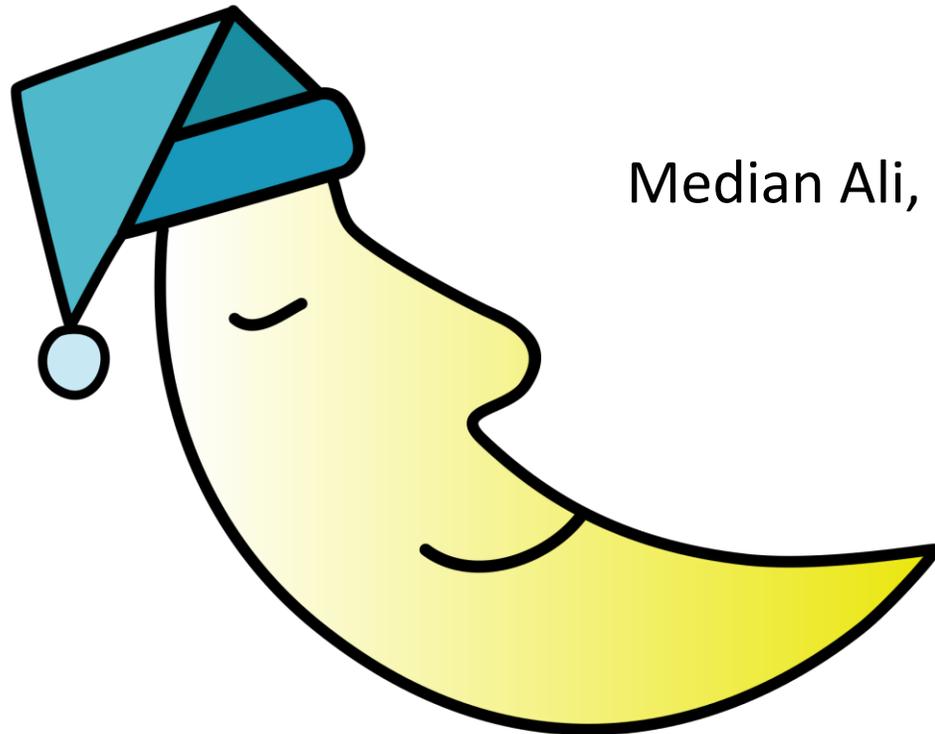


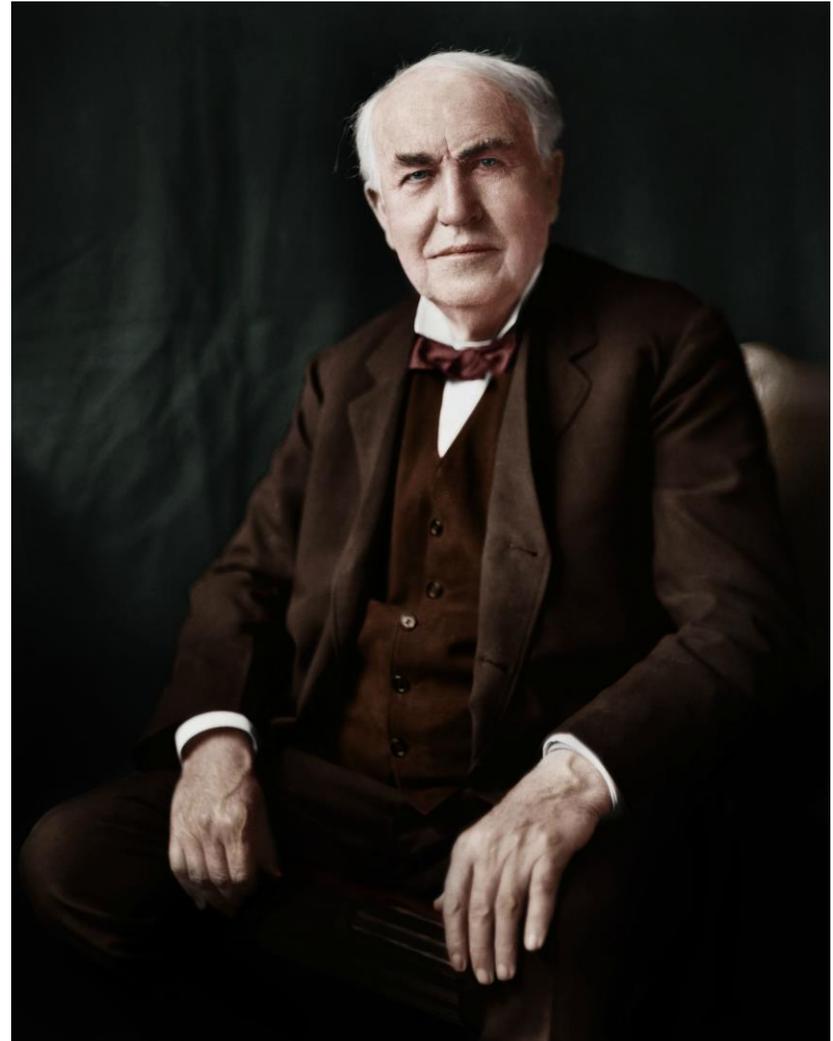
The Mysterious World of Sleep



Median Ali, MD, FCCP, DSM



**“Sleep is a criminal waste of time,
inherited from our cave days”
Thomas Edison**





The cot in Edison's library



Thomas Edison taking a midday nap under a tree in the Blue Ridge Mountains (1921)



Thomas Edison sleeping at his West Orange, New Jersey laboratory (1924)



Thomas Edison napping at the Ford Edison Camp in Hagerstown, Maryland, with President Warren Harding (right)



Why It is important to know about Sleep

- You spend 1/3 of your life sleeping
- 50-70 million US adults have a [sleep disorder](#).
- 48.0% report [snoring](#)..
- Drowsy driving is responsible for 1,550 fatalities and 40,000 nonfatal injuries annually in the United States.
- Short Insomnia 30% of adults and chronic insomnia by 10%
- 25 Million U.S. adults have OSA
- have obstructive sleep apnea
- 35.3% adults report <7 hours of sleep during a typical 24-hour period.
- 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 have been shown to make a significant contribution.

Four Leading Theories on Why Humans Need to Sleep

- **Recharge the battery (conserving energy):** we consumed so much energy while we were awake, our body needed to rest
- **Taking out the trash (Synaptic Homeostasis):** your brain works to only keep the synaptic connections you need and dissolving the inessential connections
- **Recordkeeping (memory consolidation):** sleep may best be characterized as an active brain state for optimizing memory consolidation.
- **Dreaming:** REM dreaming allows people to [process difficult or stressful memories](#) in a relatively stress-free environment.

HOW MUCH SLEEP DO YOU REALLY NEED?

AGE

Newborn
to
2 months old



3 months
to
1 year old



1 to 3
years old



3 to 5
years old



5 to 12
years old



12 to 18
years old

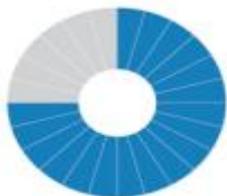


Adult
(18+)

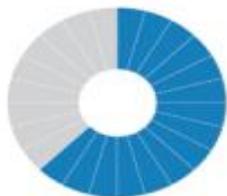


SLEEP NEED

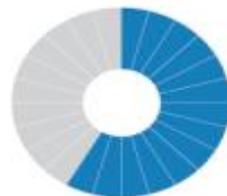
12 hrs
to
18 hrs



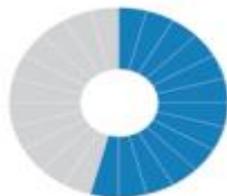
14 hrs
to
15 hrs



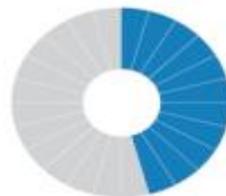
12 hrs
to
14 hrs



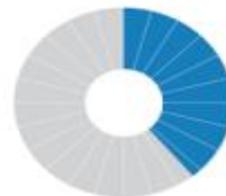
11 hrs
to
13 hrs



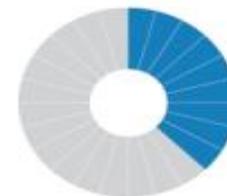
10 hrs
to
11 hrs



8.5 hrs
to
9.25 hrs



7 hrs
to
9 hrs



Poor sleep in the hospital

- **CONTRIBUTING FACTORS**
 - **Environmental factors:**
 - Noise
 - Patient care intervention
 - Light exposure
 - **Non environmental factors**
 - Acute illness
 - Medications
 - Ventilators and other equipment

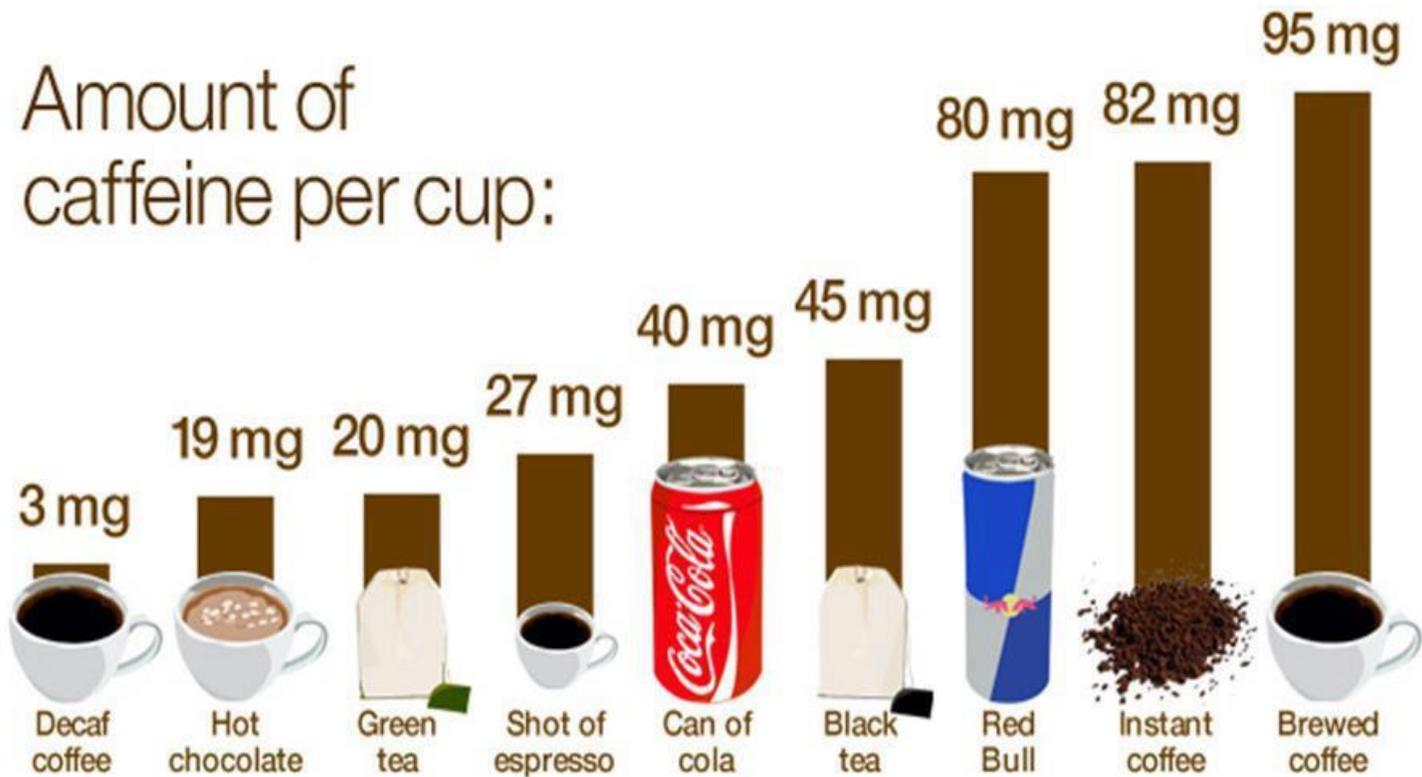
INTERVENTIONS TO IMPROVE SLEEP IN The Hospital

- Assess and treat underlying sleep disorders
- Treatment of the acute illness
- Review of concomitant medications
- **Nonpharmacologic strategies**
 - Noise reduction
 - Light therapy
 - Reducing nighttime interruptions
- **Pharmacotherapy**
 - Melatonin: 1-5 mg
 - Trazodone: low dose 50 mg
 - Ambien: avoid in elderly
 - Benzodiazepines: significant adverse effects
 - Antihistamines: watch for S/E such as confusion



“He’s sleeping nice and peacefully, Let’s wake him up to take his Ambien”

Benefits and risks of caffeine and caffeinated beverages



Caffeine Calculator

How much of your favorite energy drink, soda, or coffee should you consume?

Help?

Enter a Drink
Coffee (Brewed)

Your Weight
150 Pounds Kilos

Calculate Your Limits...

DAILY SAFE MAXIMUM
Your maximum is **2.5 cups per day***
Based on 8 fl. oz serving.

LETHAL DOSAGE
62.8 cups of [Brewed Coffee](#) would be terminal.



*Applies to age 18 and over. For entertainment purposes only and does not replace professional medical advice ([disclaimer](#)). See [safe limit formula](#).

Caffeine Calculator

How much of your favorite energy drink, soda, or coffee should you consume?

Help?

Enter a Drink
Tea (Black)

Your Weight
150 Pounds Kilos

Calculate Your Limits...

DAILY SAFE MAXIMUM
Your maximum is **9.7 cups per day***
Based on 8 fl. oz serving.

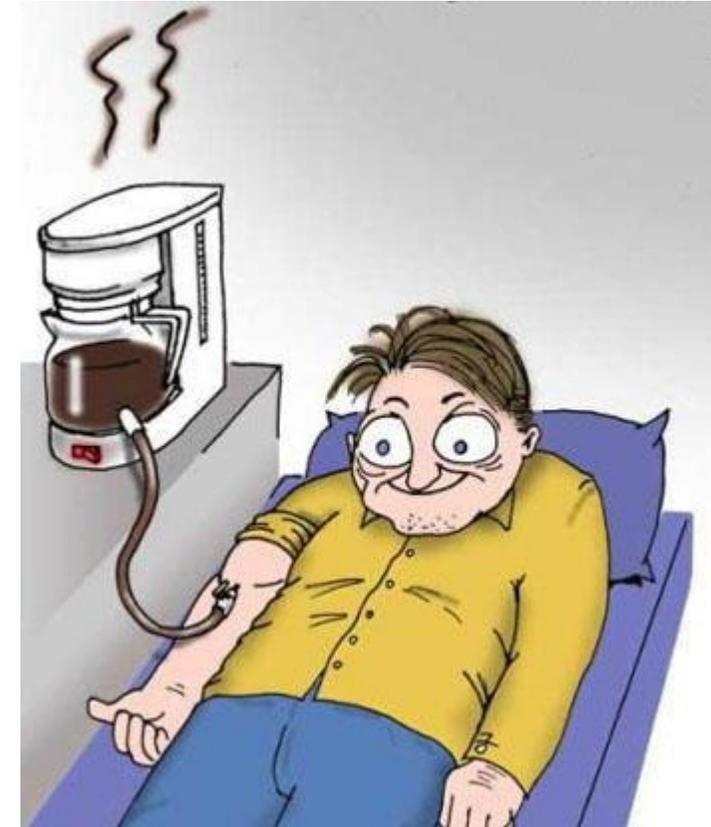
LETHAL DOSAGE
243.8 cups of [Black Tea](#) would be terminal.



*Applies to age 18 and over. For entertainment purposes only and does not replace professional medical advice ([disclaimer](#)). See [safe limit formula](#).

Benefits and risks of caffeine and caffeinated beverages

- For the majority of healthy adults, consuming less than 400 mg of caffeine a day appears to be safe
- Consumption of caffeinated beverages is associated with some short-term benefits:
 - increased mental alertness
 - improvements in cognitive performance,
 - improved athletic performance.
 - mitigates many of the adverse effects of sleep deprivation and jet lag on cognitive performance and mental alertness.
- The majority of studies show that there may be a modest inverse relationship between coffee consumption and all-cause mortality



Benefits and risks of caffeine and caffeinated beverages

- Consumption of high levels of caffeine can be associated with short-term adverse effects:
 - Headache
 - anxiety, tremors, and insomnia
 - In the long term, caffeine is also associated with generalized anxiety disorder and substance abuse disorders
- Heavy coffee intake may trigger coronary and arrhythmic events in susceptible individuals
- Coffee intake is not considered a long-term risk factor for myocardial disease.
- Caffeine is associated with a reduced risk of Parkinson disease, Alzheimer disease, alcoholic cirrhosis, and gout. Both caffeinated and decaffeinated coffee are also associated with a lower risk of type 2 diabetes.



Anchorage Daily News via Getty Images

The Exxon Valdez Oil Spill



Rolls Press Popperfoto via Getty Images

Three Mile Island



JEFF HAYNES via Getty Images

American Airlines Flight 1420 Crash



BOB PEARSON via Getty Images

The Challenger Explosion



Oklay Ortakcioglu via Getty Images

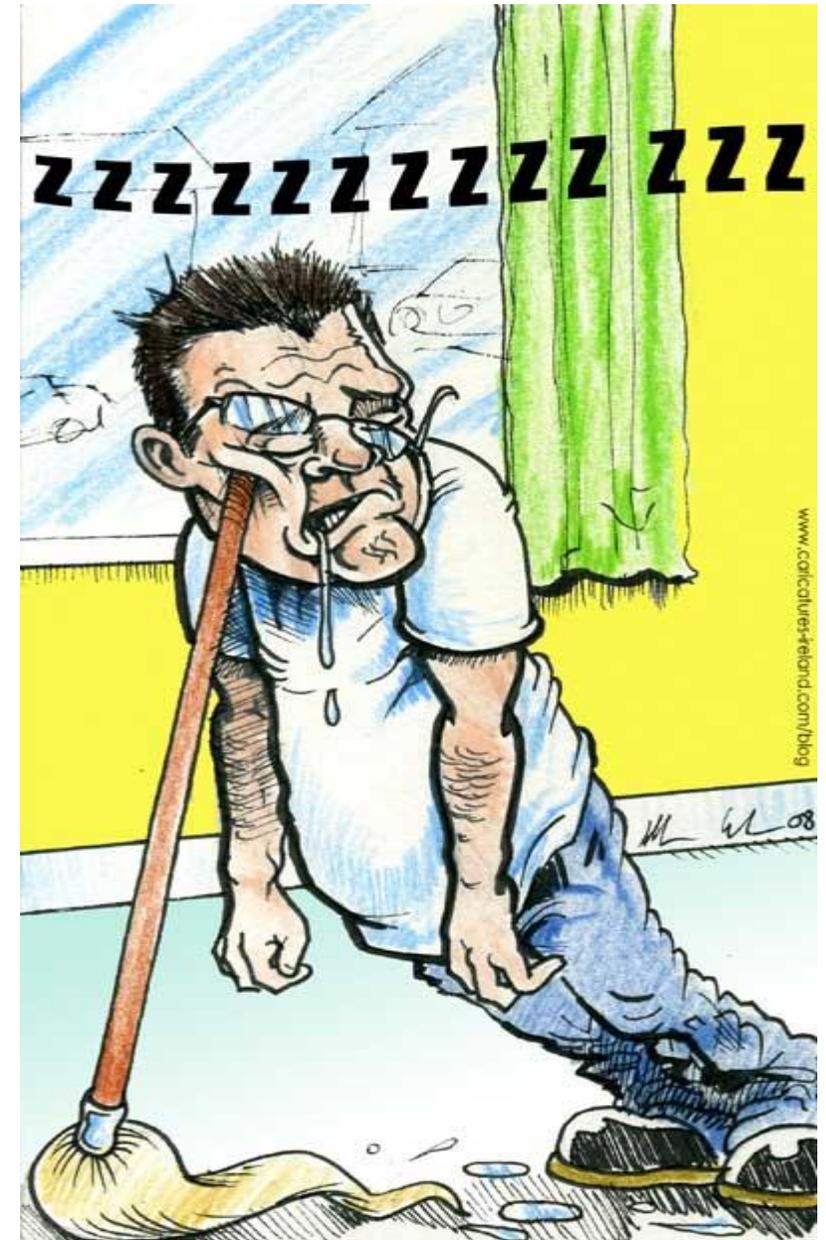
Chernobyl



Air France Flight 447

Insufficient sleep

- AASM recommends that adults sleep seven or more hours per night on a regular basis to promote optimal health
- Acute and accumulated sleep deprivation result in measurable changes in cognitive performance, alertness, and neurobehavioral function
- Sleep restriction is recognized as a risk factor for adverse cardiometabolic profiles and outcomes
- Healthy sleep behavior is recommended to promote ideal cardiac health, along with efforts to address other established risk factors including blood pressure, cholesterol, diet, blood glucose, physical activity, weight, and smoking cessation



Drowsy Driving:

Drowsy driving
on the rise...



The Highest risk for accidents

- A-Drunk Driver
- B- Sleep Apnea patient not using his CPAP
- C-Night Shift worker
- D-Drunk Medical Resident texting and driving after a night call

HIGH-RISK POPULATIONS

- Teenage and young adult drivers
- Sleep apnea and other sleep disorders
- Sedating medications and alcohol
- Commercial drivers: Test for OSA if (BMI) ≥ 35 kg/m²
- Medical house staff
- Night or rotating shift workers

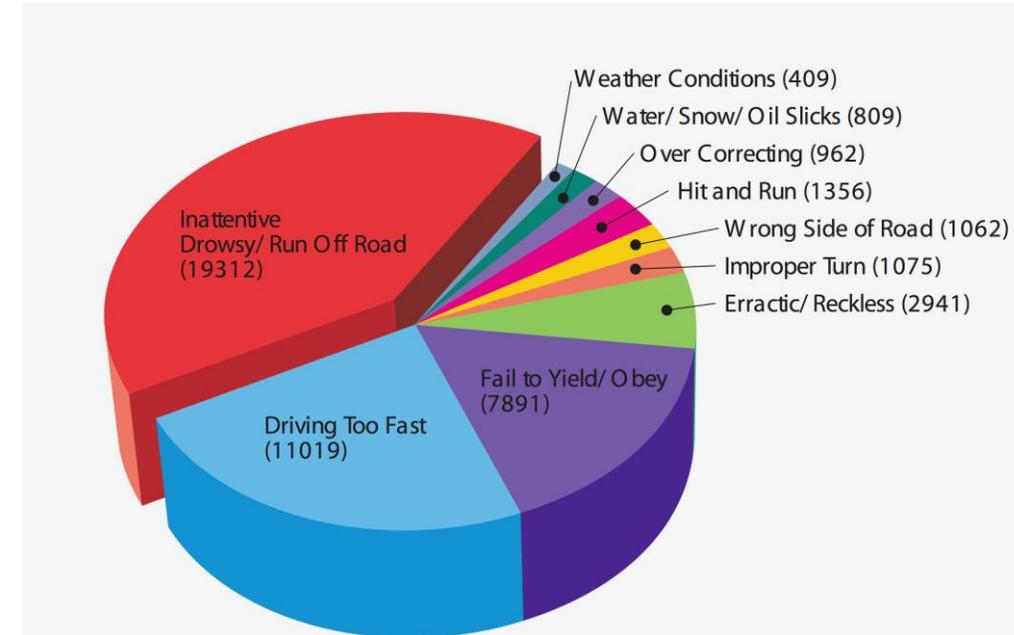
PREVENTION AND COUNTERMEASURES

- Education
- Treat sleep disorders
- Counseling about sedating medications
- Naps and caffeine
- Stimulants
- Audio-tactile lane markings
- On-board assessment of driver fatigue
- On-road crash prevention technologies
- Driverless cars: could **reduce traffic** fatalities by up to 90%,



LEGAL CONSIDERATIONS

- Individual may be held civilly liable for falling asleep and criminally liable if the individual was aware of the risks associated with the sleep disturbance and did not take measures to reduce the risks.
- Clinician who fail to inform a patient of his or her risk of injury due to a medical condition or its treatment may be held liable to the patient if an injury occurs subsequently



LEGAL CONSIDERATIONS

- All patients who have a sleep disorder should be warned about the risk of driving while drowsy
- An expert panel of the American Thoracic Society advocates reporting "if a highest-risk patient insists on driving before the condition has been successfully treated or fails to comply with treatment requirements"
- Get familiar with your state law



Sleep and Sex

- Lack of sleep lowers testosterone levels
- Lack of sleep can negatively affect vaginal lubrication.
- Chronic sleep loss can cause erectile dysfunction in men.
- Sleep loss causes men to misjudge women's sexual interest.
- Sleep problems cause women to have more sexual distress.

Sleep and Sex

- 40% of OSA patients may have ED
- Sleep deprivation is known to cause frontal lobe impairment, which has a negative effect on decision-making variables such as risk-taking sensitivity, moral reasoning and inhibition
- Sleep deprivation could have unexpected effects on perceptual experiences related to mating and dating

Is CPAP sexy?

- Improve symptoms :27-54% reported improvement in symptoms of mild-severe ED
- Better sleep quality for the bed partner



How to Make Presentations That Don't Put Your Audience to Sleep



- YOUR MIND IS TIRED
- MY VOICE IS BORING
- YOU ARE ABOUT TO ENTER THE POWER-POINT ZONE ...

.. ZZZZZZ

N
N
N
N
N



Sleep and Death



Hypnos and [Thanatos](#), *Sleep and His Half-Brother Death*
by [John William Waterhouse](#)

Sleep and Death

- Patients with untreated severe OSA (ie, AHI ≥ 30 events per hour) have a two- to threefold increased risk of all-cause mortality compared with individuals without OSA
- Both short and long duration of sleep are significant predictors of death in prospective population studies.
- The recent literatures confirms that sleep deprivation is associated with HTN, CAD, and DM.
- Increased sympathetic nervous system activity is considered to serve as a common pathophysiology in sleep deprivation's relationships with these diseases.

Sleep and Death

- An association between both short and long sleep duration and a proinflammatory state has been described in the literature
- several inflammatory pathways are implicated (TNF- α , IL-1, -6, and -17 and CRP).
- Receiving hypnotic prescriptions was associated with greater than threefold increased hazards of death even when prescribed <18 pills/year

Did sleep apnea contribute to Justice Scalia's death? His unplugged breathing machine raises that question



By [Ariana Eunjung Cha](#) February 24, 2016 Washington post

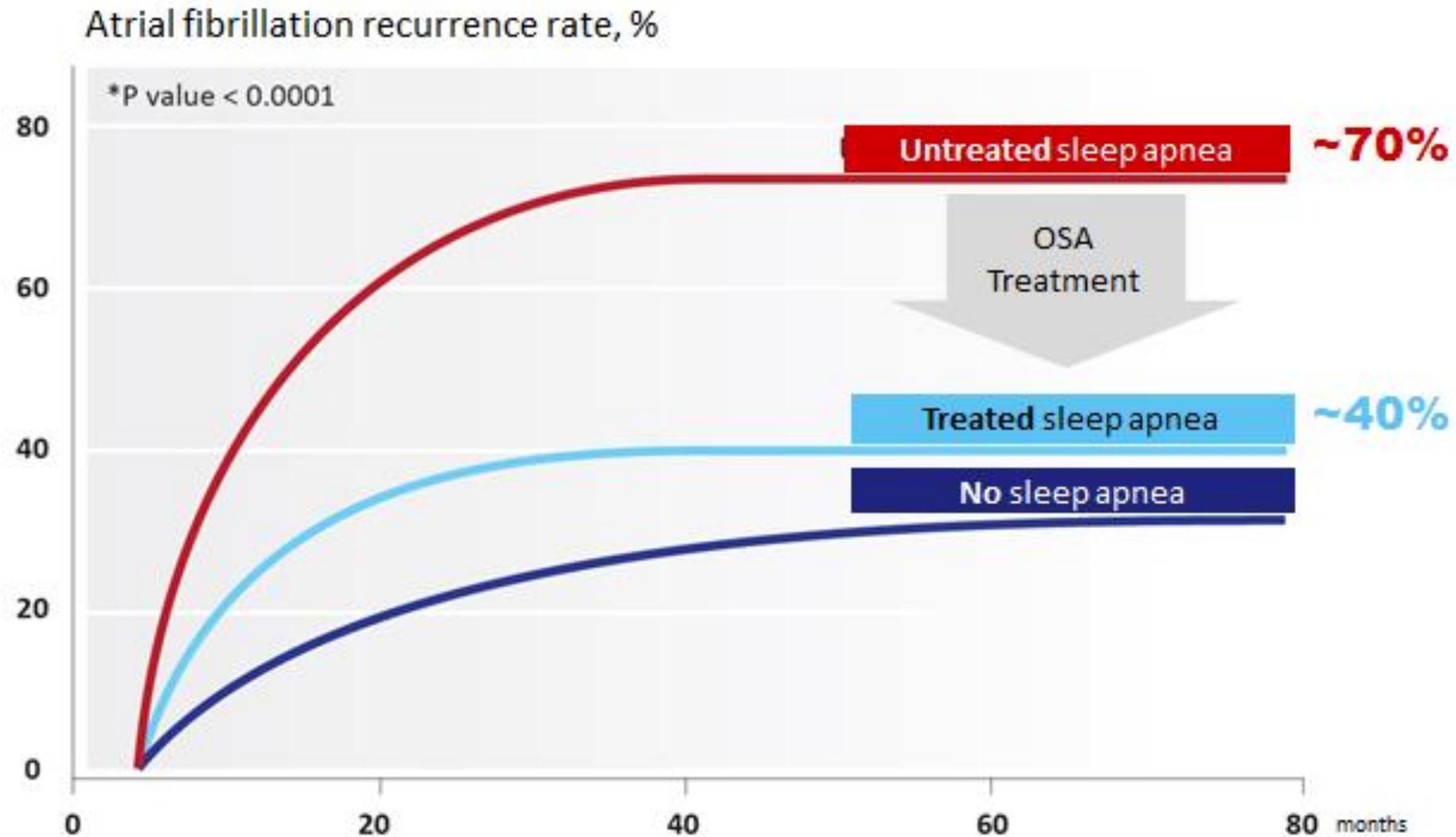
OSA and SUDDEN CARDIAC DEATH

- Limited data suggest that severe or untreated OSA may increase risk of fatal cardiac arrhythmias
- A longitudinal study of 107 patients with OSA followed for seven years found that the rate of sudden cardiac death (SCD) was increased in patients who had discontinued positive airway pressure therapy, compared with those who were adherent (7 versus 0 percent)
- In the absence of OSA or other sleep disorders, sleep is considered to be cardioprotective, typically associated with a nadir of cardiovascular risk.
- Patients with OSA appear to have a nocturnal (midnight to 6 AM) predilection to SCD, with an approximately threefold increased risk, compared with the general population and those without OSA

ATRIAL FIBRILLATION

- A strong association (up to fourfold higher odds) between OSA and atrial fibrillation
- OSA is a risk factor for AFIB
- OSA is a risk factor for recurrence of AFIB after cardioversion or ablation
- Treatment of OSA with CPAP may lower risk of AFIB recurrence after cardioversion or ablation

Treatment of OSA Reduces AFib Recurrence Post Ablation



For sleep's sake have a screen break before bed

- A 2012 study showed that melatonin levels are suppressed by roughly 22% when someone is exposed to [backlit](#) screens for two hours.¹
- Blue light has a dark side
- Use dim red lights for night lights. Red light has the least power to shift circadian rhythm and suppress melatonin.
- Avoid looking at bright screens beginning two to three hours before bed.
- If you work a night shift or use a lot of electronic devices at night, consider wearing blue-blocking glasses or installing an app that filters the blue/green wavelength at night.
- Expose yourself to lots of bright light during the day, which will boost your ability to sleep at night, as well as your mood and alertness during daylight



[← Display & Brightness](#)

Night Shift

Night Shift automatically shifts the colors of your display to the warmer end of the color spectrum after dark. This may help you get a better night's sleep.

Scheduled

Manually Enable Until Tomorrow

COLOR TEMPERATURE

Less Warm

More Warm

Warmer settings may affect the appearance of

Edward—still smiling so beautifully that my heart felt like it was going to swell up and burst through my chest—put his arm around my shoulder and turned to face my grandmother.

Gran's expression surprised me. Instead of looking horrified, she was staring at me sheepishly, as if waiting for a scolding. And she was standing in such a strange position—one arm held awkwardly away from her body, stretched out and then curled around the air. Like she had her arm around someone I couldn't see, someone invisible...

Only then, as I looked at the bigger picture, did I notice the huge gilt frame that enclosed my grandmother's form. Uncomprehending, I raised the hand that wasn't wrapped around Edward's waist and reached out to touch her. She mimicked the movement exactly, mirrored it. But where our fingers should have met, there was nothing but cold glass...

With a dizzying jolt, my dream abruptly became a nightmare.

There was no Gran.

That was *me*. Me in a mirror. Me—ancient, creased, and withered.

Edward stood beside me, casting no reflection, excruciatingly lovely and forever seventeen.

He pressed his icy, perfect lips against my wasted cheek.

"Happy birthday," he whispered.

I woke with a start—my eyelids popping open wide—and gasped. Dull gray light, the familiar light of an overcast morning, took the place of the blinding sun in my dream.

Just a dream, I told myself. *It was only a dream*. I took a deep breath, and then jumped again when my alarm went off. The little calendar in the corner of the clock's display informed me that today was September thirteenth.

Only a dream, but prophetic enough in one way, at least. Today was my birthday. I was officially eighteen years old.

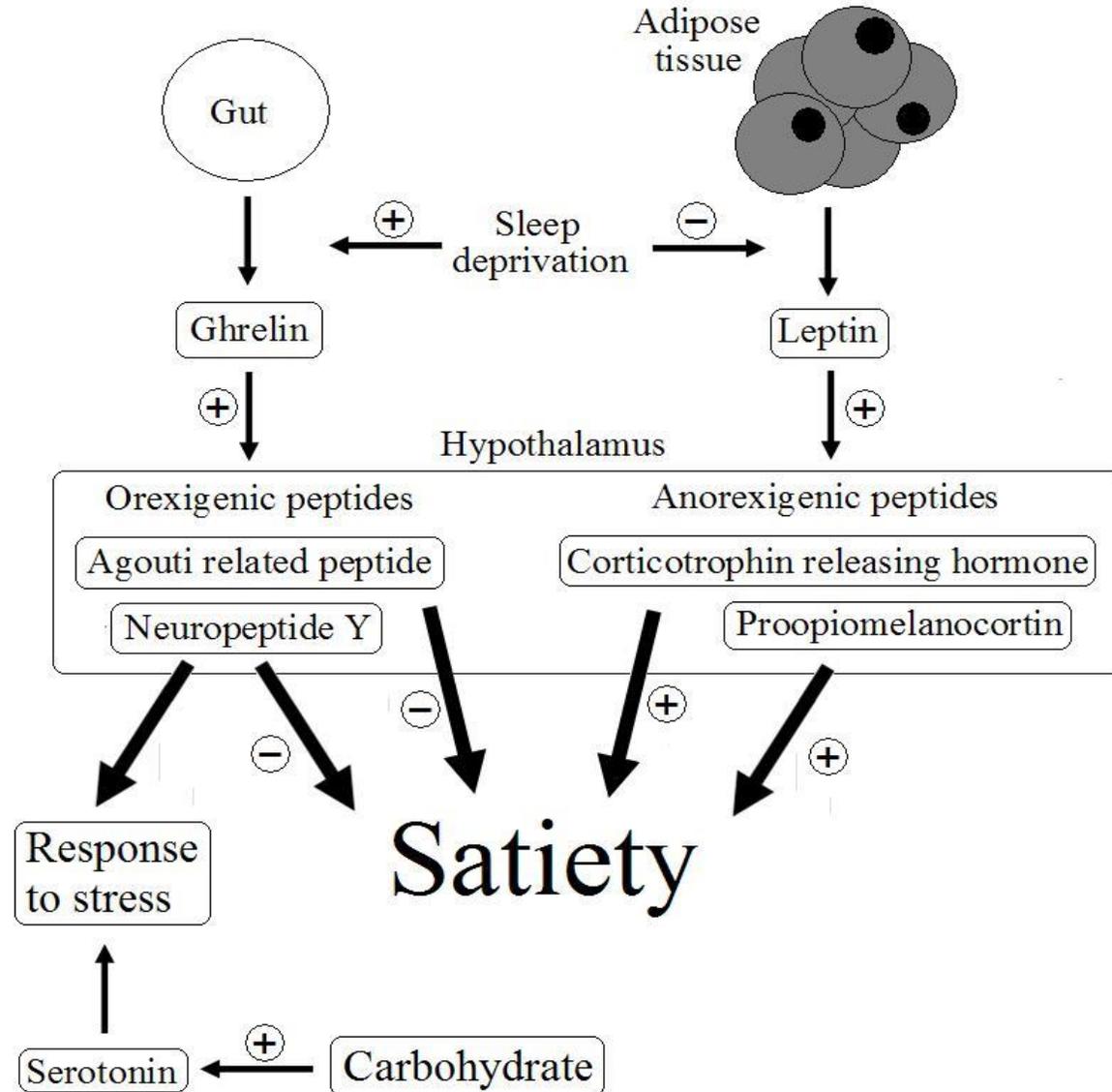
I'd been dreading this day for months.

All through the perfect summer—the happiest summer I had ever had, the happiest summer *anyone anywhere* had ever had, and the rainiest summer in the history of the Olympic Peninsula—this bleak date had lurked in ambush, waiting to spring.

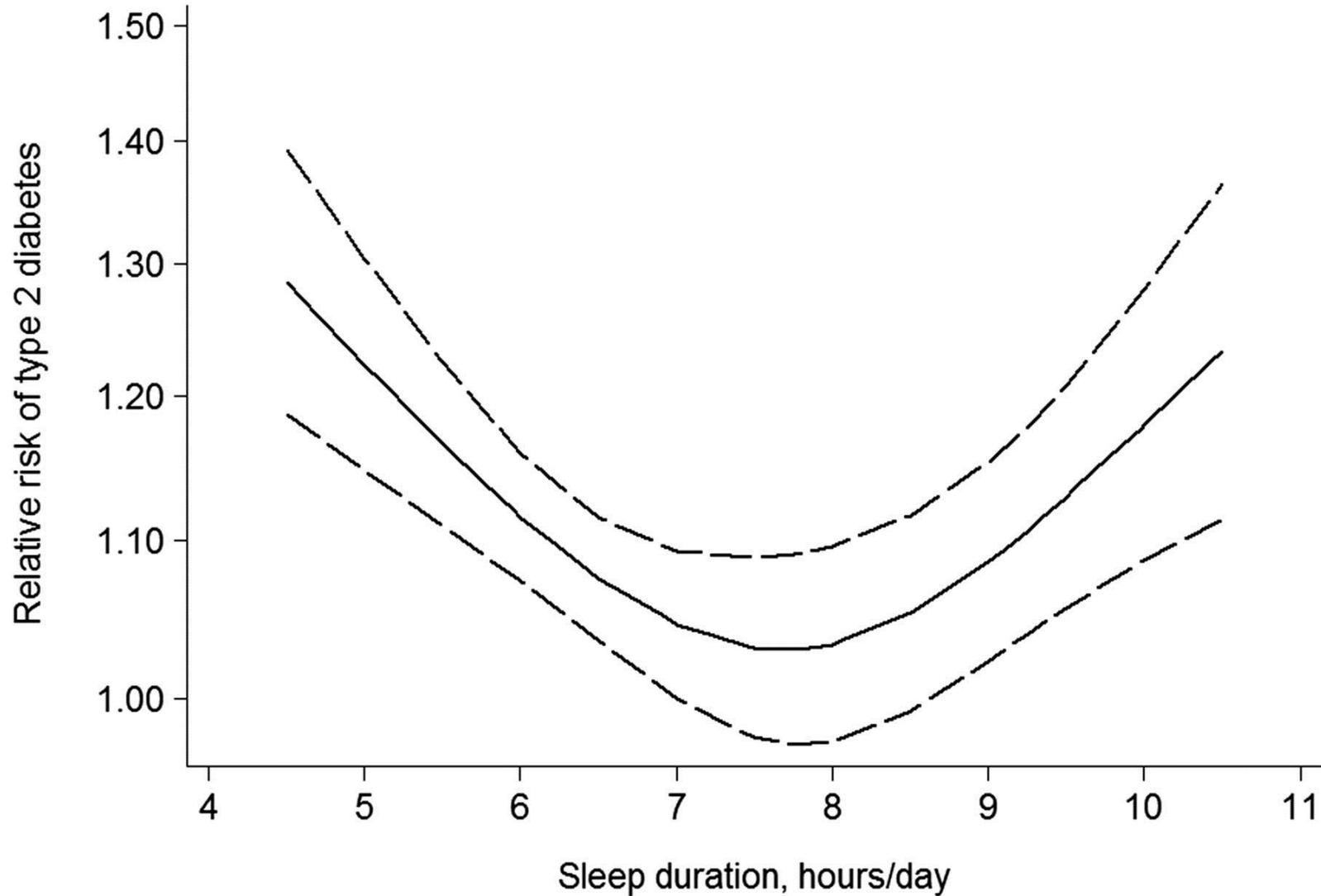
Sleep deprivation and Obesity

- Sleep restriction, when compared with sleep extension is associated with a decrease in serum leptin (an anorexigenic hormone), an increase in serum ghrelin (an orexigenic hormone), and increased hunger and appetite (in particular for calorie-dense foods with high carbohydrate content)
- sleep deprivation may reduce the proportion of weight lost as fat during caloric restriction
- Sleep deficiency may have contributed to the obesity epidemic in the United States

Sleep deprivation and Obesity



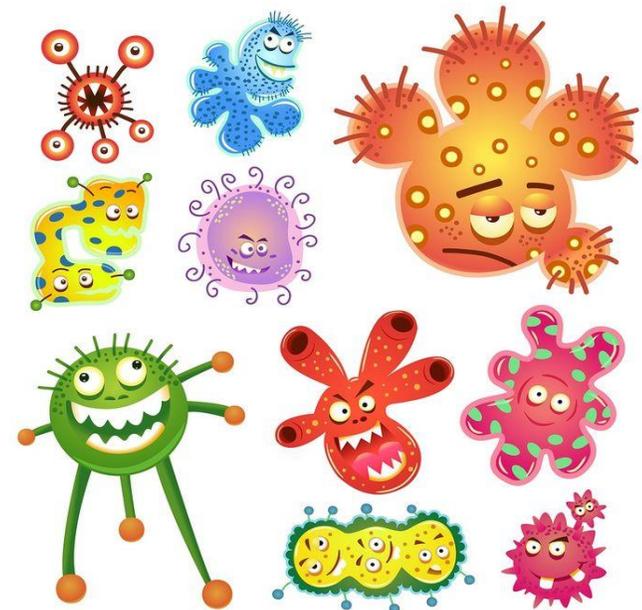
Sleep Duration and Relative risk of type 2 DM



Sleep and Cancer

- **Prostate cancer:**

- Researchers surveyed of 2,102 men and followed the 1,347 men in the group who didn't fall asleep easily and/or experienced disrupted sleep.
- After about five years, 135 men developed prostate cancer, with 26 of them having an aggressive form of the disease.
- Researchers identified a twofold risk of developing prostate cancer in men with sleep insomnia.



Sleep and Cancer

- **Colorectal cancer:**

- Researchers studied the sleep quality of 1,240 people about to have a colonoscopy.
- 338 study participants were diagnosed with colorectal cancer. Those diagnosed were more likely to average less than six hours of sleep per night.
- Researchers calculated a 50 percent increased risk of colorectal cancer for people sleeping less than six hours per night.

Cancer, Volume 117, Issue 415 February 2011 Pages 841–847

- **Breast cancer:**

- Researchers asked 101 recently diagnosed breast cancer patients about the average amount of sleep they got two years before diagnosis.
- They found that the post-menopausal women who slept fewer hours had a higher likelihood of cancer recurrence.
- The study was the first to suggest more aggressive breast cancers are associated with inadequate sleep.

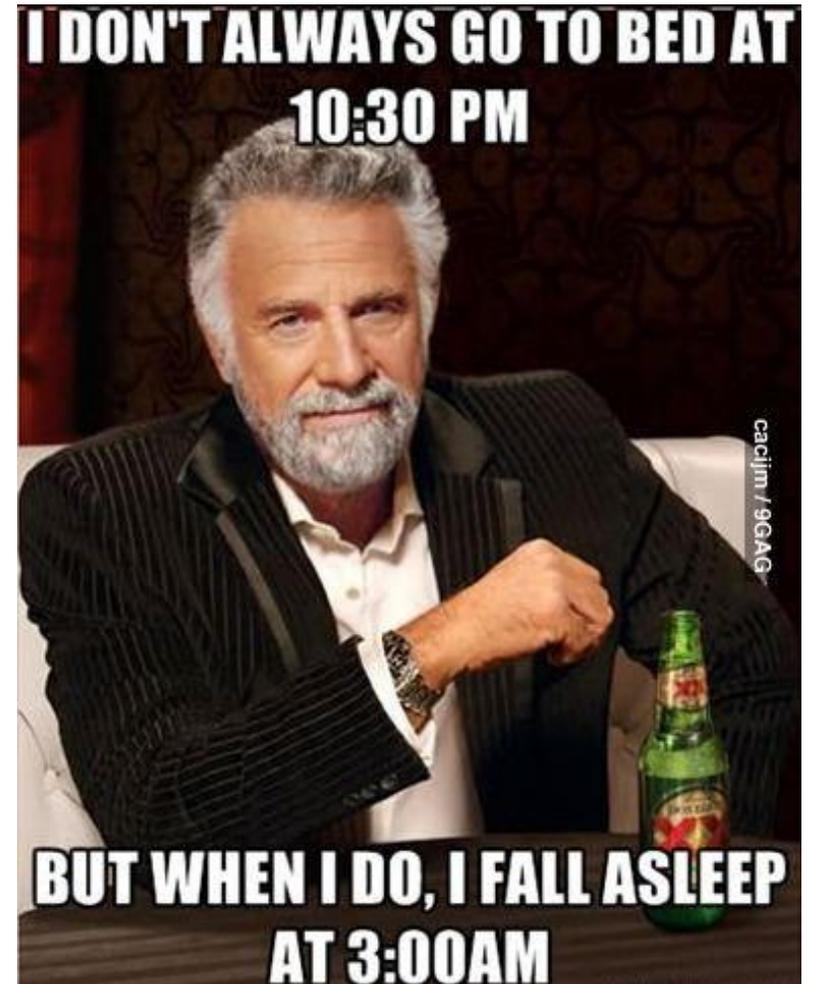
[Breast Cancer Research and Treatment](#) August 2012, Volume 134, [Issue 3](#), pp 1291–1295

Treatment of Insomnia

- Treat any underlying medical condition, psychiatric illness, substance abuse, or sleep disorder that may be precipitating or exacerbating the insomnia
- cognitive behavioral therapy for insomnia (CBT-I)
- For patients whose insomnia continues to be severe enough to require an intervention despite CBT-I, we recommend the addition of a medication to CBT-I

Treatment of Insomnia

- Short acting Medication for sleep onset
Insomnia [zaleplon](#), [zolpidem](#), [triazolam](#), [lorazepam](#), and [ramelteon](#).
- Long acting for sleep maintenance
insomnia [zolpidem](#) extended
release, [eszopiclone](#), [temazepam](#), [estazolam](#),
low dose [doxepin](#), and [suvorexant](#)
- Risk for long term use of OTC sleeping pills



Sleep hygiene

- Sleep as long as necessary to feel rested (usually seven to eight hours for adults) and then get out of bed

- Maintain a regular sleep schedule, particularly a regular wake-up time in the morning

- Try not to force sleep

- Avoid caffeinated beverages after lunch

- Avoid alcohol near bedtime (eg, late afternoon and evening)

- Avoid smoking or **other nicotine intake, particularly during the evening**

- Adjust the bedroom environment as needed to decrease stimuli (eg, reduce ambient light, turn off the television or radio)

- Avoid prolonged use of light-emitting screens (laptops, tablets, smartphones, ebooks) before bedtime

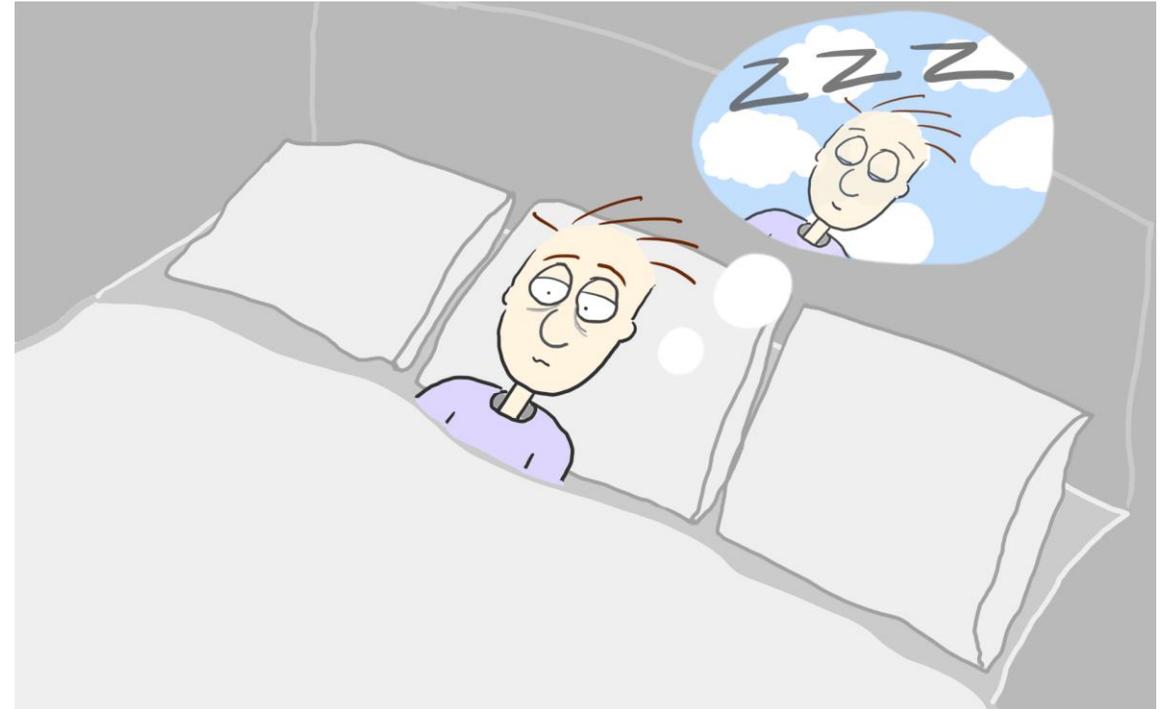
- Resolve concerns or worries before bedtime

- Exercise regularly for at least 20 minutes, preferably more than four to five hours prior to bedtime

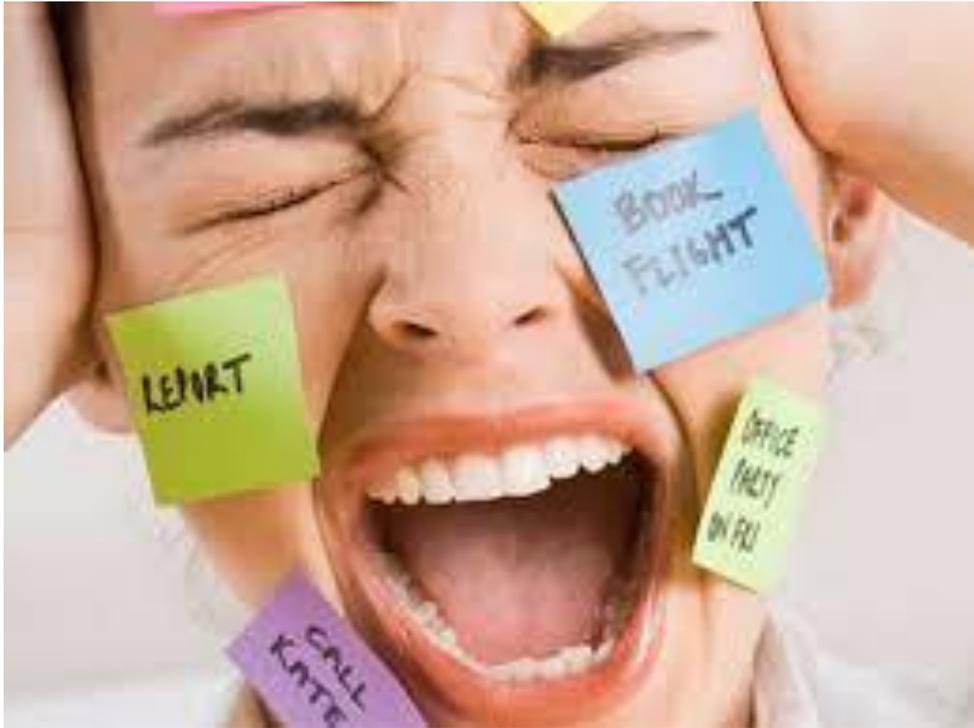
- Avoid daytime naps, especially if they are longer than 20 to 30 minutes or occur late in the day

Stimulus control

1. Go to bed only when sleepy.
2. Do not watch television, read, eat, or worry while in bed. Use bed only for sleep and sex.
3. Get out of bed if unable to fall asleep within 20 minutes and go to another room. Return to bed only when sleepy. Repeat this step as many times as necessary throughout the night.
4. Set an alarm clock to wake up at a fixed time each morning, including weekends.
5. Do not take a nap during the day.



Schedule Worry Time



- My alarm clock might not work in the morning
- I lost my deodorant and smell like crap.
- The cigarettes I smoke are murdering me from the inside.
- I forgot to buy more instant coffee and will be super cranky tomorrow morning.
- I think there's a leak in the kitchen wall.
- I'm pushing all my responsibilities to the last minute and can't quite finish them all.
- My girlfriend is totally going to dump me.
- I'm missing a key DVD in my crappy children's show DVD collection.
- I've been slacking off on my exercise regimen for the past few ~~days~~ ~~weeks~~ months.

Sleep Restriction

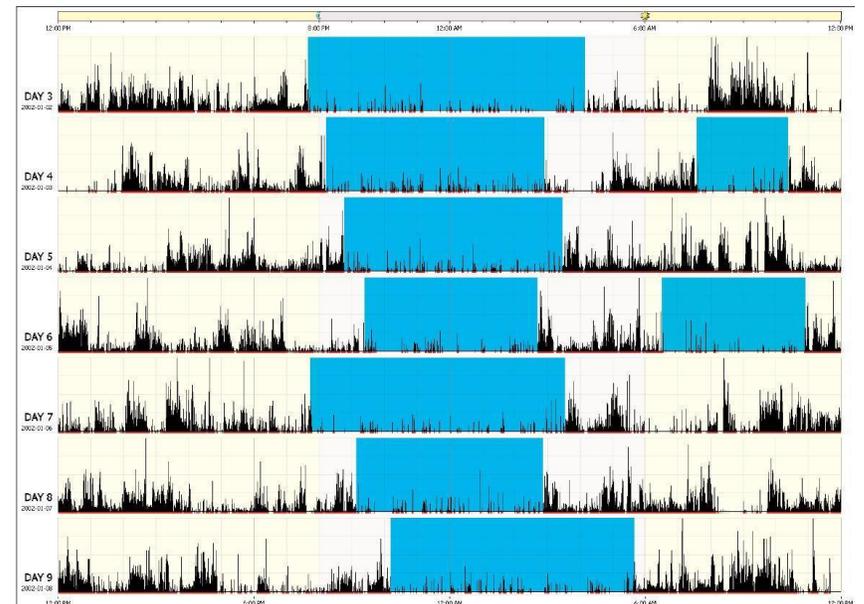
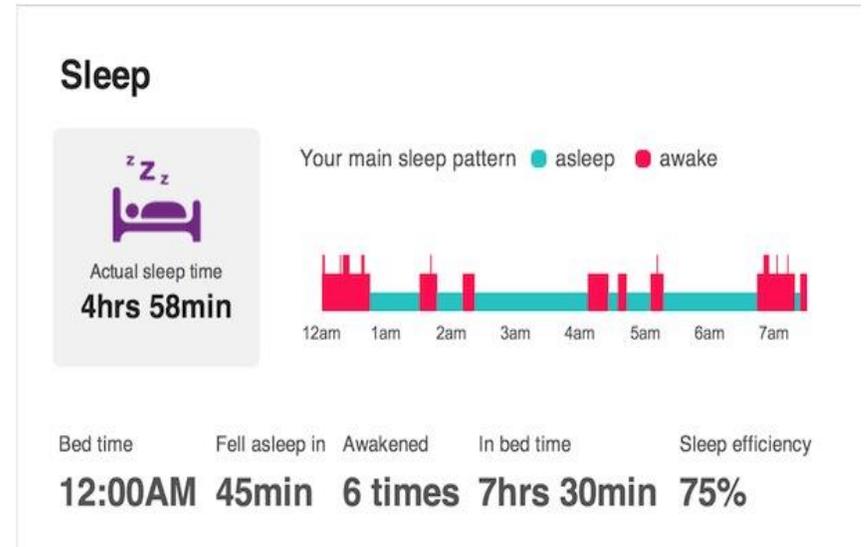
- Determine the individual's Average Total Sleep Time (ATST) per night (this can be calculated from a [sleep diary](#) that has been filled out for one week).
- Restrict the individual's time in bed each night to the ATST.
- Establish a fixed bedtime depending on the desired wake time in the morning, and do not permit any sleep to occur outside of the sleep window.
- Do not reduce time spent in bed to less than 4.5 hours per night
- Monitor daily sleep efficiency, which is calculated by the Total Sleep Time (TST) / time spent in bed multiplied by 100.
- Extend the time spent in bed by 15 minutes when the weekly average sleep efficiency exceeds 90 percent. Reduce the time spent in bed by 15 minutes when the weekly average sleep efficiency falls below 80 percent.

Hypnotics, Cancer and Death

- In 2010, an estimated 6% to 10% of adults in the United States took a hypnotic drug to help them sleep
- Adults who use hypnotics to help them sleep have a greater than 3-fold increased risk for early death
- 35% overall increased risk for cancer in hypnotics users.
- The associations were evident in every age but were greatest among those aged 18 to 55 years

Personal monitoring devices

- The accuracy of the data provided by these consumer devices is not well known
- One study compared four consumer-grade devices with a research-grade actigraphy device and showed that all devices overestimated minutes of sleep
- Multistage validation studies are needed
- They don't give accurate information about the quality of sleep, sleep stages or sleep disorders
- They may give false assurance about your sleep for example a patient with OSA could have 300 Apnea and hypopnea in one night and the device may report sleeping for 8 hours



Actigraphy

Obstructive sleep Apnea

Risk Factors

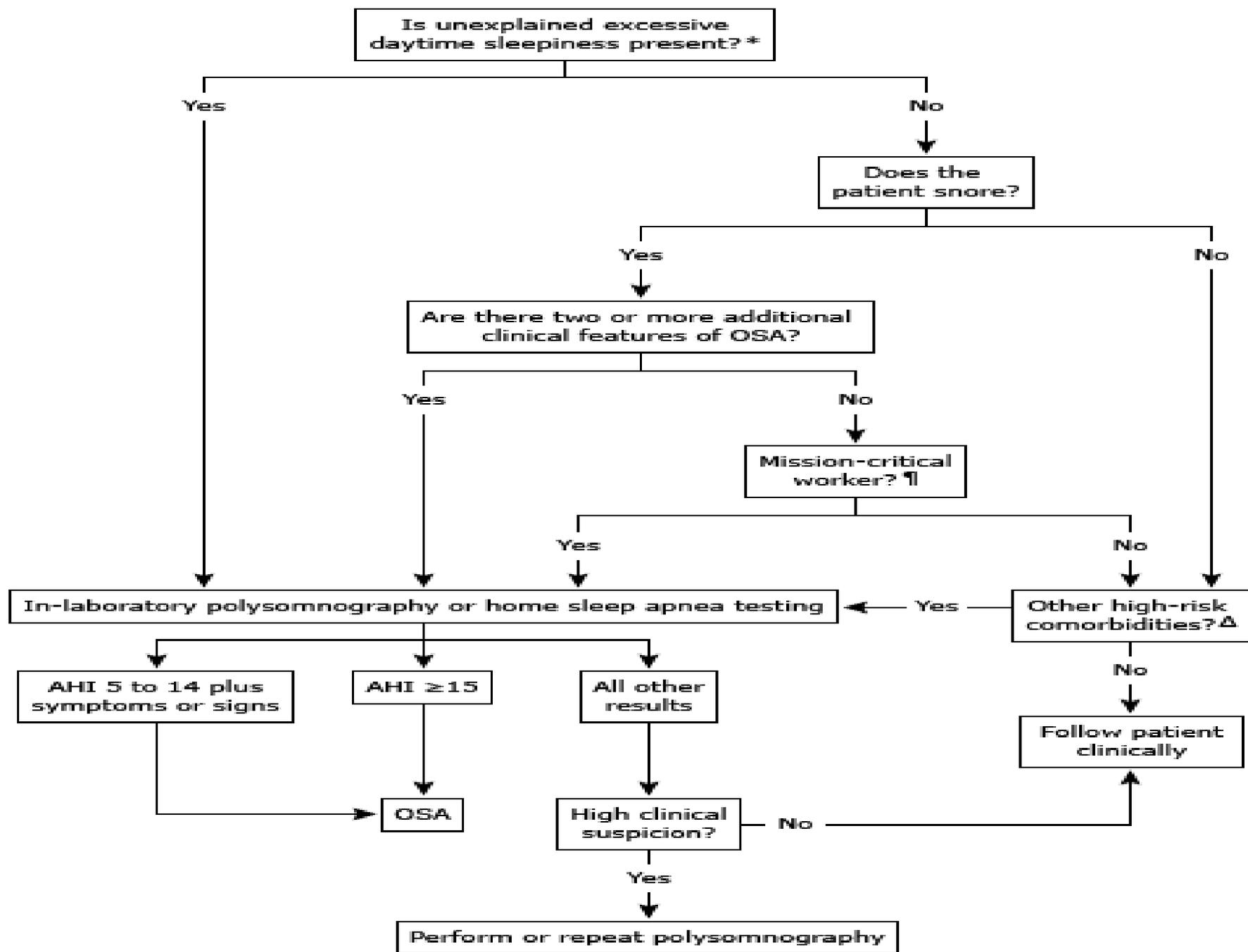
1. **Craniofacial and upper airway abnormalities**
2. **Nasal congestion**
3. **Smoking**
4. **Menopause**
5. **Family history**
6. **Medications:** Alcohol, Sedatives, narcotics
7. **Medical conditions:** Pregnancy, CHF, COPD, ESRD, PCOS, Acromegaly

Symptoms

1. **Snoring/Dry Mouth**
2. **EDS/Fatigue**
3. **Restless sleep**
4. **Morning Headaches**
5. **Witnessed apnea**
6. **Nocturia**
7. **Depression**
8. **Symptoms of fibromyalgia**
9. **Memory impairment**
10. **Overactive bladder**
11. **Difficulty concentration**

Signs

1. **obesity**
2. **crowded oropharyngeal airway**
3. **Large tongue**
4. **large neck circumference**
5. **hypertension.**



Polysomnography (PSG)

- Total sleep time
- Sleep efficiency
- Sleep stage percentage
- Sleep stage latency
- Apneas: cessation, or near cessation, of airflow
- Hypopneas: abnormal reduction of airflow to a degree that is insufficient to meet the criteria for an apnea
- Snoring
- Apnea Hypopnea index
- Body position
- Oxyhemoglobin saturation
- Limb movements



HOME SLEEP STUDY

- To evaluate for OSA in patients with a high pre-test probability of having moderate to severe OSA and no comorbid medical or sleep disorders.
- To evaluate the efficacy of an oral appliance or upper airway surgery for OSA.
- To guide the titration of positive airway pressure therapy i



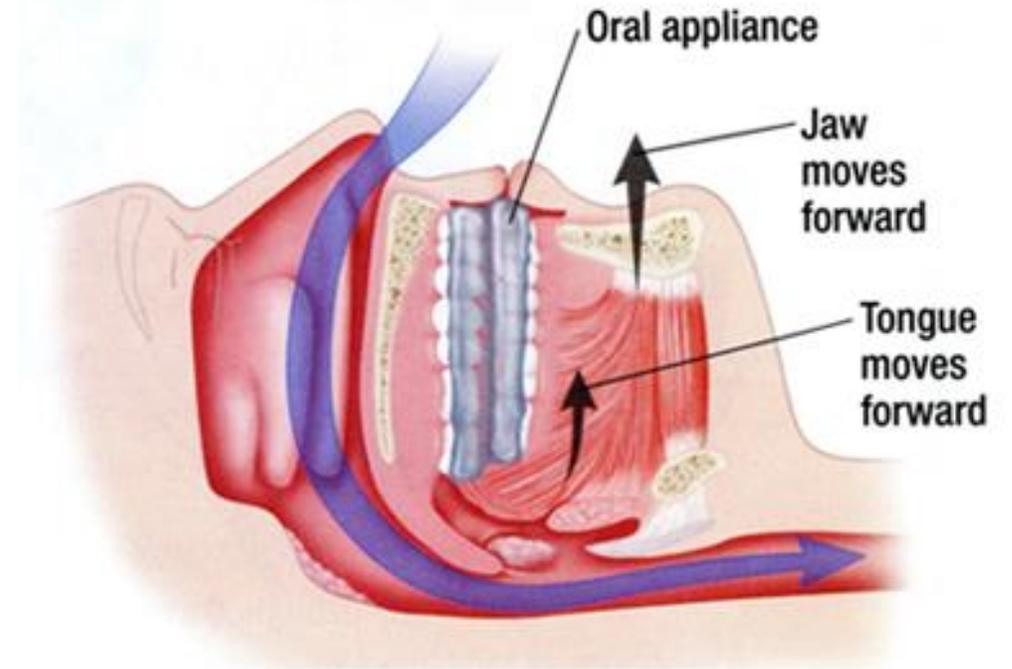
Treatment of OSA

- Severe OSA (AHI ≥ 30 events per hour): positive airway pressure as initial therapy
- Mild to moderate OSA: positive airway pressure as initial therapy rather than an oral appliance
- For patients who anticipate problems with positive airway pressure therapy adherence, an oral appliance is a reasonable alternative as first-line therapy.



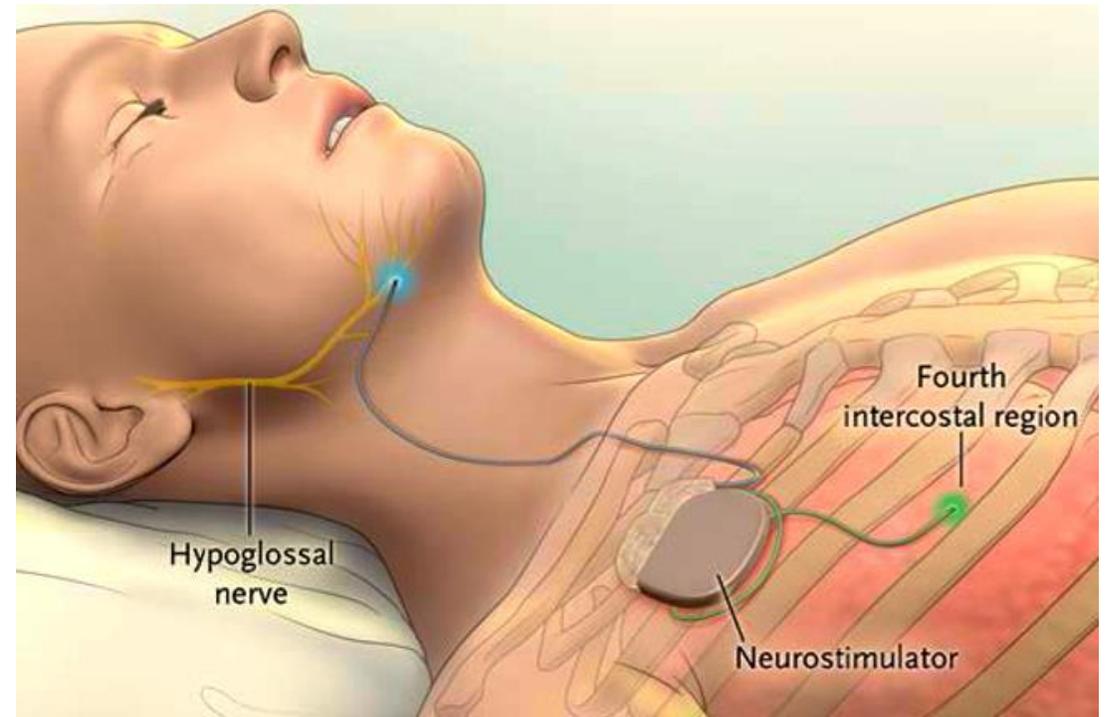
ORAL APPLIANCES

- For patients with mild or moderate OSA who have failed or declined CPAP.
- Potential advantages of oral appliance therapy over CPAP include portability, tolerability, and improved adherence.
- Less effective than positive airway pressure at improving the AHI and oxyhemoglobin saturation
- They should not be used for routine management of patients with severe OSA (AHI >30 events per hour).



The Inspire obstructive sleep apnea device

- Implantable treatment option for people with Obstructive Sleep Apnea who can not tolerate CPAP
- The system delivers mild stimulation to the hypoglossal nerve which controls the movement of the tongue and other key airway muscles.
- By stimulating these muscles, the airway remains open during sleep.
- It is controlled by a small handheld sleep remote..

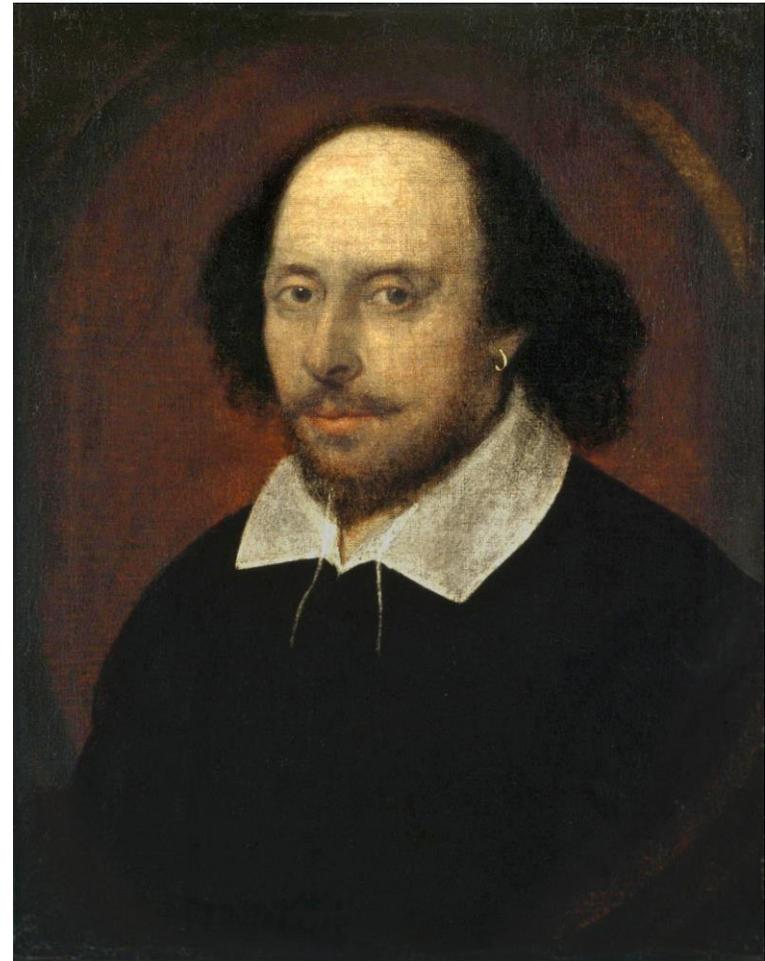


CPAP in obstructive sleep apnea does not reduce cardiovascular events (August 2016)

- Randomized Trial included 2717 patients with moderate to severe OSA and established cardiovascular disease to CPAP therapy plus usual care or usual care alone and followed patients for 3.7 years
- There was no difference in cardiovascular events (eg, cardiovascular deaths, myocardial infarction, or stroke).
- CPAP should be administered for the associated noncardiovascular benefits (eg, improvement in symptoms and quality of life)



Don't sleep any more than you have to. I usually sleep about four hours per night.



Oh sleep! Oh sweet sleep, nature's gentle healer, what have I done to frighten you? You won't weigh down my eyelids anymore, or dull my mind to make me forget