

Achieving Better Sleep

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London Family AgeSmart Lecture Series

True or False:

Everyone needs 8 hours of sleep.

I can catch up/make up for lost sleep.

We can train ourselves to be early birds.

We need less sleep as we get older.

Fixing “sleep hygiene” issues will cure my sleep problems

A “good night’s sleep” can always cure problems with excessive daytime sleepiness.

If I wake up tired, then my sleep quality must have been poor.

Only obese people can have sleep apnea.

Why we sleep?

Lots of theories but no one knows for sure; but clearly we need to sleep.

In laboratory experiments, after rats had been deprived of **total sleep** for an average of 16.5 days, they died.

If they are selectively deprived of **REM** sleep but allowed to sleep in the other stages, they still died, but in an average of 43 days.

If rats were selectively deprived of **stages 3 and 4 sleep** but allowed to sleep in other stages, they also died but in an average of 44.5 days.

Why We Sleep...to avoid this....



Myths, Biases, and Ignorance

Conventional wisdom regarding sleep generally forms our beliefs and thus our behaviors.

Not based on any understanding of the heterogeneity of sleep amongst individuals nor any understanding of the regulatory mechanisms of sleep and wake.

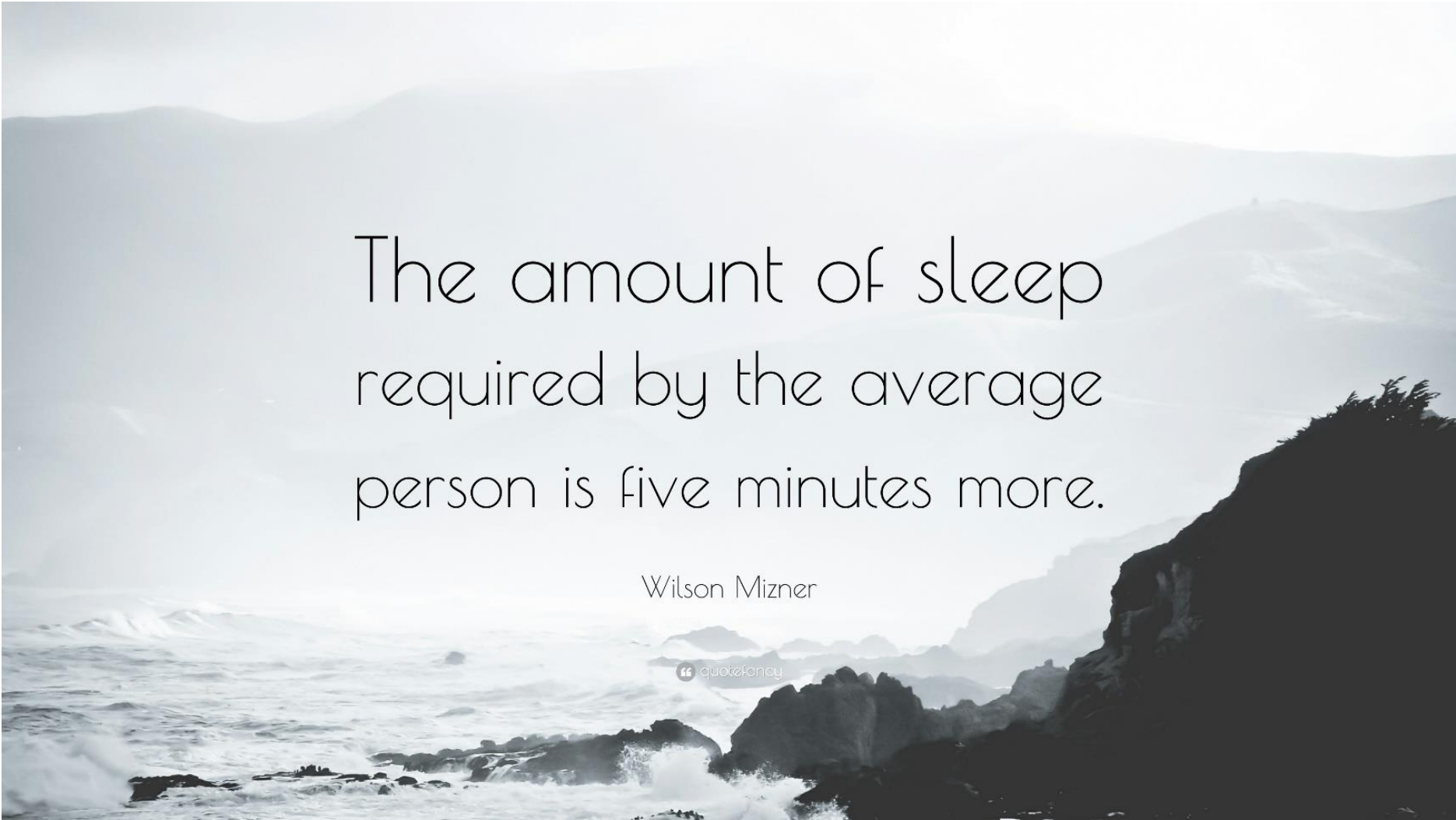
Optimizing One's Sleep: Considerations

Sleep is a heterogeneous physiological process that varies from person to person!

- ***SLEEP NEEDS***
- ***SLEEP CAPABILITIES***
- ***OPTIMAL TIMING OF SLEEP***
- ***EXPECTATIONS (WHICH THEN GUIDE BEHAVIORS)***
- ***Other confounding influences:***
 - *Sleep fragmenting conditions (OSA, PLMD, sleep related seizures, etc.)*
 - *Medications*
 - *Medical conditions*

Sleep Needs

DOC, “HOW MUCH SLEEP DO I NEED”?

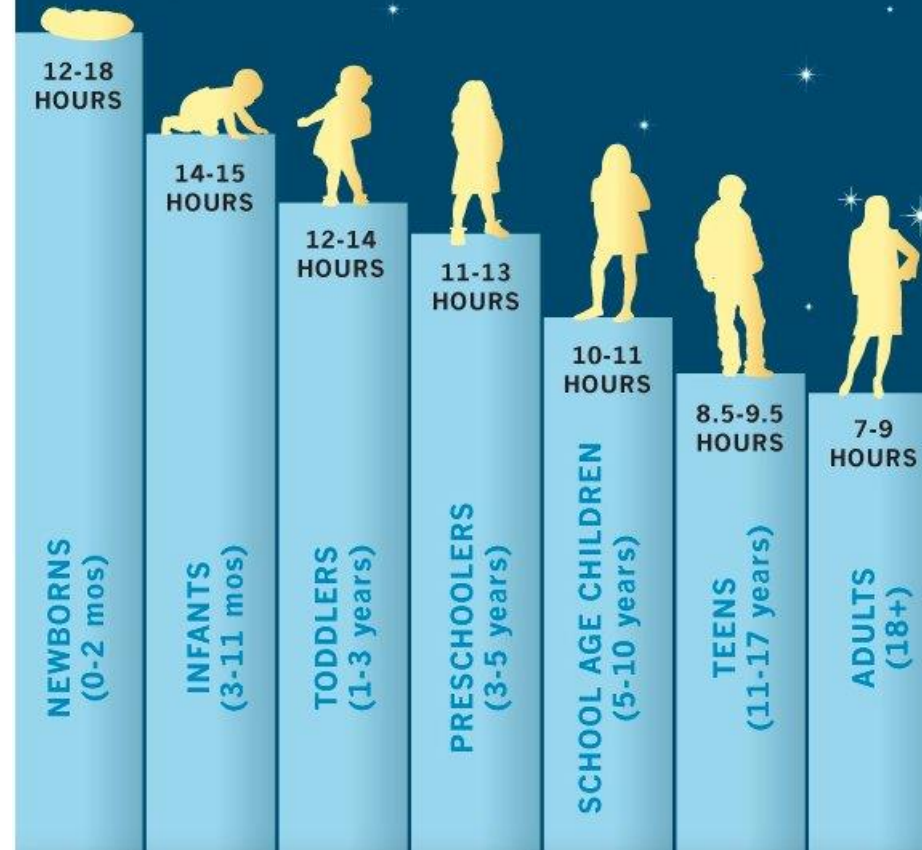


The amount of sleep
required by the average
person is five minutes more.

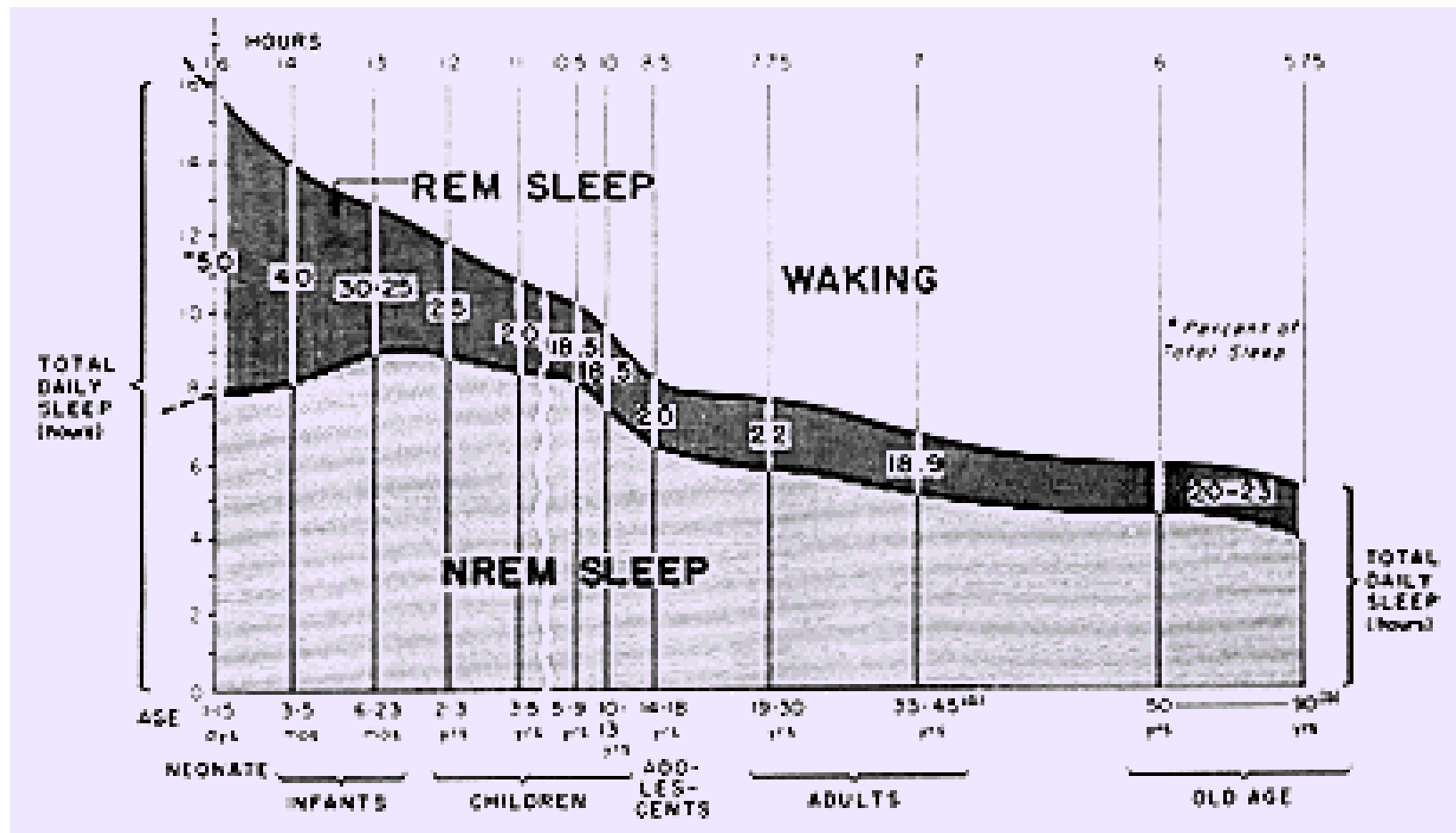
Wilson Mizner

“ quote fancy

HOW MUCH SLEEP DO WE REALLY NEED?



Sleep Changes over a lifetime



Sleep Needs

A meta analysis of 3577 healthy subjects showed that total amount of sleep decreases linearly with age at a loss of about 10 minutes per decade up to the age of 60

The percent of REM sleep also diminishes but plateaus after age 60.

Sleep efficiency declines as we age.

Sleep Duration and Mortality

Numerous large scale epidemiologic, cohort studies have demonstrated significant morbidity and mortality relationships with sleep duration.

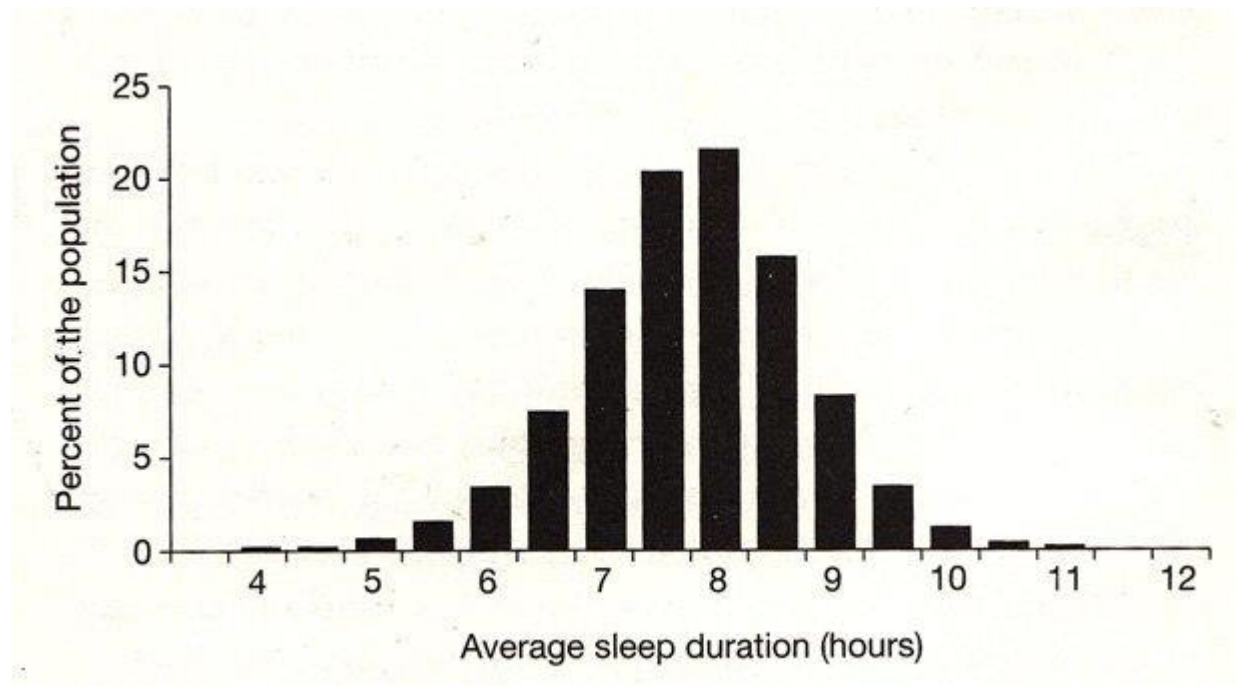
- Increased risk of developing hypertension
- Increased risk for obesity
- Increased risk of developing CAD
- Increased risk of developing DM II
- Overall increased risk of cardiovascular mortality

Sleep Deprivation

A 2001 study demonstrated that individuals with chronic 2 hours/night sleep restriction and/or acute, one night of no sleep, demonstrated reaction times similar to those individuals with a BAL concentration of 0.089 g/dl.

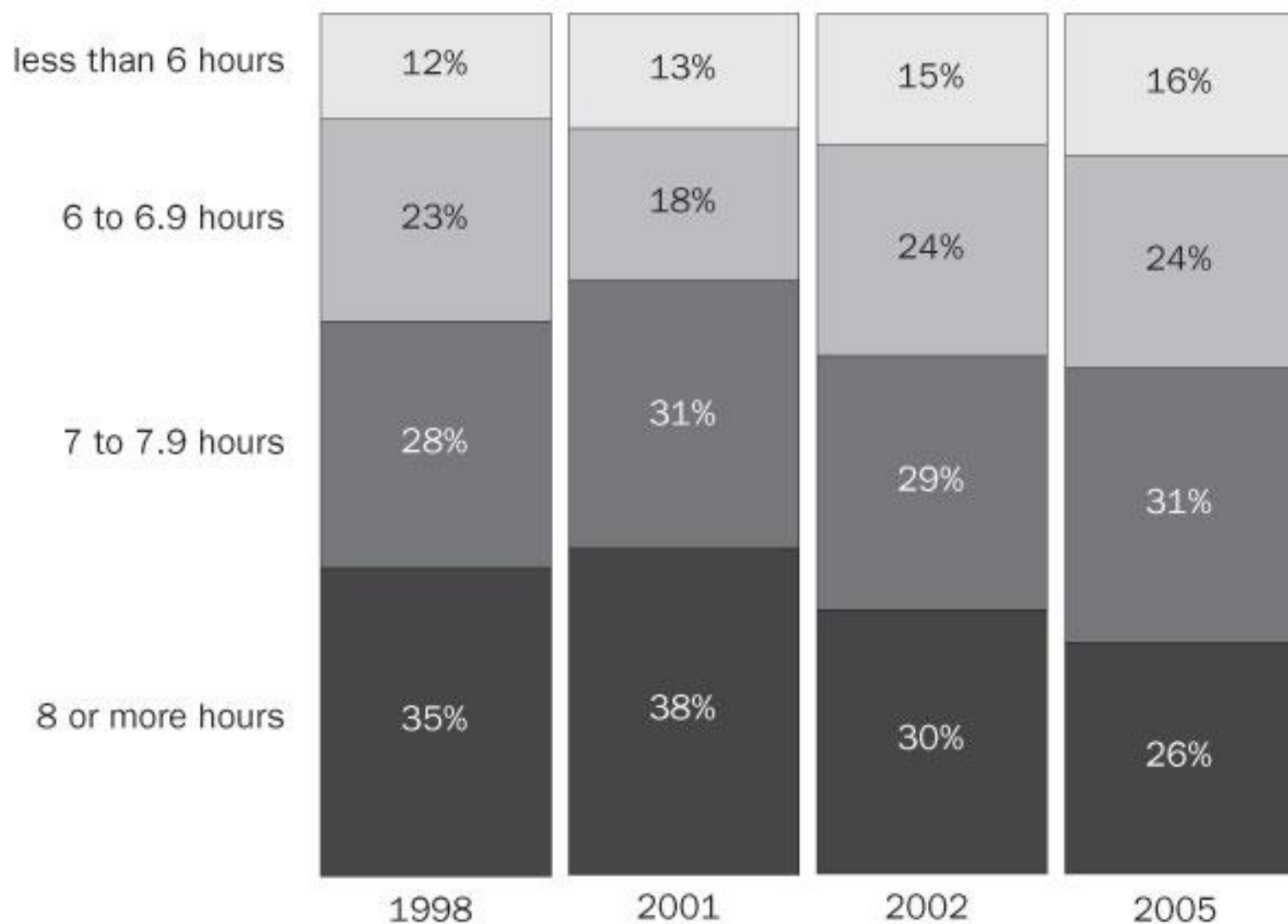
Further demonstrated that 17-19 hours awake equivalent to BAL 0.05 g/dl.

Sleep Needs—Average Sleep Duration



GETTING ENOUGH Z'S?

STUDIES BY THE NATIONAL SLEEP FOUNDATION SHOW THAT ADULTS ARE GETTING FEWER HOURS OF SLEEP



Sleep Needs

Vary from person to person

Best indications of sleep needs are:

- How do you feel when you wake up in the morning?
- How do you function during the day?
 - Alertness/sleepiness?
 - Cognitive function
 - Mood regulation
- Do you wake with an alarm?
- Do you sleep much more on weekends compared to weekdays?

Sleep Capabilities

HOW MUCH SLEEP CAN YOU GET?

Normal Sleep Architecture

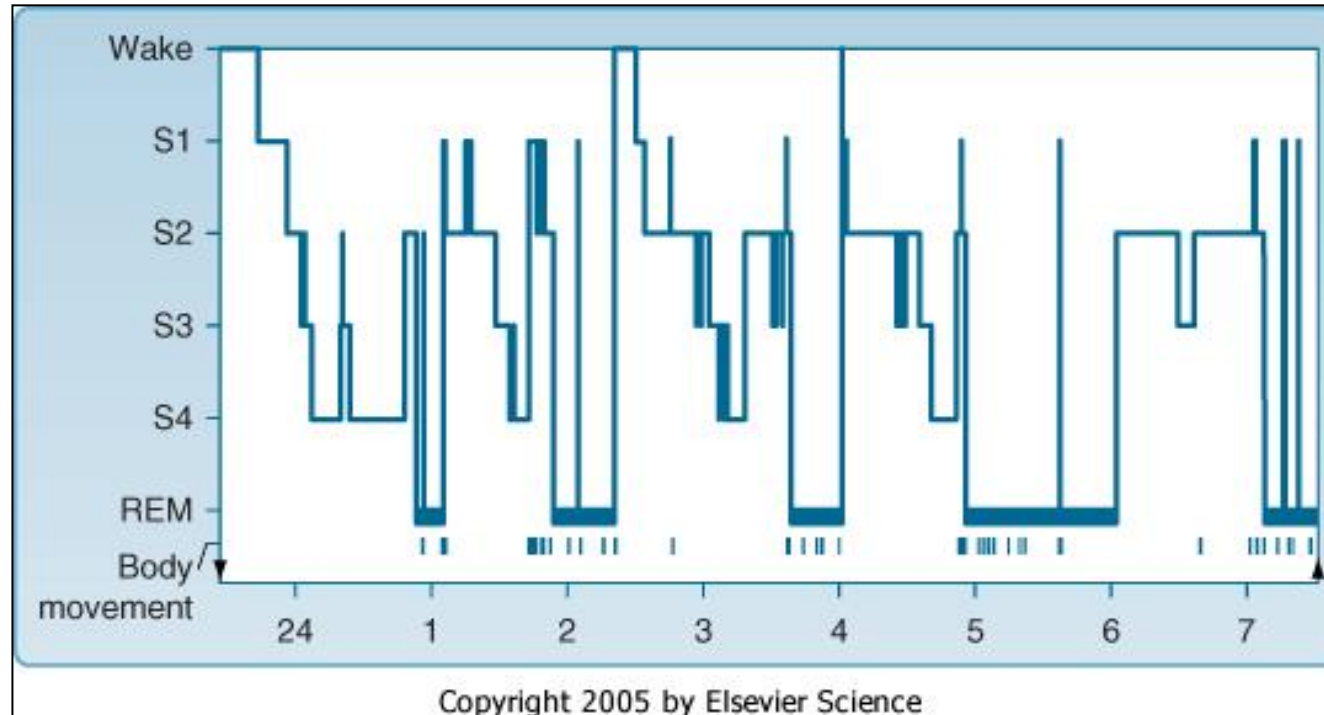


Figure 2-7 The progression of sleep stages across a single night in a normal young adult volunteer is illustrated in this sleep histogram. The text describes the "ideal" or "average" pattern. This histogram was drawn on the basis of a continuous overnight recording of electroencephalogram, electrooculogram, and electromyogram in a normal 19-year-old man. The record was assessed in 30-second epochs for the various sleep stages. REM, rapid eye movement.

Age Related Changes in Sleep Architecture

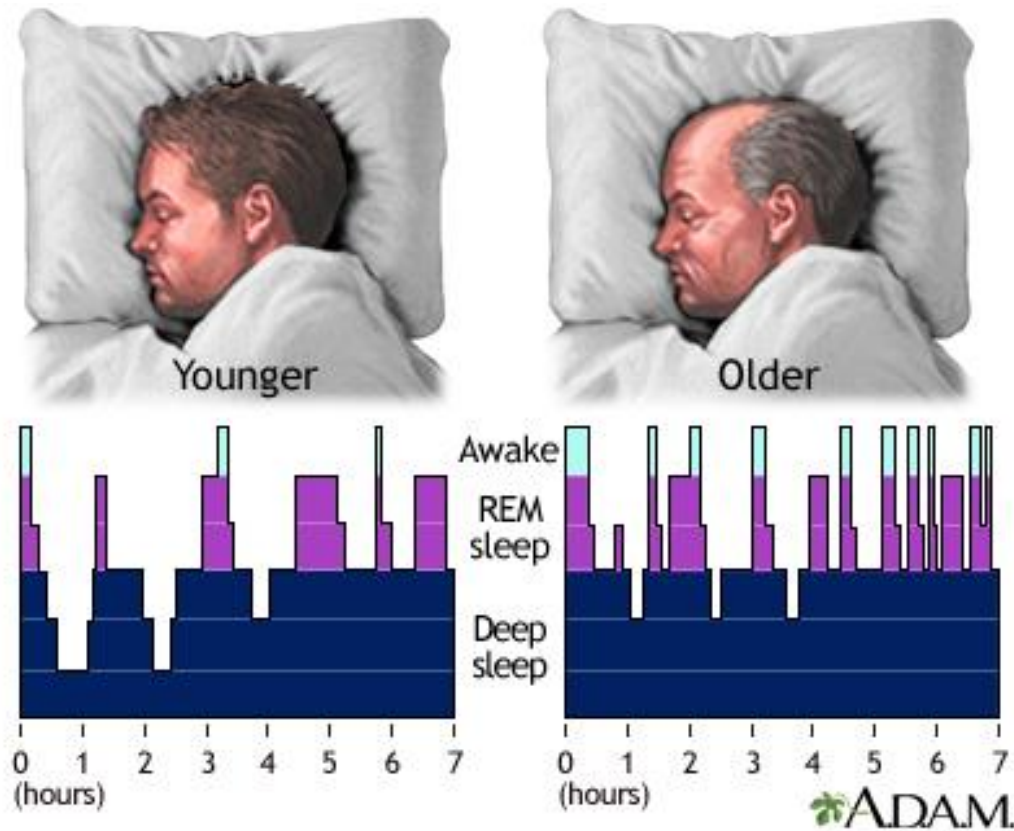


Sleep Capabilities

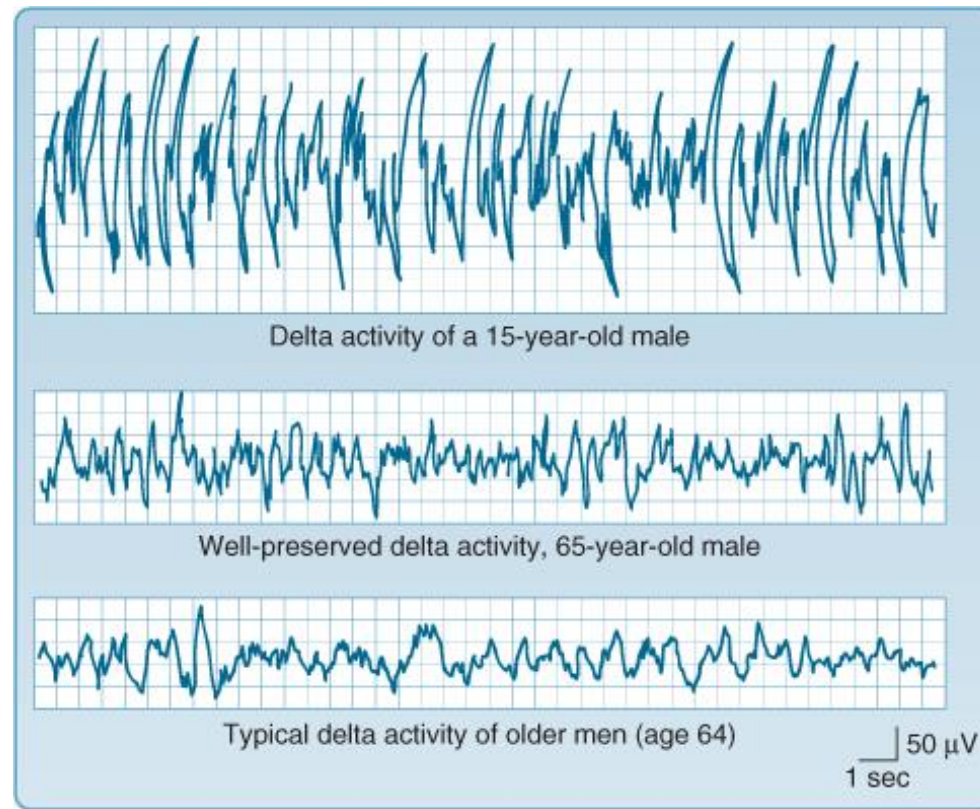
Sleep is a neurobiological process, governed by discrete structures and processes in our central nervous system.

And like any biological process in the human body, it can be subject to dysfunction!!!

Age Related Changes in Sleep Architecture



Age Related Changes in Sleep Architecture



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Timing of sleep

WHEN IS THE OPTIMAL TIME THAT YOU SHOULD SLEEP?

Chronobiology

The study of the timing of biologic functions.

Ultradian Rhythm: Functions with a period under 18 hours
(e.g. REM/NREM alterations)

Circadian Rhythm: Functions with a period around 24 hours
(e.g. body temperature rhythm)

Infradian Rhythm: Period more than 24 hours (e.g.
menstrual cycle)

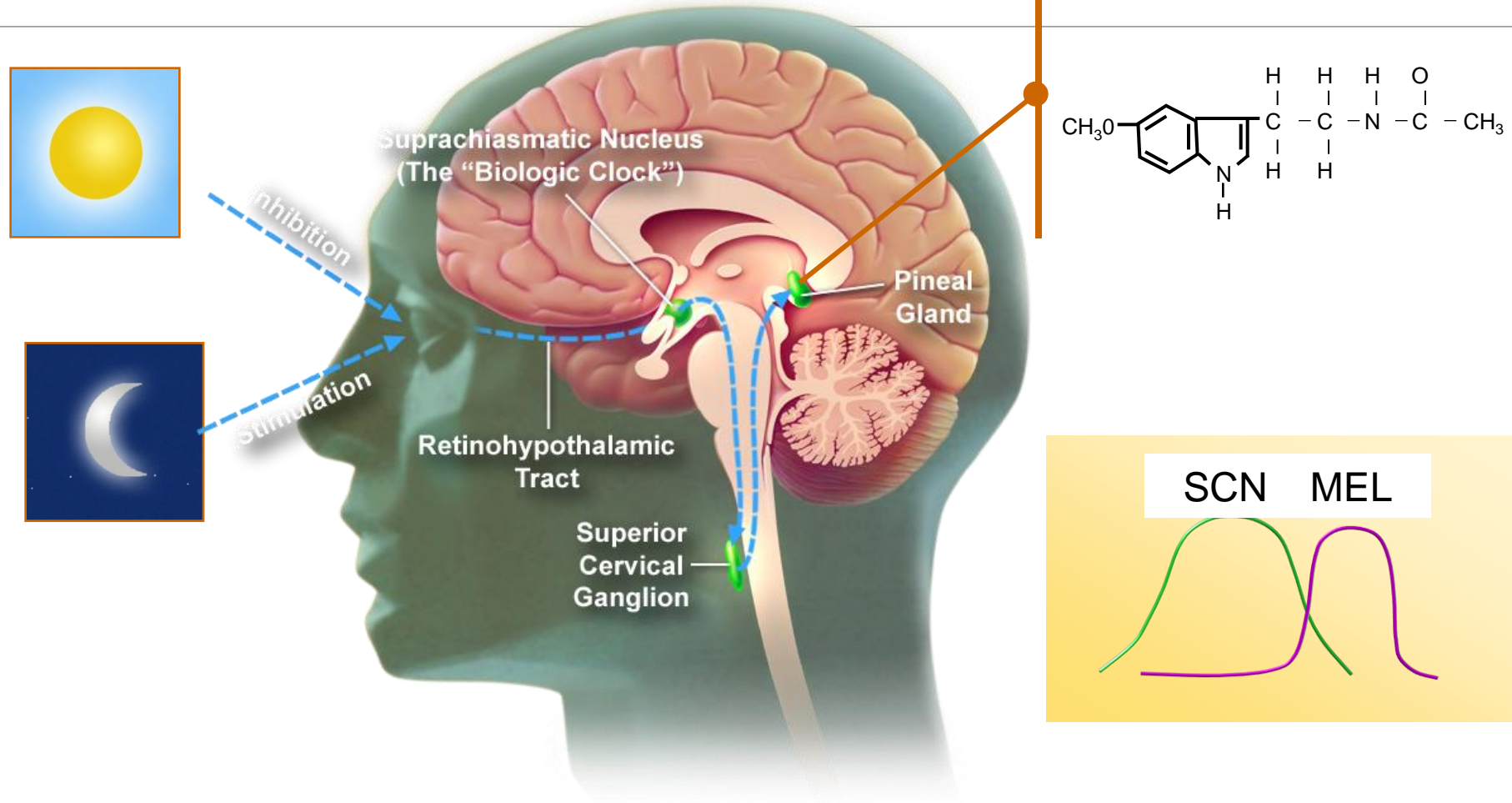
Circadian Rhythm

In humans, the “free running” period is a bit more than 24 hours.

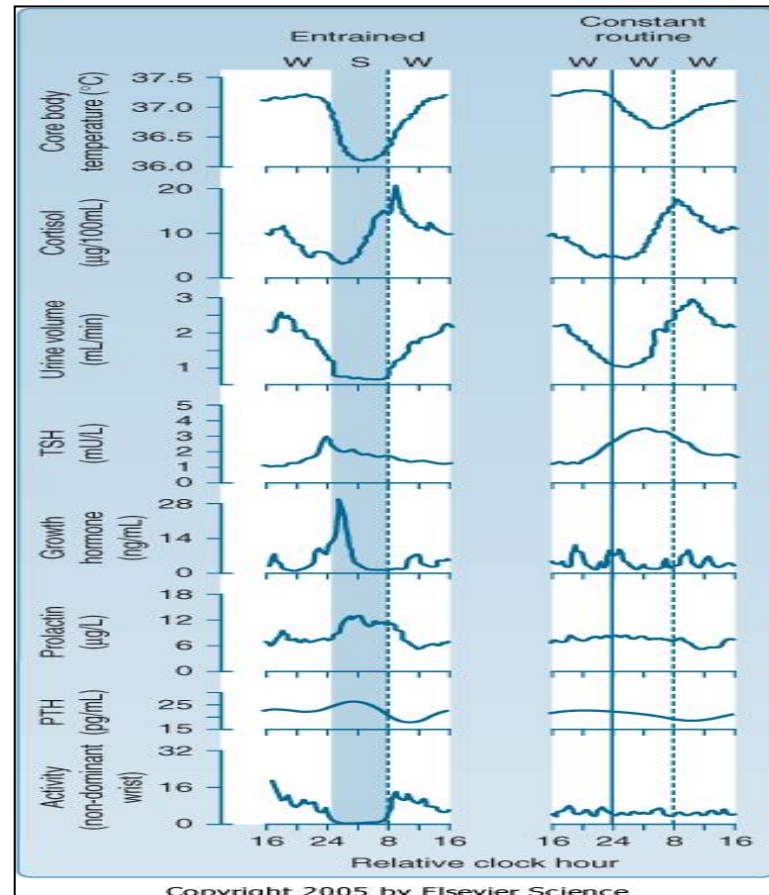
Light “entrains” or sets the clock for 24 hours.

For optimal function, “internal” body rhythms must be synchronized to each other and to the “external” light-dark cycles and social rhythms.

Circadian Rhythms and the Suprachiasmatic Nucleus (SCN)



Circadian Variation of Endocrine System



Two Process Model

Process S: Homeostatic Pressure to Sleep

Process C: Circadian Drive to Sleep

Circadian and Homeostatic Regulation of Sleep

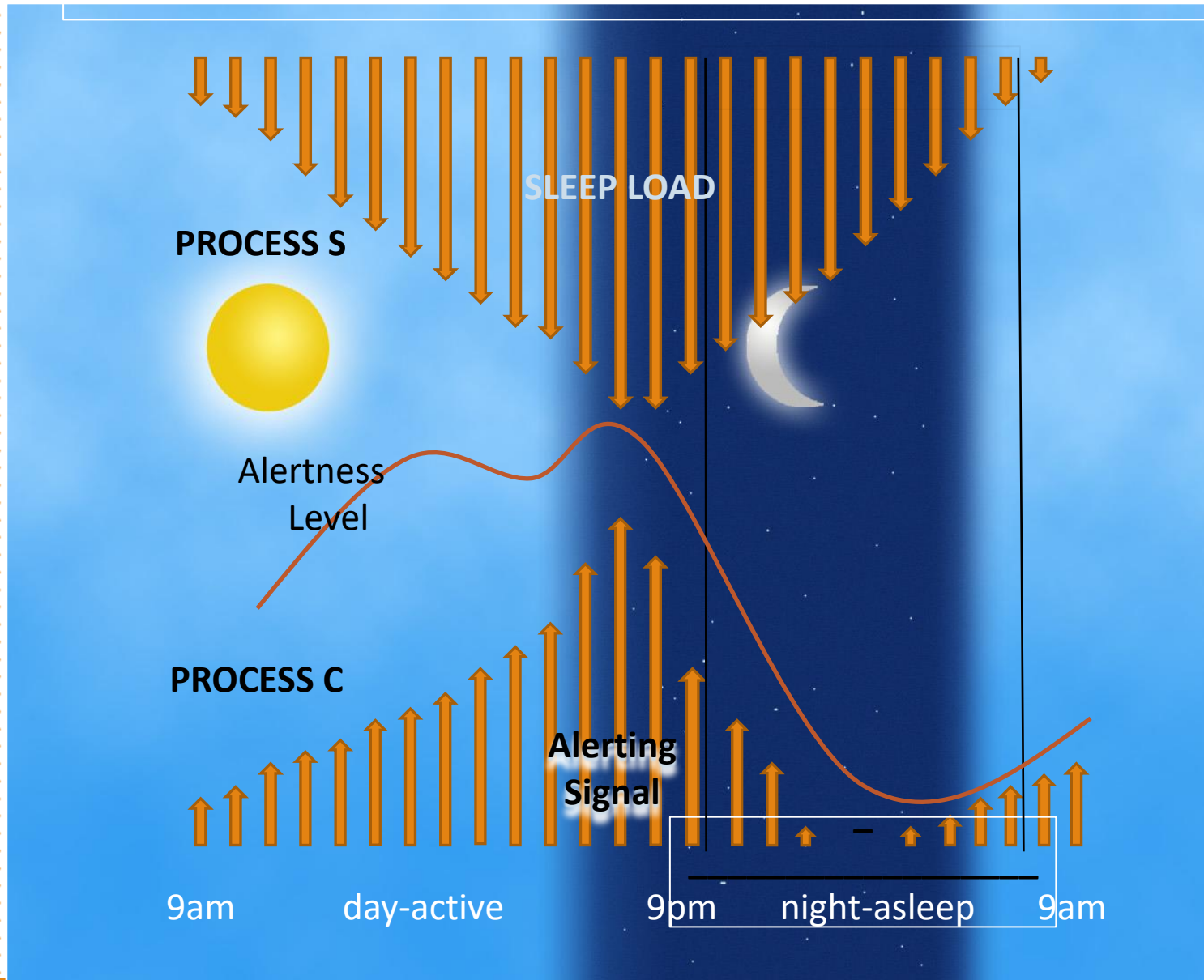


Figure 6

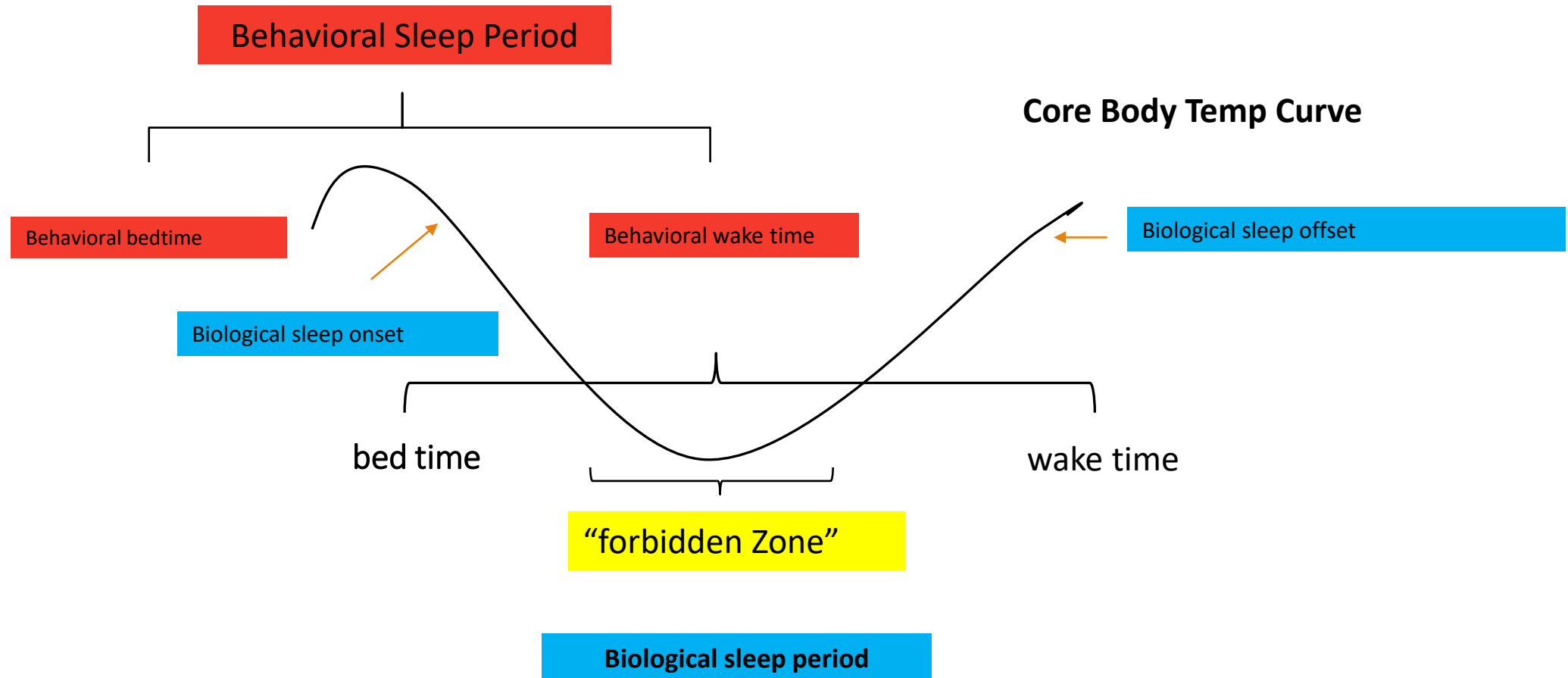
Adapted from Kilduff TS, Kushida CA. Sleep Disorders Medicine: Basic Science, Technical Considerations and Clinical Aspects. 199; and Kennaway DJ, Voultsios A. J Clin Endocrinol Metab. 1998;83:1013-1015.

Circadian Timing

Timing of sleep versus duration of sleep

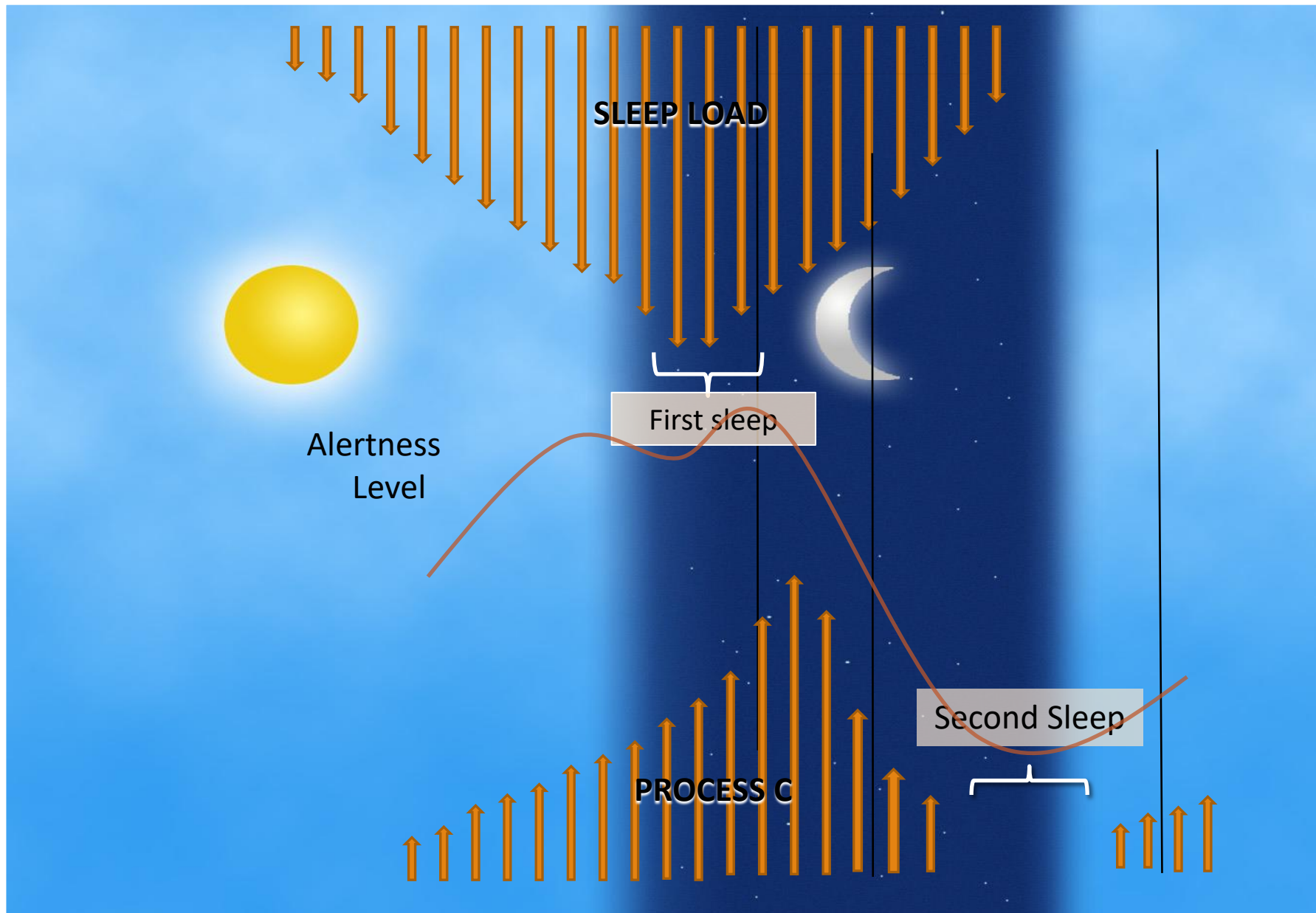
“Night owls” (“Evening Type”) versus “Early Birds”
 (“Morning Type”)

Circadian Misalignment



“Two Sleeps”: Decoupling of the Two Process Model

- A biological model for sleep maintenance insomnia.
- Before the advent of electricity, many or most cultures would sleep and wake based upon the light-dark cycles, going to bed approximately 1-2 hours after dusk, sleeping for 3-4 hours, waking for 1-2 hours, and then sleeping again for another 2-4 hours.
- Why was this phenomenon considered “normal”?



Sleep Disorders

(fairly) Common Sleep Disorders (not comprehensive)

Insomnia Disorders

Sleep Fragmenting Disorders

- SRBD (OSA, CSA, complex SBD, CSR, hypoventilation syndromes), PLMD, nocturnal Seizure Disorders

Circadian Rhythm Disorders

- DSPS, ASPS, SWSD, jet lag, irregular sleep wake schedule, free running

CNS Hypersomnia Syndromes

- Narcolepsy (w/ or w/out cataplexy); idiopathic hypersomnia; recurrent hypersomnia; hypersomnia due to medical condition (MS, PD, head trauma, CVA, hypothyroidism, medications, etc); hypersomnia due to medication

Sleep Related Movement disorders

- RLS, PLMD, nocturnal leg cramps, sleep related bruxism

Parasomnias

- RBD, sleepwalking, sleep terrors, sleep related eating disorder, isolated sleep paralysis, nightmare sleep disorder, sleep related dissociative disorder, sleep related enuresis

Pediatric

- OSA, sleep association disorder, behavioral insomnia, all of the above may apply to varying extents

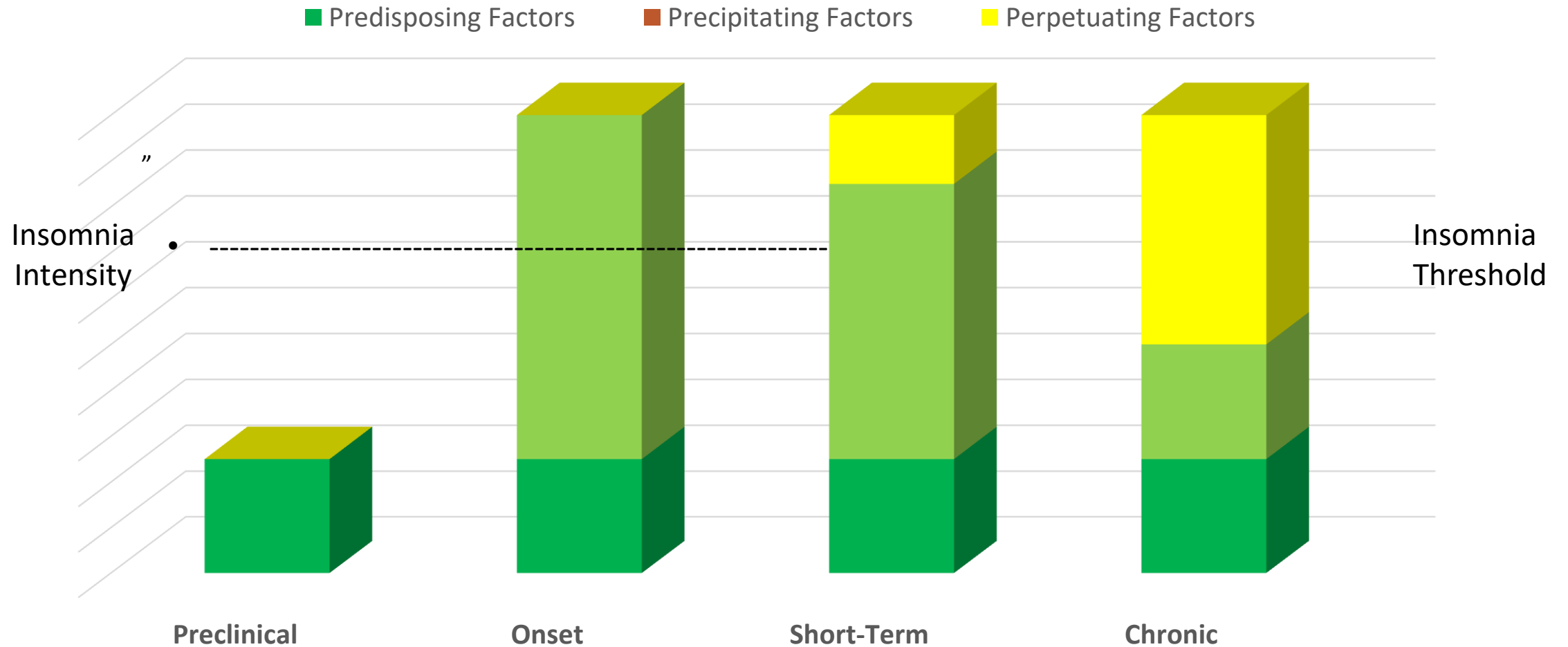
Insomnia: Epidemiology

30%-36% of the General population report at least one nocturnal **insomnia** symptom on a chronic basis.

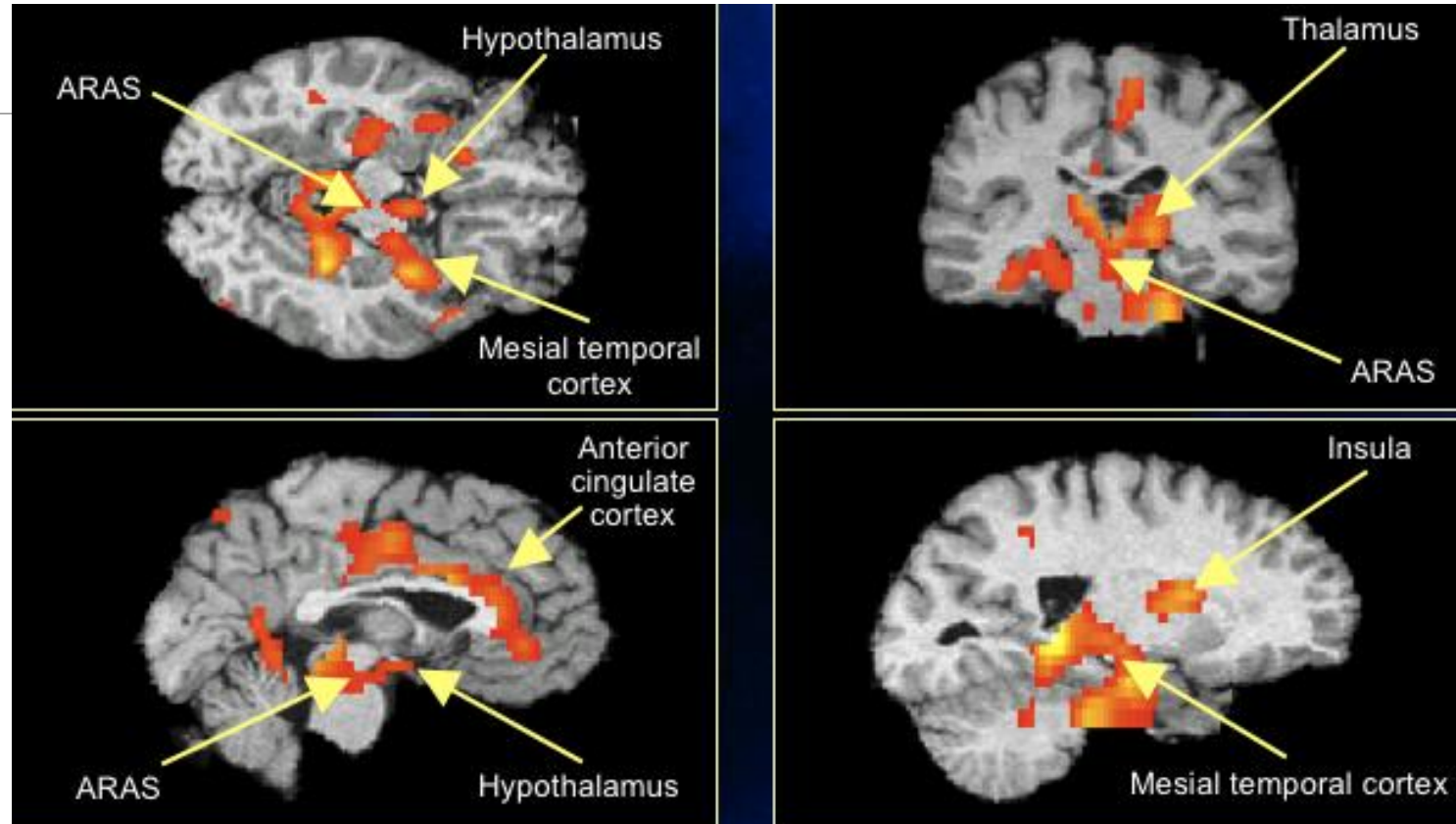
10% to 15% with chronic insomnia symptoms **and** associated daytime consequences.

A 2002 survey performed in a primary care setting found that **50% of patients** had intermittent insomnia, while **19%** **reported chronic insomnia.**

Course of insomnia



CNS areas which are relatively more active in insomniacs during sleep



General Arousal System: ARAS and hypothalamus

Emotion regulating System (limbic system): hippocampus, amygdala, and anterior cingulate cortex)

Cognitive System: Prefrontal Cortex

Treatments: Sleep Hygiene

- ***Not an effective stand alone treatment for insomnia***
- Relaxing Routine
 - Warm bath/shower
 - Quiet activities
 - Lower lights
- Regular sleep schedule
 - Go to bed and get up around the same time
 - Limit naps
- Limit stimulating behaviors before bedtime
 - Limit caffeine after 2 pm
 - Limit alcohol after dinner
 - Limit large or spicy meals
 - Limit vigorous exercise 4-6 hours before bed



Treatments: Sleep Hygiene Continued

De-stress, learn relaxation techniques

- Physical and mental



Maintain a regular physical activity routine

- Physical activity helps with stress
- Fitness reportedly helps with sleep quality

Do not go to bed hungry or full

- Light snack of carbs and foods with tryptophan



Practice stimulus control (see next slide)



Treatments: Stimulus Control

- Based on the concept of decreasing the arousal response to the bed and sleep process.
 - Bed for sleeping only, limit other activities (except sex!)
 - Eating, reading, watching television, studying, work, hobbies
 - Go to bed when you are drowsy
 - If you don't fall asleep within 10-15 minutes
 - Get up, leave the bedroom
 - Read or watch something dull
 - Room and bed comfortable
 - Little clutter (Feng Shui the bedroom) <http://fengshui.about.com/>
 - <http://video.about.com/fengshui/Feng-Shui-Bedroom-Tips.htm>
 - No pets on/in the bed
 - Temperature Cool
 - Lighting low, expose yourself to bright lights during day
 - Bed, sheets, PJ's comfortable and not binding



Treatments: Cognitive Behavioral Therapy for insomnia (CBT-I)

- Multiple modalities incorporated (sleep hygiene, stimulus control, sleep restriction, cognitive restructuring, meditation, visualization)
- Intended to help reframe expectations and beliefs about sleep and sleep loss in an effort to help reduce arousal response to sleep and restructure sleep process.

Sleep Medications and Dementia

Multiple observational, mostly retrospective studies have suggested a link between hypnotic use and dementia.

Sleep disturbances (night time awakenings, irregular sleep/wake cycles) is a common complaint in patients with dementia of various types (~25% to 40%).

- Likely of multi-factorial etiologies (intrinsic deterioration of the circadian rhythmicity, disorganization of sleep/wake cycles, undiagnosed obstructive

Possibly an antecedent symptom related to the neurodegenerative processes leading to dementia

Dose related risk of hypnotic use with risk of dementia in some studies may reflect insomnia severity and risk of dementia

HTN and CV events/mortality—“these blood pressure meds are killing people”

Hypnotics and Dementia

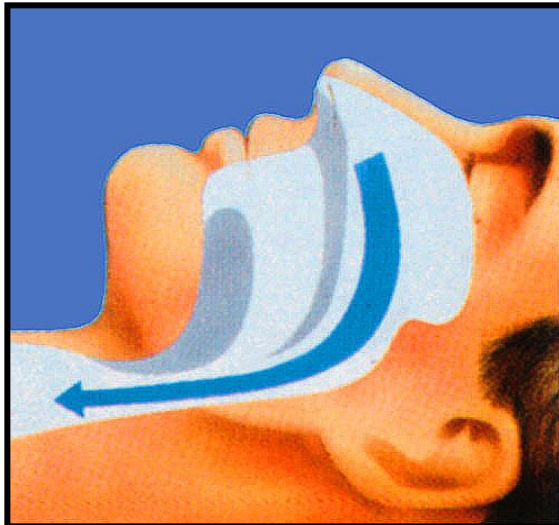
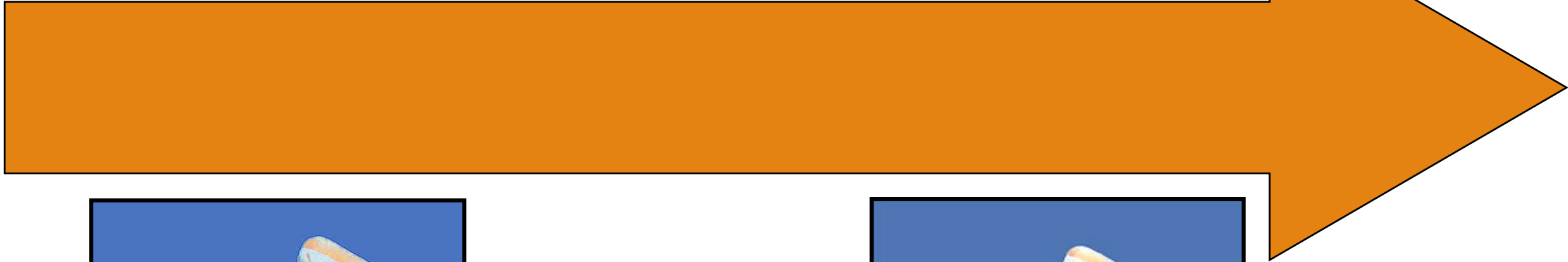
WE JUST DON'T KNOW THE RISK!!!

Sleep Related Breathing Disorders

Conditions characterized by collapsing of the throat muscles while asleep, leading to obstruction (partial or complete) of airflow. Subsequent oxygen level drops and rise in carbon dioxide levels leads to disruption of sleep, which restores muscle tone and alleviates the obstruction.

Continuum of Obstruction

Normal Snorers “UARS” Mild OSA Moderate OSA Severe OSA Obesity Hypoventilation



OBSTRUCTIVE SLEEP APNEA (OSA)

Common symptoms include:

Night time awakenings

Non restorative sleep

Daytime sleepiness

Frequent nighttime urination

Morning headaches

Cognitive dysfunction (concentration, focus, recall, memory complaints)

Mood changes

OBSTRUCTIVE SLEEP APNEA (OSA)

Estimated 20% of the adult population has some degree of OSA

Studies have demonstrated a prevalence ranging from 9% to 38% and was higher in men. It increased with increasing age and, in some elderly groups, was as high as 90% in men and 78% in women.

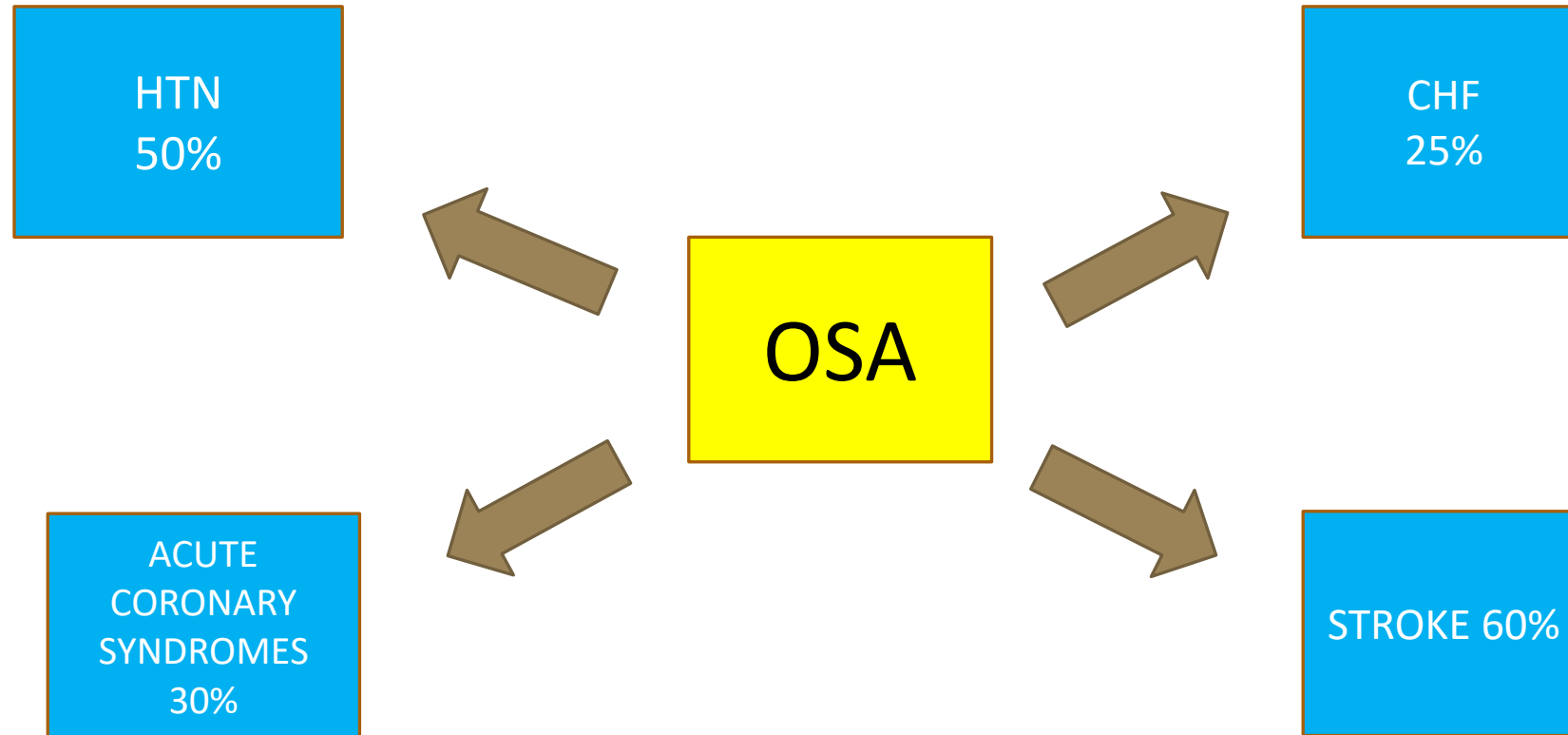
Risk factors for OSA

Table 2. Model-based^a Prevalence Estimates of Mild to Severe Sleep-Disordered Breathing, Wisconsin Sleep Cohort Study, Wisconsin, 1988–2011

Body Mass Index ^b by Age, years		Estimated Prevalence of AHI ^c ≥5	
		% ^d	95% CI
<i>Men</i>			
Age → BMI {	30–49		
	<25	7.0	5.0, 9.3
	25–29.9	18.3	15.2, 21.6
	30–39.9	44.6	48.7, 50.2
	≥40	79.5	71.1, 86.2
	50–70		
	<25	18.9	14.8, 23.8
	25–29.9	36.6	32.8, 40.3
	30–39.9	61.4	57.0, 65.5
	≥40	82.8	77.1, 87.7
<i>Women</i>			
	30–49		
	<25	1.44	0.82, 2.23
	25–29.9	4.2	2.7, 5.8
	30–39.9	13.5	9.8, 17.7
	≥40	43.0	33.0, 54.2
	50–70		
	<25	9.3	6.8, 12.3
	25–29.9	20.2	16.4, 24.4
	30–39.9	41.1	35.6, 46.7
	≥40	67.9	60.6, 75.1

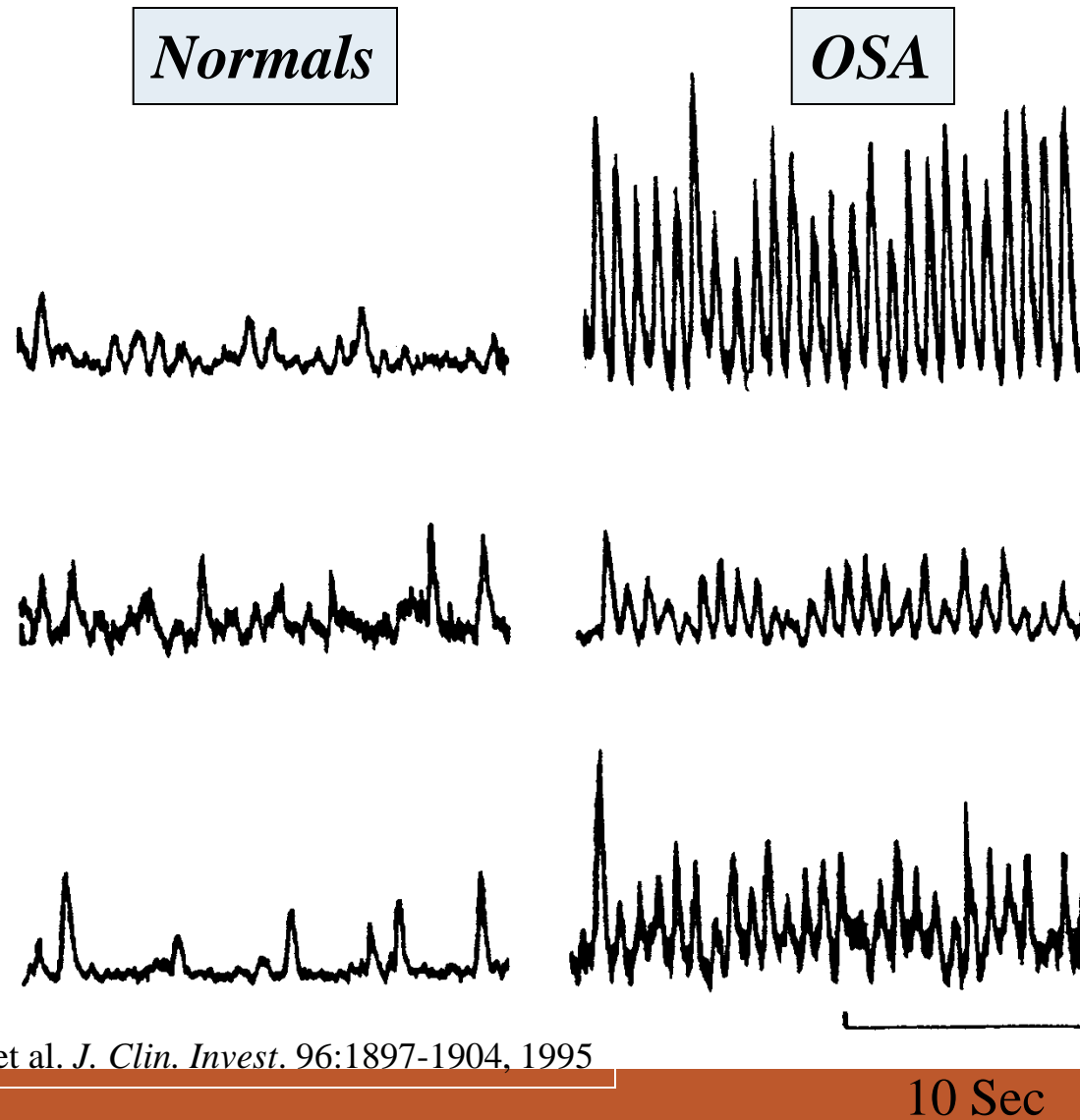
- Obesity does not cause OSA; it makes it worse
- If an individual has mild OSA at a normal BMI, for every 20 lbs over that weight, the risk of developing moderate to severe OSA increases by a factor of 6.
- OSA is not a male exclusive disease; after menopause, prevalence in women approximates that for men.
- Age is clearly a risk factor for OSA.

OSA: prevalence in cardiovascular disease

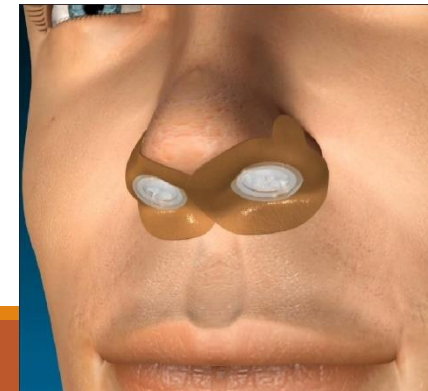
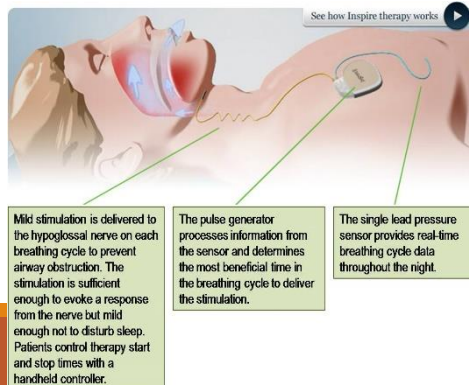
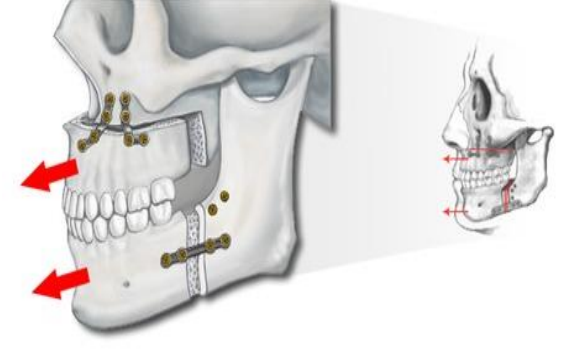
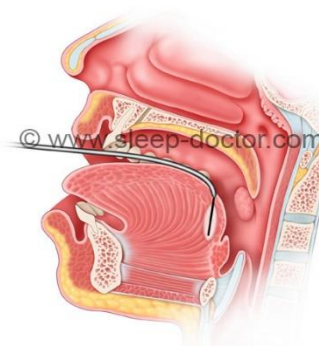
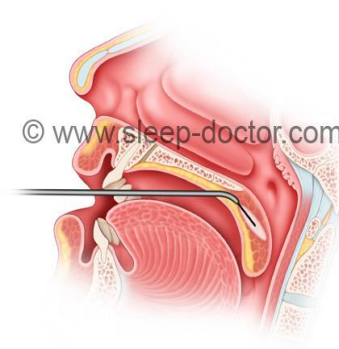
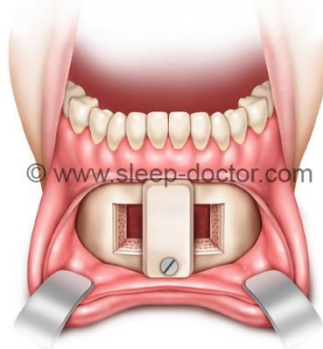
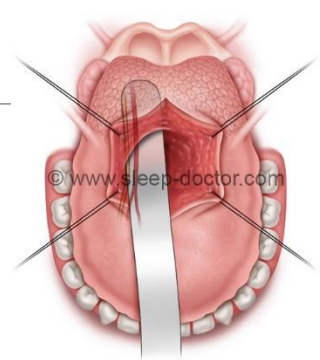
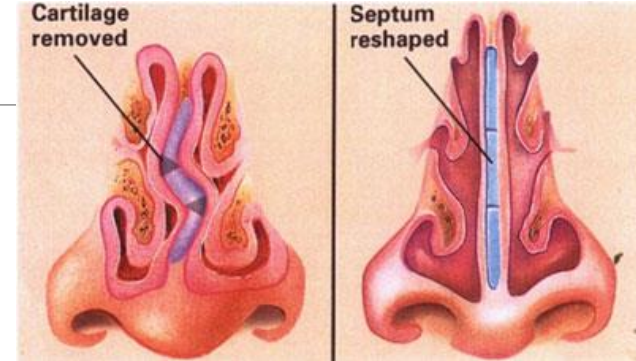


Reproduced from JACC; **Prevalence of obstructive sleep apnea (OSA)** in patients with cardiovascular and cerebrovascular disease. The figures used are approximations from published data and are unadjusted for baseline variables (1 to 4): 1. Parati G, Ongaro G, Bonsignore MR, Glavina F, Di Rienzo M, Mancia G. Sleep apnoea and hypertension. *Curr Opin Nephrol Hypertens* 2002;11:201–14; 2. Sin DD, Fitzgerald F, Parker JD, Newton G, Floras JS, Bradley TD. Risk factors for central and obstructive sleep apnea in 450 men and women with congestive heart failure. *Am J Respir Crit Care Med* 1999;160:1101–6; 3. Bassetti C, Aldrich MS. Sleep apnea in acute cerebrovascular diseases: final report on 128 patients. *Sleep* 1999;22:217–23; and 4. Peker Y, Kraiczi H, Hedner J, Loth S, Johansson A, Bende M. An independent association between obstructive sleep apnoea and coronary artery disease. *Eur Respir J* 1999;14:179–84.

Sympathetic Nerve Activity During Quiet Wakefulness



Treatment options for OSA



Summary: Optimizing your sleep:

What are your:

Sleep Needs

Sleep Capabilities

Optimal Timing of Sleep

Expectations/Beliefs (guiding behaviors)

Are there co-existing sleep fragmenting conditions?

Are there medications that could be exacerbating or causing issues?

Are the co-existing medical conditions that could be playing a role?



THANK YOU VERY MUCH!!!!