatonin (gummies 2.5mg) St. John's wort \*
- Ask Doctor before taking anything

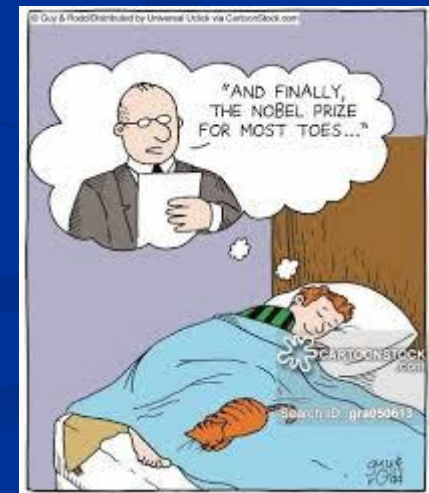
# Sleep Positions

- **Back**- good for spine but may snore
- **Side**-good but not for Sciatic nerve
- **Stomach**- Not good for your body!
- <https://draxe.com/sleep-positions/>



# Sleep..

- The spine elongates and realigns
- Heart rate decreases
- Collagen increases to repair damaged skin
- Muscle and tissue repair
- Your immune system gets a boost
- The digestive system gets a rest



# Strange sleep habits?

- **Tom Cruise's** snores are apparently so bad that he sleeps in a soundproof "snoratorium."
- **Michael Phelps** sleeps in a chamber with air comparable to that at an elevation of 8,500 to 9,000 feet
- **Eminem** (singer) takes it to another level by wrapping tinfoil around his windows to get a better nights sleep

# Sleep habits..

- *Martha Stewart* sleeps 4 hours night
- *Marissa Mayer*
  - Yahoo's CEO is a workaholic, clocking as many as 130 hours- To catch up, she recharges by taking weeklong vacations every four months.
- *Mariah Carey*-
  - Sleeps 10 hours a day with 20 humidifiers in her room?



# Sleep Habits..

- **Da Vinci** followed an extreme form of a polyphasic sleep schedule called the Uberman sleep cycle, which consists of 20-minute naps every four hours.
- Novelist **Emily Brontë** walked around in circles until she fell asleep.
- **Churchill** Every day at 5 p.m., would drink a weak whiskey & soda before taking a two-hour nap.
- **Lyndon Johnson** – worked 7-2pm then napped worked 4-9pm.



# Meditation: Pure Consciousness or Relaxation

- **Meditation** = practices that train attention to heighten awareness and bring mental processes under greater voluntary control
- **Yoga, Zen, transcendental meditation (TM)**
- Potential physiological benefits
  - Similar to effective relaxation procedures





# Sleep & Dreams

- Evolutionary & Biological Reasons
- A lack of sleep leads to *illness*
- Explaining Dreams is difficult  
*May lead to personal growth?*

# The End



*Get some sleep! Jeopardy?*