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**Sleep:  
Science and Benefits**

**Dr. Ritamarie Loscalzo**

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**"You know you're in love when you  
can't fall asleep  
because reality is  
finally better than  
your dreams."  
— Dr. Seuss**



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## A Good Night's Sleep Does Wonders for the Brain and Body



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## Sleep Facts

- ✓ Between 1910 - 1960, average sleep duration was 9 hours
- ✓ **Current average is 7.5 hours**
- ✓ 1/3 of population sleeps 6 hours or less
- ✓ Estimated that **adults need an average of 8 - 8.5 hours and children need 9 - 10**
- ✓ Shift workers sleep less than 5 hours per work day
- ✓ Sleep problems add about **\$15.9 billion** to US health care costs
- ✓ More than **1,500 deaths a year caused by drivers falling asleep at the wheel**



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## Scary Sleep Statistics from NIH

- ✓ School-age children need at least 10 hours of sleep daily
- ✓ Teens need 9-10 hours
- ✓ Adults need 7-8 hours
- ✓ Nearly 30% of adults reported an average of  $\leq 6$  hours of sleep per day in 2005-2007
- ✓ In 2009, only 31% of high school students reported getting at least 8 hours of sleep on an average school night



<http://www.drRitamarie.com/go/CDCInsufficientSleep>



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## Sleep Tidbits



- ✓ **70% of Americans are sleep deprived**
- ✓ **One of the most common causes of being tired is lack of quality sleep**
- ✓ According to Dr. Mark Hyman, the most important thing you can do for your health is have enough sleep
- ✓ **Insufficient sleep leads to imbalance between melatonin and growth hormone**, leading to stunted growth, decreased repair, and slower healing



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## Sleep Benefits

- ✓ **Fat burning:** reduces cortisol and increases leptin
- ✓ Increased lean body **growth and repair:** enhances growth hormone and DHEA
- ✓ Enhances **focus and attention**
- ✓ Detoxification and metabolic **waste removal**
- ✓ Enhances **learning**, memory, and creativity
- ✓ Improves **insulin sensitivity**
- ✓ **Decreases cancer risk** via melatonin
- ✓ Enhances serotonin and **reduces depression**
- ✓ **Reduces inflammation:** CRP higher with less than 6 hours of sleep
- ✓ **Enhances endurance** and stamina



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## Sleep Deprivation Effects

- ✓ **Nurses and shift worker studies:** higher incidences of heart disease
- ✓ **Sleep deficit leads** to performance loss, slowed reaction time, impaired memory, and decreased motivation
- ✓ **Brain uptake of glucose drops** as much as 7% with sleep deprivation
- ✓ One sleepless night can induce **insulin resistance** in healthy people



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## Fun Facts about Sleep

- ✓ Men dream about other men 70% of the time
- ✓ Women dream about men and women equally
- ✓ We can only dream about faces we've seen
- ✓ 12% of people only dream in black and white
- ✓ **Which animal are you most like?**
  - Koalas sleep 22 hours a day
  - Giraffes sleep 1.9 hours a day in 5-10 minute sessions
- ✓ **10 days of sleep deprivation can be lethal**
- ✓ 1 in 50 teenagers still wet the bed
- ✓ Within 5 minutes of awakening 50% of dream is forgotten; within 10 minutes 90% is gone



<http://www.drRitamarie.com/go/BetterSleepCouncilStatsAndResearch>

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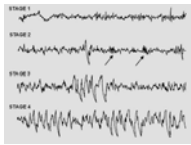
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## Sleep and Brain Wave Measurement

- ✓ **Sleep Definition:** Loss of consciousness and reduced responsiveness to external stimuli
- ✓ **Sleep Measurement:** In 1929 German psychiatrist, Hans Berger, discovered that the electrical activity of the brain could be recorded as brain waves - the electroencephalogram (EEG)
- ✓ **EEG Frequencies are Grouped into Bands:**
  - Delta, 0.5 to 4 Hz – Stage 3
  - Theta, 4 to 8 Hz – Stage 1, Stage 3
  - Alpha, 8 to 12 Hz – Wakeful and relaxed, i.e. meditation – Stage 1
  - Sigma, 12 to 14 Hz – Stage 2
  - Beta, 14 to 30 Hz – Wakeful and alert
  - Gamma, 30 to 50 Hz



<http://www.drRitamarie.com/go/NeurobiologyOfSleep> <http://www.drRitamarie.com/go/Consciousness>

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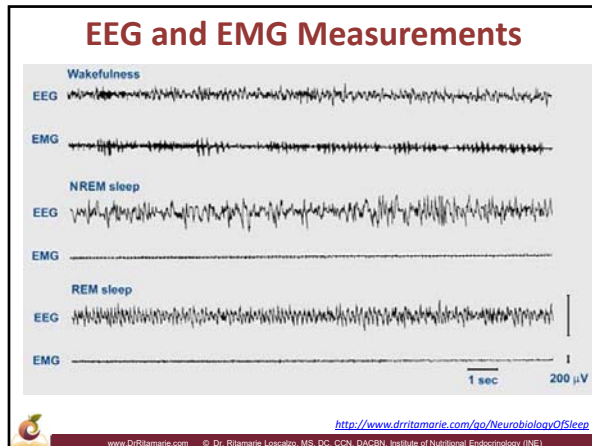
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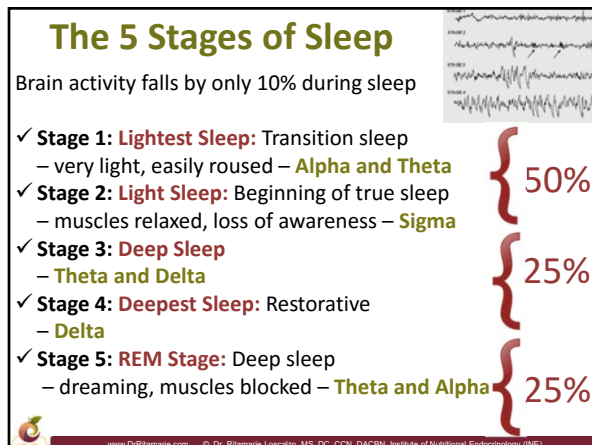
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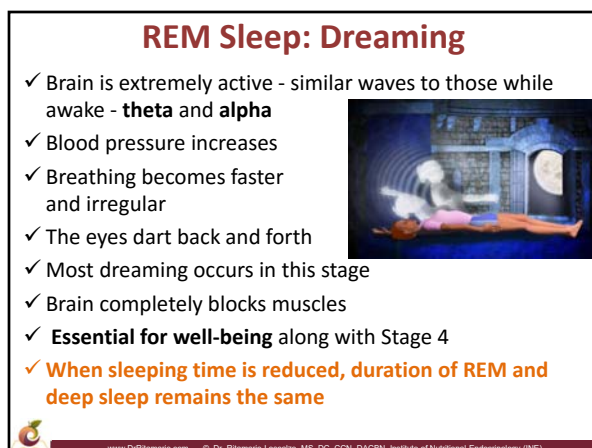
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## REM Sleep and Memory

- ✓ **Long-term memory is formed**
  - Actual neuron structures that represent memories are created
  - Essential for the process of memory reorganization
  - Memories that are not important are discarded and others are enhanced
- ✓ **New experiences are organized into networks**
  - Networks enable us to see the connection between old and new memories
  - This process is accountable for late night problem solving
  - When you wake up the following morning, you know the solution; REM sleep has helped you find it
- ✓ **Intensive firing of neurons**
  - Scientists assume that dreams are result of this stimulation
  - Similar brain waves to awake state



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## Deep Sleep

- ✓ Body regeneration most active
- ✓ Blood supply and growth hormone increased
- ✓ On average, people need approximately 2 hours per night
- ✓ Deep sleep will **not be increased beyond needed amount**
- ✓ **Light sleep will be reduced** to preserve the amount of deep sleep



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## Studies on the Impact of Sleep

- ✓ **Stanford University study:** College football players who tried to sleep at least 10 hours a night for 7 – 8 weeks improved their average sprint time and had less daytime fatigue and more stamina
- ✓ **Pediatrics Journal 2009 study:** Children ages 7 - 8 who got less than 8 hours of sleep a night were more likely to be hyperactive, inattentive, and impulsive



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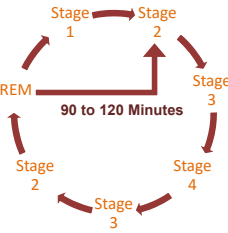
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## Sleep Cycles

- ✓ **Normal sleep cycle pattern:**
  - Stage 1, 2, 3, 4, 3, 2, 5 (REM)
  - REM usually occurs about 90 minutes after falling asleep
- ✓ **The number of completed cycles** is more important than the number of hours spent sleeping
- ✓ **Waking up mid-cycle** usually results in feeling tired throughout the entire day



<http://www.drRitamarie.com/go/OptimizeSleepHormones>

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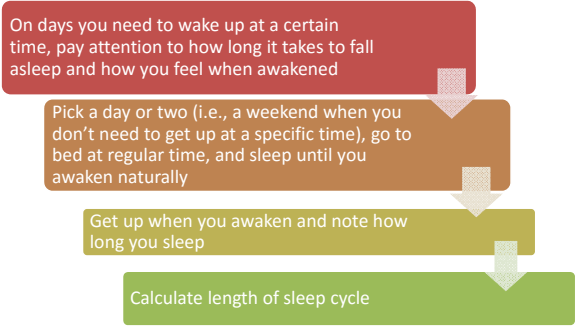
## Analyzing Sleep Cycles

On days you need to wake up at a certain time, pay attention to how long it takes to fall asleep and how you feel when awakened

Pick a day or two (i.e., a weekend when you don't need to get up at a specific time), go to bed at regular time, and sleep until you awaken naturally

Get up when you awaken and note how long you sleep

Calculate length of sleep cycle



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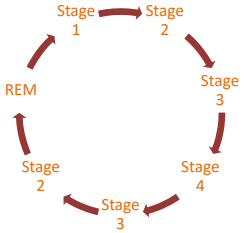
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## Calculate Sleep Cycle

- ✓ If you always wake up at a certain time, you are likely at the end of a sleep cycle
- ✓ Takes a little guess and check
- ✓ Subtract from hours until awakening how long it usually takes to fall asleep (ask a partner for help if possible)
- ✓ Use chart on next page to get an idea if sleep cycle is length



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### Sleep Cycle Chart Excerpt

Amount of Time Asleep (hours)	Length of Your Sleep Cycle (in minutes)		
	Most Likely	Likely	Possible, but Unlikely
7:00	84	105	60, 70
7:10	86	108	61, 72
7:20	88	110	63, 73
7:30	90	75	64, 113
7:40	92	77	66, 115
7:50	94	78	67, 118
8:00	96	80	68, 69, 120
8:10	82	98	61, 70
8:20	83	100	63, 71
8:30	85	102	64, 73
8:40	87	104	65, 74
8:50	88	76	66, 106
9:00	90	77	68, 68, 108

Chart excerpted from p 11 – 12 of <http://www.drRitamarie.com/go/OptimizeSleepHormones>  
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### Hormones That Influence and Are Influenced by Sleep

- ✓ Insulin/Glucagon
- ✓ Cortisol/DHEA
- ✓ Growth Hormone
- ✓ Leptin/Ghrelin
- ✓ Melatonin
- ✓ Estrogen/Progesterone
- ✓ Testosterone



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