"Sleep, Snoring and Sleep Apnea: Uniquely different in Women"

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What is sleep?

• “A reversible state of perceptual unresponsiveness to the environment”
• Combined with specific changes in physiologic states
  – Respiration
  – Cardiac
  – Endocrine
  – Neurologic
• “unique state of “Being””
Why do we sleep?

“because if we do not bad things happen”
Three Behavioral States

- Wake
- Non-REM Sleep
- REM “Rapid eye movement” Sleep
Sleep Architecture and Sleep Cycle
Sleep: Age and Gender Differences

• Age
  – Infants initiate sleep into REM and need 16/hr sleep
  – Adults initiate sleep in non-REM and need 8 hr.
  – With aging slow wave sleep (recovery sleep) declines from 20%
  – Sleep onset is harder, wake earlier, and have lower sleep efficiency
Sleep: Age and Gender Differences

• Objectively (in sleep lab) women sleep better than men

• Subjectively they sleep worse

• Men tolerate sleep debt better (58% versus 43%)

• Sleep has major genetic determinants and individual tolerances differ
Sleep and Wake: Two Distinct Centers

**Wake**

- Thalamus
- Cortex
- Medulla

**Sleep**

- Thalamus
- Cortex
- Medulla

**Posterior Hypothalamus**

(Reticular Formation of the Brainstem)

Noradrenalin, Dopamine (amphetamine, cocaine), acetylcholine (nicotine), Histamine, Glutamate

**Anterior Hypothalamus**

GABA, turns off waking centers, valium like drugs

Serotonin, Adenosine, Opiates, Cytokines (TNF alpha, IL-2)
Childhood/Puberty

• Just as in adults boys have more sleep apnea than girls (may have to do with the length of the airway)

• Major effects of hormonal changes and social stresses
  – More affective disorders in girls (depression/anxiety)
  – Little data on the effects of internet and behavior
Menstrual Cycle

- Hormonal changes (gonadal, cortisol, melatonin, pituitary)
- Both objective and subjective sleep change
  - 1 week prior to menstruation (increased sleep latency and decreased sleep efficiency)
  - Degree seems to correlate to cramps, bloating, HA
- Severe PMS affects 20-40% women
  - Hypersomnia
  - Insomnia
  - Increased dreams
Polycystic Ovarian Syndrome

• Affects 5-10% women
• Absent or irregular menstrual periods
• Obesity
• Increased androgen effects (hirsuitism)
• Increased metabolic syndrome (insulin resistance)
• Bilateral polycystic ovaries
• Marked increase in sleep apnea (40X Normal)
  – ALL SHOULD HAVE SLEEP EVALUATION
Body Temperature

Body Temperature (°C)

Clock Time

24h
Two Process Model of Sleep

Process “S” = Sleep Credit Card
Process “C” = Circadian Rhythm
Circadian Cycle

- “Forbidden zone”
  - circadian trough
  - Associated with rising of core body temperature
  - Difficult to wake
  - Severe sleep inertia

- Zeitgeber = External time cues that regulate and synchronize circadian rhythms with the environment
  - Light
  - Food
  - Social interaction
  - Exercise
Sleep Deprivation

Effects
- Behavior
- Mood
- Memory
- Accidents
- Insulin resistance
- Hypoxia/apnea
Impairment: Sleepiness versus ETOH
Roehrs et al Sleep 2004

![Graph showing mean daily sleep latency (min) MSLT versus doses of ethanol and sleep loss.](image)
Sleepiness is determined by activity and time of day

- TELEVISION 80+%  
- MOVIE 80+%  
- LECTURE/THEATER 80+%  
- DRIVING AN AUTO 77%  
- CONCENTRATION 67%  
- LESS SEXUALLY AROUSED 50%  
- PHONE CONVERSATIONS 32%  
- STAYING EMPLOYED 10%

Sleepiness in boring activities is abnormal !!!
EPWORTH SLEEPINESS SCALE

ASK THE LIKELIHOOD OF DOZING:

1) Watching TV
2) Sitting inactive in a public place (e.g. a theater or a meeting)
3) Sitting and reading
4) As a passenger in a car for an hour without a break
5) Lying down to rest in the afternoon when circumstances permit
6) Sitting and talking to someone
7) Sitting quietly after a lunch without alcohol
8) In a car, while stopped for a few minutes in traffic

• Chance of dozing
  – 0 = never
  – 1 = slight
  – 2 = moderate
  – 3 = high
Caffeine

<table>
<thead>
<tr>
<th>Item</th>
<th>mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hershey bar</td>
<td>25</td>
</tr>
<tr>
<td>Espresso shot</td>
<td>40</td>
</tr>
<tr>
<td>Tea</td>
<td>50</td>
</tr>
<tr>
<td>Coke 12oz</td>
<td>34</td>
</tr>
<tr>
<td>Mountain Dew</td>
<td>55</td>
</tr>
<tr>
<td>Red Bull</td>
<td>80</td>
</tr>
<tr>
<td>Coffee 12oz</td>
<td>200</td>
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</tbody>
</table>
Insomnia: Perception of poor or inadequate sleep

- Sleep Onset (at beginning)
- Sleep Maintenance (during sleep)

- Often from acute stress
- Drugs: stimulants, alcohol

- Psycho physiologic (a habit of poor sleep)
Pregnancy

• Multiple effects on sleep
  – Hormonal
  – Physical
  – Sleep apnea
  – Restless legs
Pregnancy

– Hormonal....Increased estrogen and progesterone
  • Mucosal edema  (increased secretions nasal obstruction)
  • Progesterone increases excessive daytime sleepiness
– Increase in symptoms of restless legs
  • 0% to 15% (1st) to 23% (3rd)
  • May relate to previous iron and folate deficiency
  • Treatment is mostly supportive (prevent iron deficiency and avoid caffeine)
– Physical effects
  • Abdominal distension, urinary frequency, backache, GERD, nasal congestion
Pregnancy

• Increase in snoring and OSA (4% to 14%)
  – Increased edema, decreased lung volume from increased size abdomen, weight gain
  – Snoring is associated with lower Apgar scores and a 3X increase in fetal growth retardation
  – Impaired breathing associated with pre-eclampsia (HTN, can have major effects on mother and fetus)
    • Treatment with CPAP can make a difference
Menopause

• Major impact on sleep due to fluctuation in hormonal status
  – Lower estrogen
  – Increased FSH, LH
  – Insomnia affects 35-50% (especially high in those with hot flashes and mood disturbances)
  – Increase in OSA due to relative increase in androgenic hormones
  – Increase in RLS (may be more age than hormonal)
  – Hormone replacement improves sleep and reduces severity of OSA 50% (currently not a treatment option)
EXCESSIVE DAYTIME SOMNOLENCE

- Sleep apnea / UARS
- Chronic insufficient sleep
- Shift work
- Narcolepsy
- Periodic limb movement movement syndrome
- Insomnia
- Depression
Insomnia

• Problem with falling or staying asleep

• Perception of poor and inadequate sleep
  – Mood disorders
  – Alcohol
  – Drugs
  – Age
  – Poor sleep hygiene
Sleep Help

• Exercise regularly, but do so at least three hours before bed-time. A workout after that time may actually keep you awake because your body has not had a chance to cool down.

• Establish a regular, relaxing bedtime routine that will allow you to unwind and send a "signal" to your brain that it's time to sleep. Avoiding exposure to bright light before bedtime and taking a hot bath may help.
Sleep Help

• Don't use your bed for anything other than sleep or sex. Your bed should be associated with sleep.

• Consider your sleep environment. Make it as pleasant, comfortable, dark and quiet as you can.

• If you can't go to sleep after 30 minutes, don't stay in bed tossing and turning. Get up and involve yourself in a relaxing activity, such as listening to soothing music or reading, until you feel sleepy. Remember: Try to clear your mind; don't use this time to solve your daily problems.
<table>
<thead>
<tr>
<th></th>
<th>Essential Clinical Criteria for Diagnosis of RLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A sensation of an urge to move the limbs (commonly legs) - usually associated with paresthesia</td>
</tr>
<tr>
<td>2.</td>
<td>Onset or worsening of symptoms when at rest - not associated with any specific body position.</td>
</tr>
<tr>
<td>3.</td>
<td>Relief of symptoms with movement; complete relief immediately or shortly after initiating movement.</td>
</tr>
<tr>
<td>4.</td>
<td>Marked circadian variation in degree or occurrence of symptoms; worse in the evening, improved in the morning regardless of quality or quantity of sleep.</td>
</tr>
</tbody>
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Restless leg syndrome (2 Forms)

Idiopathic  (50% cases)
  • Often seen within families and at an earlier age (autosomal dominant)
  • Onset less than 30y/o

Secondary
  • Pregnancy,
  • Uremia (20-60%),
  • Neuropathies,
  • Anemia
Exacerbating Factors

<table>
<thead>
<tr>
<th>Lifestyle Factors</th>
<th>Medications</th>
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<tbody>
<tr>
<td>Caffeine</td>
<td>SSRIs</td>
</tr>
<tr>
<td>Nicotine</td>
<td>Tricyclic antidepressants</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Metoclopramide</td>
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<tr>
<td></td>
<td>Prochlorperazine maleate</td>
</tr>
<tr>
<td></td>
<td>Dopamine antagonists</td>
</tr>
<tr>
<td></td>
<td>Diphenhydramine</td>
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Periodic Limb Movement Disorder

- Repetitive stereotyped toe extension with foot (hip, knee) dorsiflexion lasting 0.5 to 5 seconds occurring from 4 to 90 seconds
- Common in elderly
- Controversy if it is abnormal or a cause of sleep disorders
- PSG diagnosis
  - With arousal
    - > 5hr with arousal (>25 is severe)
  - No arousal
    - 5-25 mild
    - 25-50 moderate
    - 50+ severe
Women and OSA

• Women have a lower ventilatory response to arousal (more stable pattern of breathing) than men
• Amount of daytime sleepiness measured by (ESS) is not related to AHI (traditional measure of OSA severity)
• Population studies ratio of Men/Women = 2:1 but in sleep lab 8:1
Sleep Apnea Symptoms Differ

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snoring</td>
<td>18%</td>
<td>7%</td>
</tr>
<tr>
<td>Age</td>
<td>50’s</td>
<td>60’s</td>
</tr>
<tr>
<td>Fatigue/Sleepiness</td>
<td>25/10</td>
<td>25/5</td>
</tr>
<tr>
<td>Worry about apnea</td>
<td>10-15%</td>
<td>2%</td>
</tr>
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</table>

Figure 3. Relatives’ concern about witnessed sleep apnea in men and women by age.
Sleep Apnea Treatment

I  PREDISPOSING CONDITIONS
II  MEDICAL CAUSES
III  DRUGS
IV  MEDICAL DEVICES
V  SURGERY
CONSERVATIVE SELF TREATMENTS

• Weight loss
• Sleep positioning
• Sleep time and sleep hygiene
• Medication, Tobacco, and alcohol avoidance
• Regular exercise
• Nasal Sinus Allergy treatment
• Earplugs, Different bedrooms, Altering bed times,
• Divorce
SLEEP POSITIONING

• Tennis ball technique
• Snore ball
• Snore pillows
• Foam wedges
• Recliner to sleep in semi-sitting position
Treat Medical Causes

- Obesity
- Hypothyroidism
- Acromegally
- Congestive Heart Failure
DEVICES

• 300 patented devices for snoring
  – Chin straps
  – nasal tubes
  – palatal string
  – electrical stimulators
  – noise makers
  – nose drops
  – hypnosis
  – acupuncture
CPAP – Nasal Pillow Masks
CPAP Mechanism of Action

- Pneumatic splint of the upper airway
- Expiratory pressure is what counts!!!!
- Increases functional residual capacity (FRC)
- Reduces muscle tone to the upper airway
Complications CPAP
Mandibular Advancement Devices

www.amisleep.com
Summary