Obstructive Sleep Apnea: Looking beyond the teeth and saving lives!

Jamison R. Spencer, DMD, MS

Spencer Study Club

- Scary video by WatchPAT

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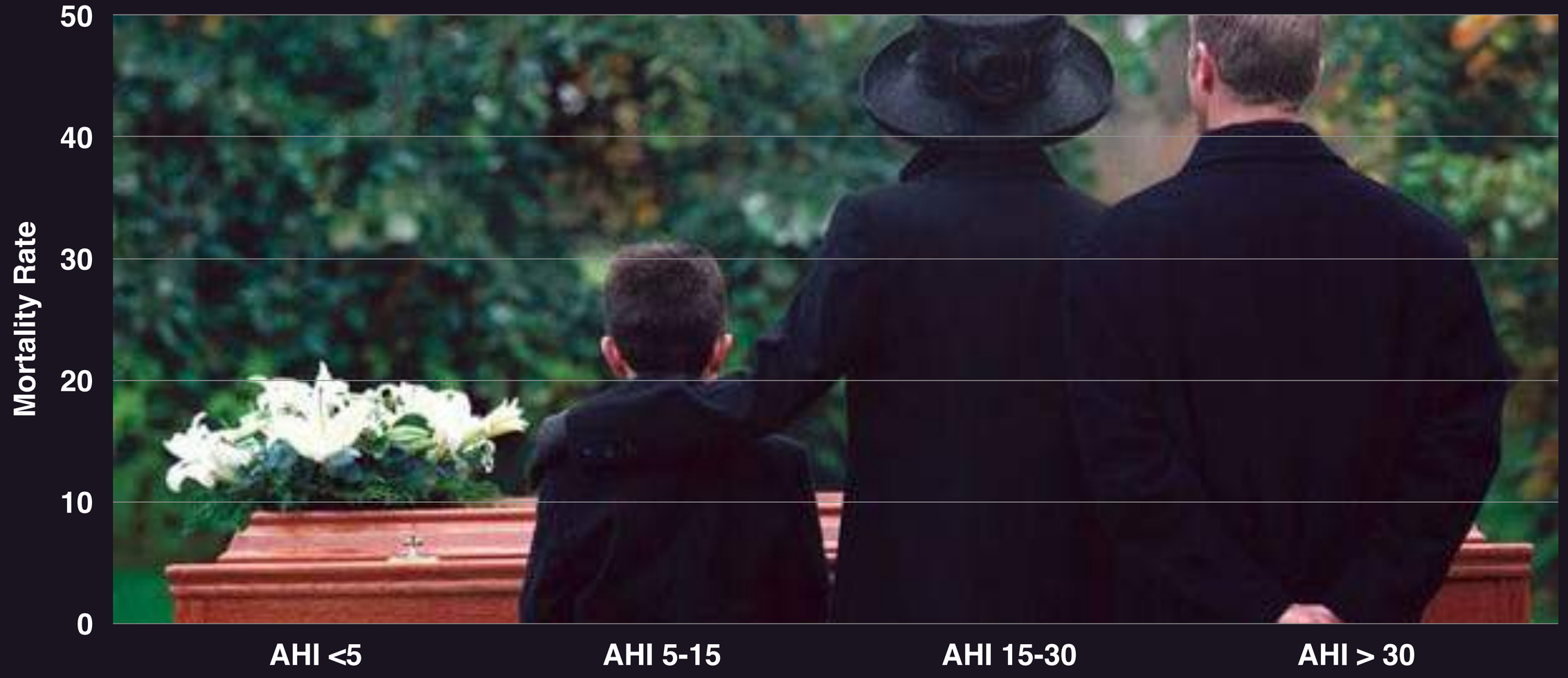
5 Years 10 Years 15 Years 18 Years



Sleep Disordered Breathing and Mortality: Eighteen-Year Follow-up of the Wisconsin Sleep Cohort: SLEEP, Vol. 31, No. 8, 2008

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Sleep Apnea Definitions

- Apnea = Cessation of ventilation for 10 seconds or more.
- Hypopnea = 30-50% reduction in airflow for 10 seconds or more.
- Apnea-Hypopnea Index (AHI) = Average number of apneas plus hypopneas per hour of sleep.

Apnea Hypopnea Index (AHI)

- Normal: less than 5 events per hour

Apnea Hypopnea Index (AHI)

- Mild: 5-15 events per hour
- Normal: less than 5 events per hour

Apnea Hypopnea Index (AHI)

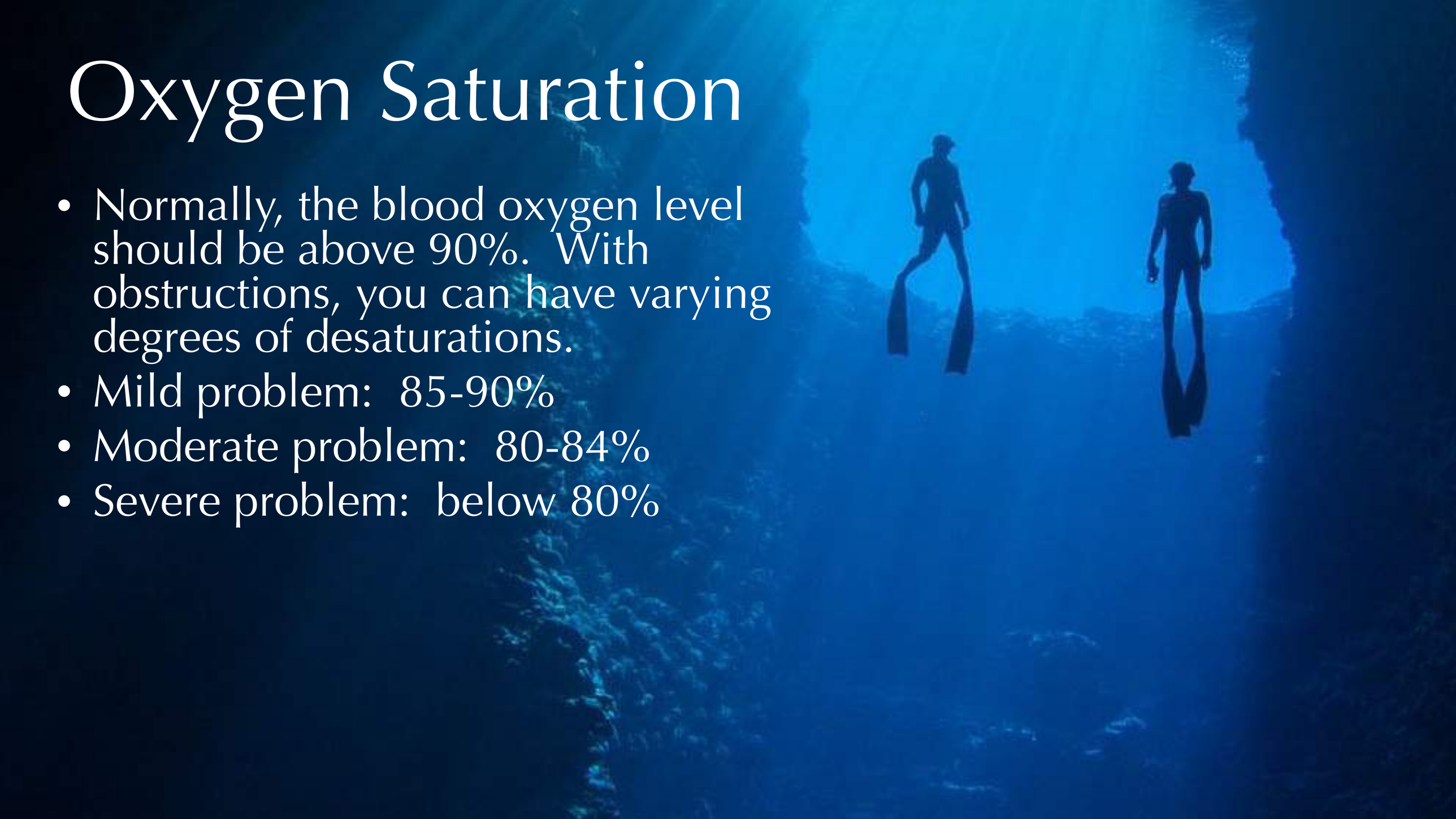
- Moderate: 16-30 events per hour
- Mild: 5-15 events per hour
- Normal: less than 5 events per hour

Apnea Hypopnea Index (AHI)

- Severe: over 30 events per hour
- Moderate: 16-30 events per hour
- Mild: 5-15 events per hour
- Normal: less than 5 events per hour

Oxygen Saturation

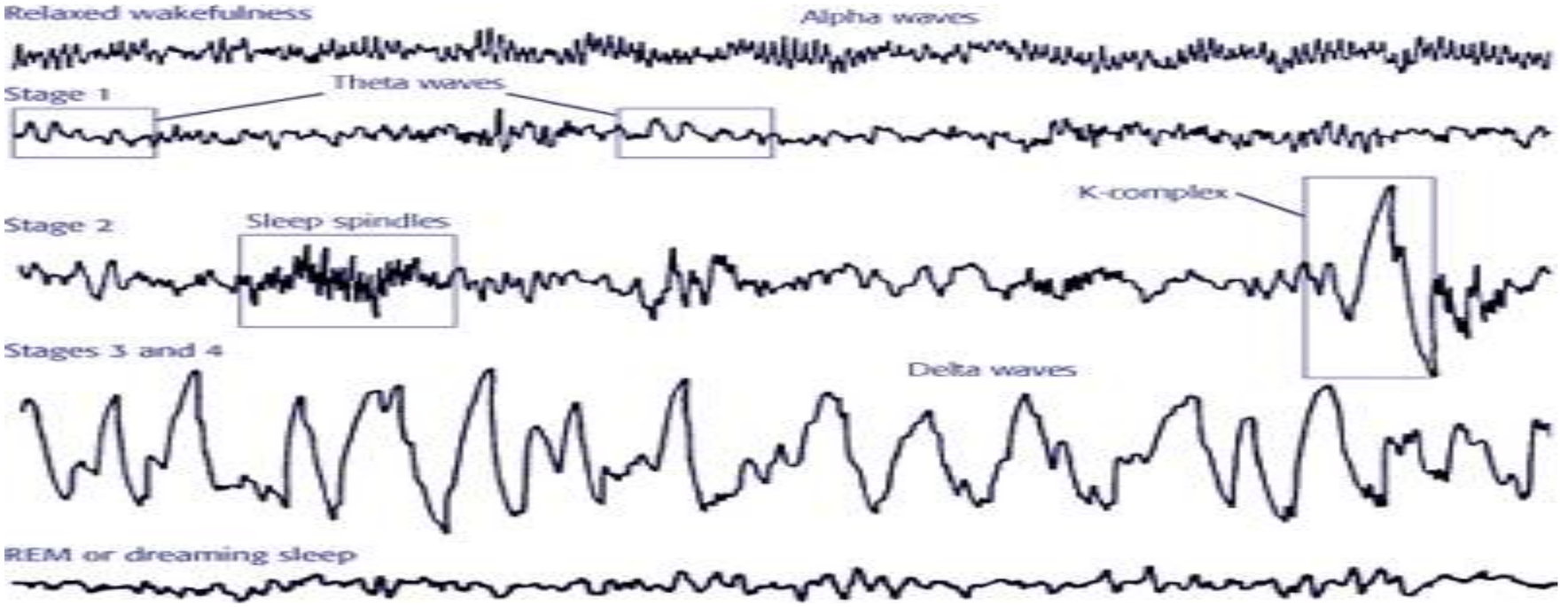
- Normally, the blood oxygen level should be above 90%. With obstructions, you can have varying degrees of desaturations.
- Mild problem: 85-90%
- Moderate problem: 80-84%
- Severe problem: below 80%



Sleep Stages

- Non-REM
  - N1
  - N2
  - N3
- REM

Brain Waves



- Lawrence Epstein, M.D., Improving Sleep: A Guide to a Good Night's Rest, Harvard Health Publications 2007.

N1 (Stage 1)

- **“Light Sleep”**
- **4-5% of total sleep time is considered normal**
- **increases to 15% by age 70**

N2 (Stage 2)

- **“Restful Sleep”**
- **45-50% of normal sleep time**

N3 (Stage 3)

- **“Deep Sleep”**
- **Delta or slow wave sleep**
- **Range of total sleep: 10-20%**
- **Percentage decreases with age**
- **Above 40-50% in children**
- **May be completely absent by age 40-60**
- **Usually appears only in the first 1/3 of the sleep episode**
- **Growth hormone usually released during N3 sleep**

Pink Noise App

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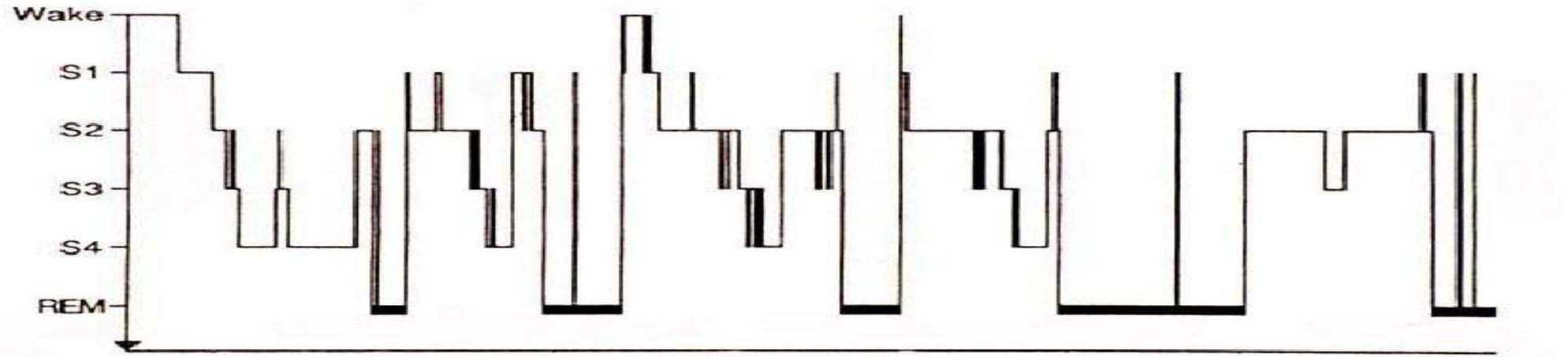
- Rapid eye movement sleep
- Observed eye movements
- 20-25% total sleep time
- Body paralysis – atonia
- Mind very active
- Very vivid hallucinatory imagery or dreaming
- Do problem solving

Sleep Cycle



Normal sleep histogram of healthy young adult.

Text your email address to
(855) 463-7504

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Jamison@JamisonSpencer.com

Let's Talk About Hygiene

Let's Talk About

Sleep Hygiene

Sleepy time

light

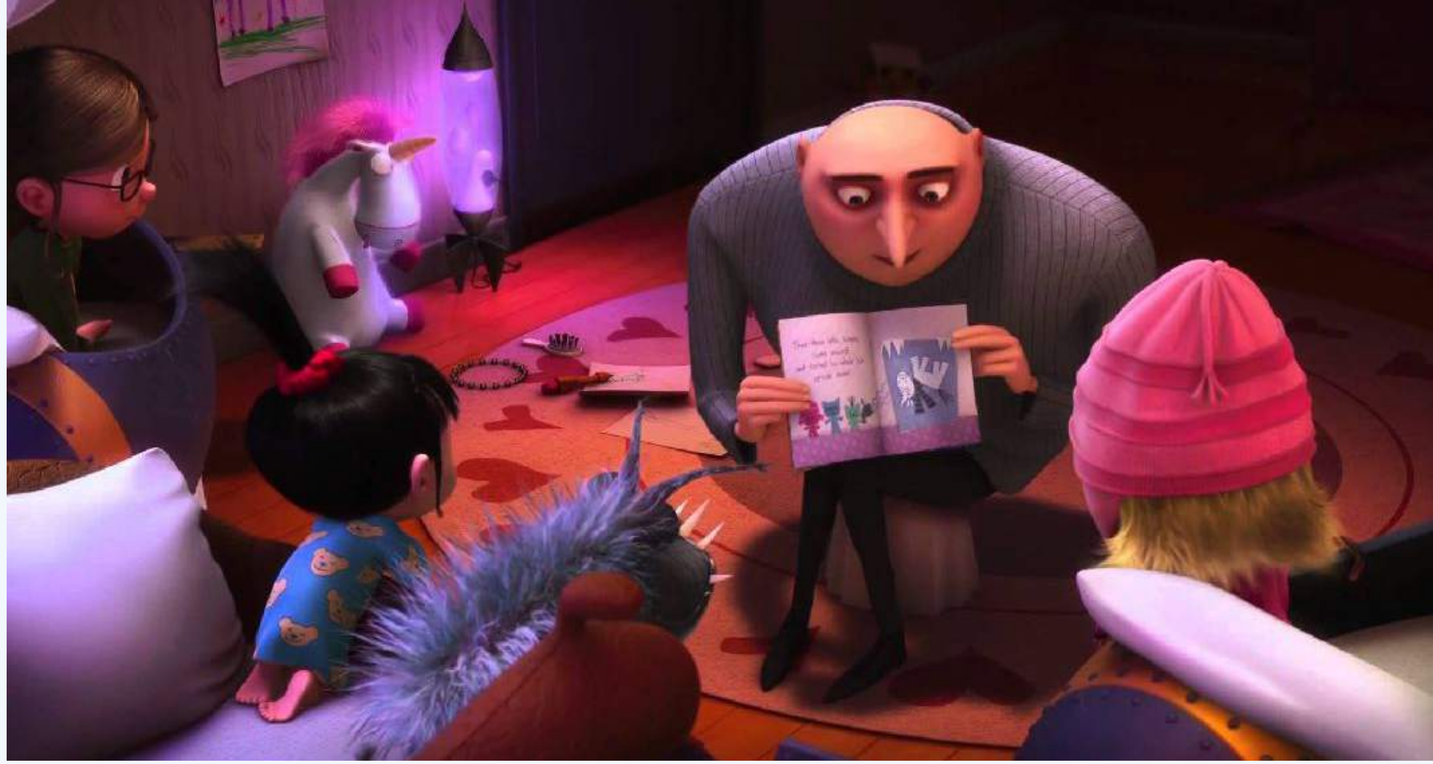
environment

exercise

priority

Let's Talk About

Sleep Hygiene



Sleepy time: Try to have a regular bedtime…and give yourself enough time for sleep.

Let's Talk About

Sleep Hygiene

*l*ight: Limit exposure to bright light, including computer/ipad screens, the last hour or so before bed.

Tip: www.justgetflux.com

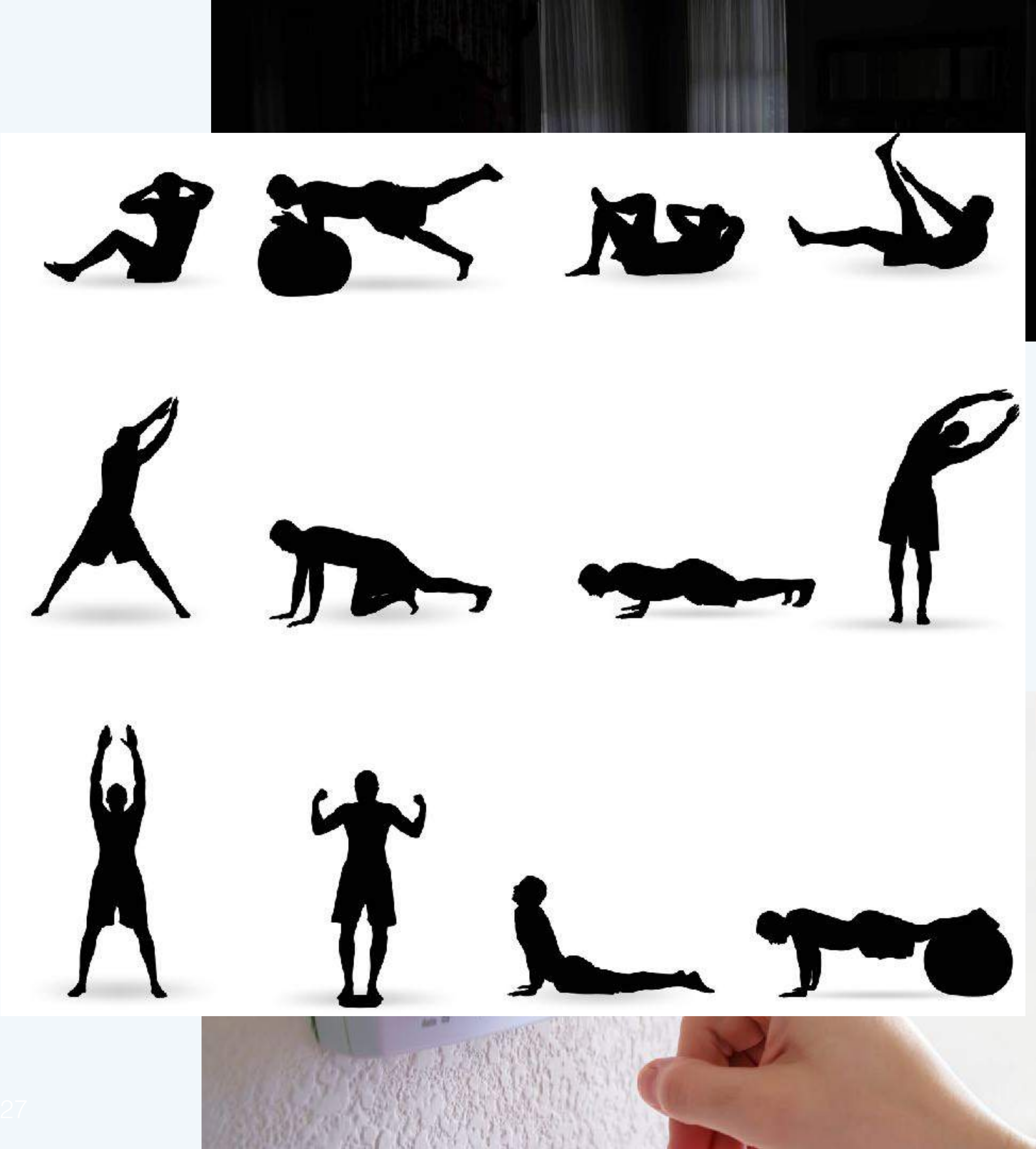
Let's Talk About

Sleep Hygiene

exercise: Daily exercise will help you sleep more deeply...and it's good for you on a bunch of other levels too.

environment: Keep your sleep environment dark quiet and comfortable.

Tip: www.simplynoise.com



Let's Talk About

Sleep Hygiene

priority: Make sleep a priority!

Let's Talk About

Sleep Hygiene

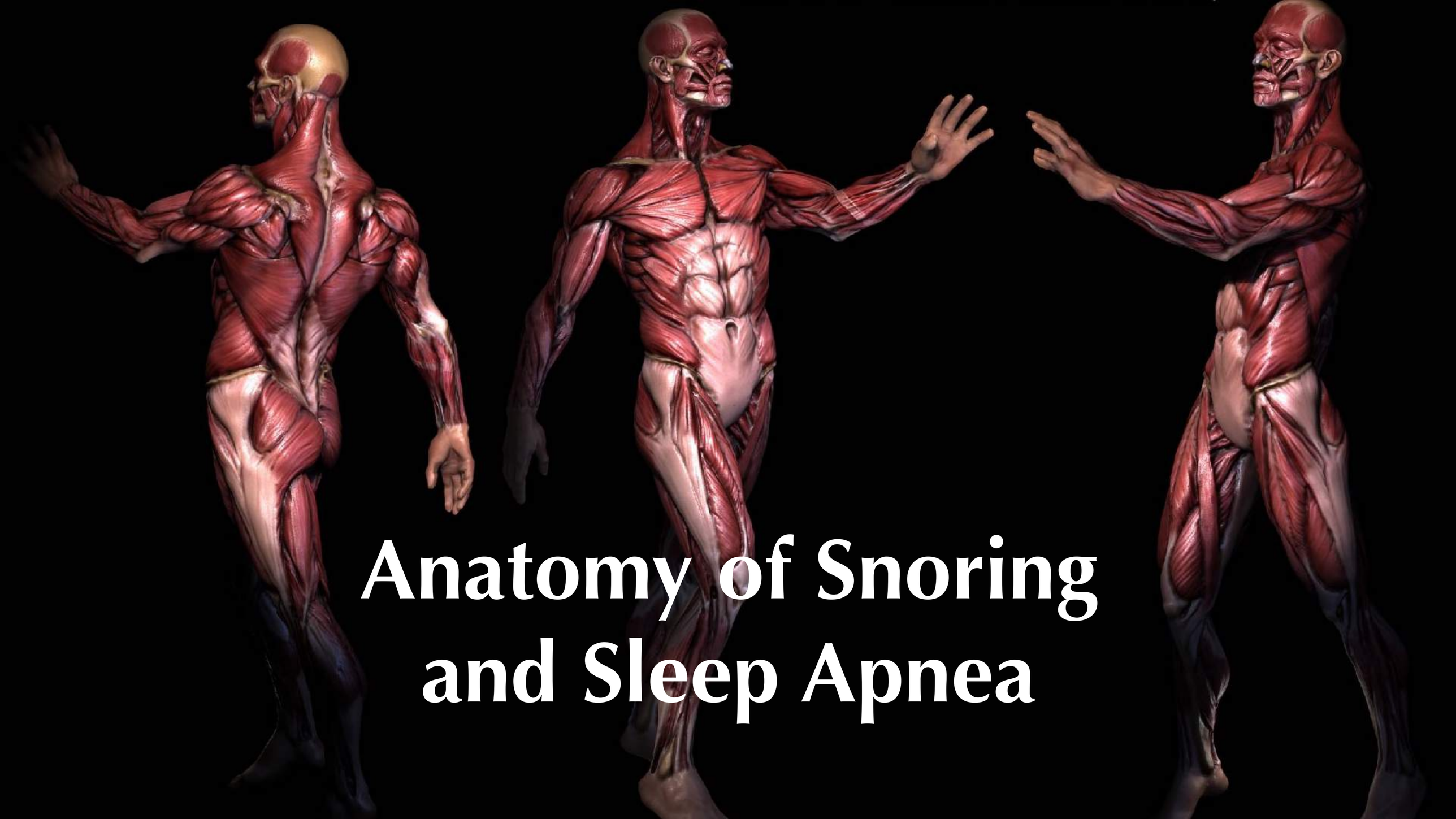
Sleepy time

light

environment

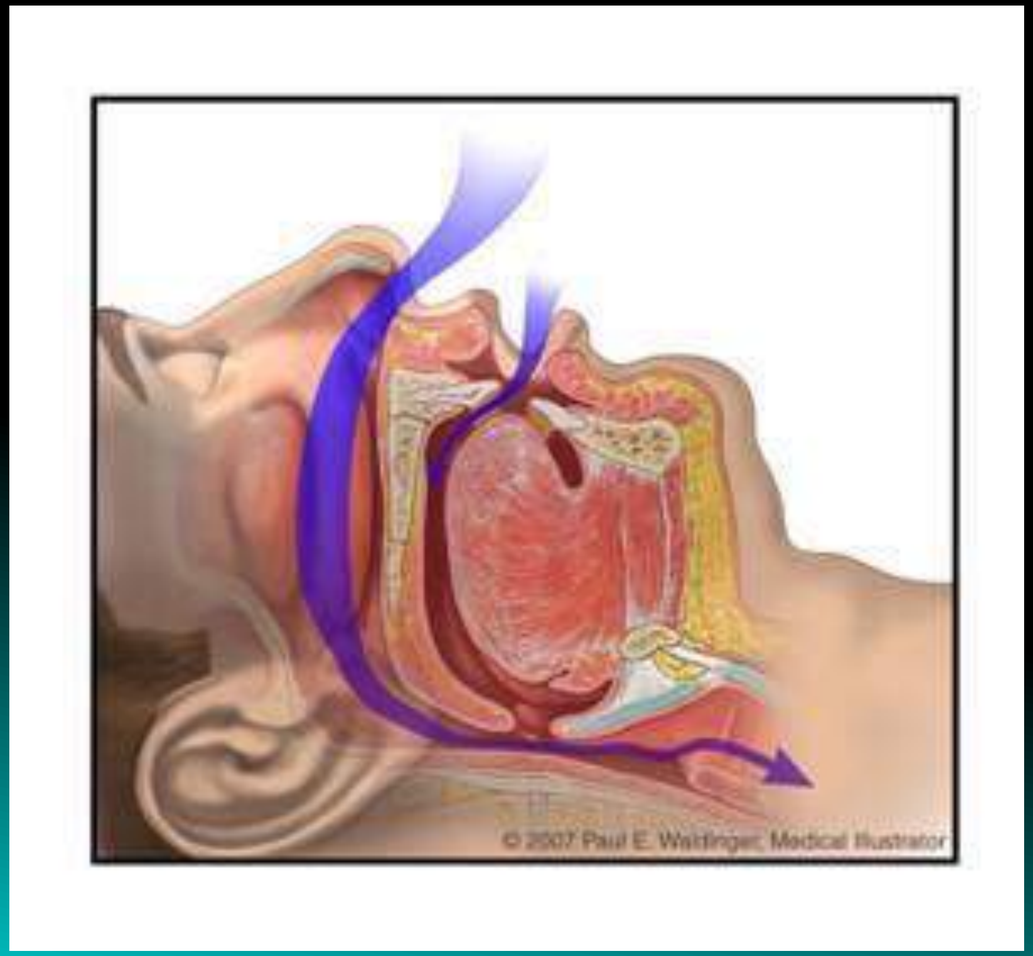
exercise

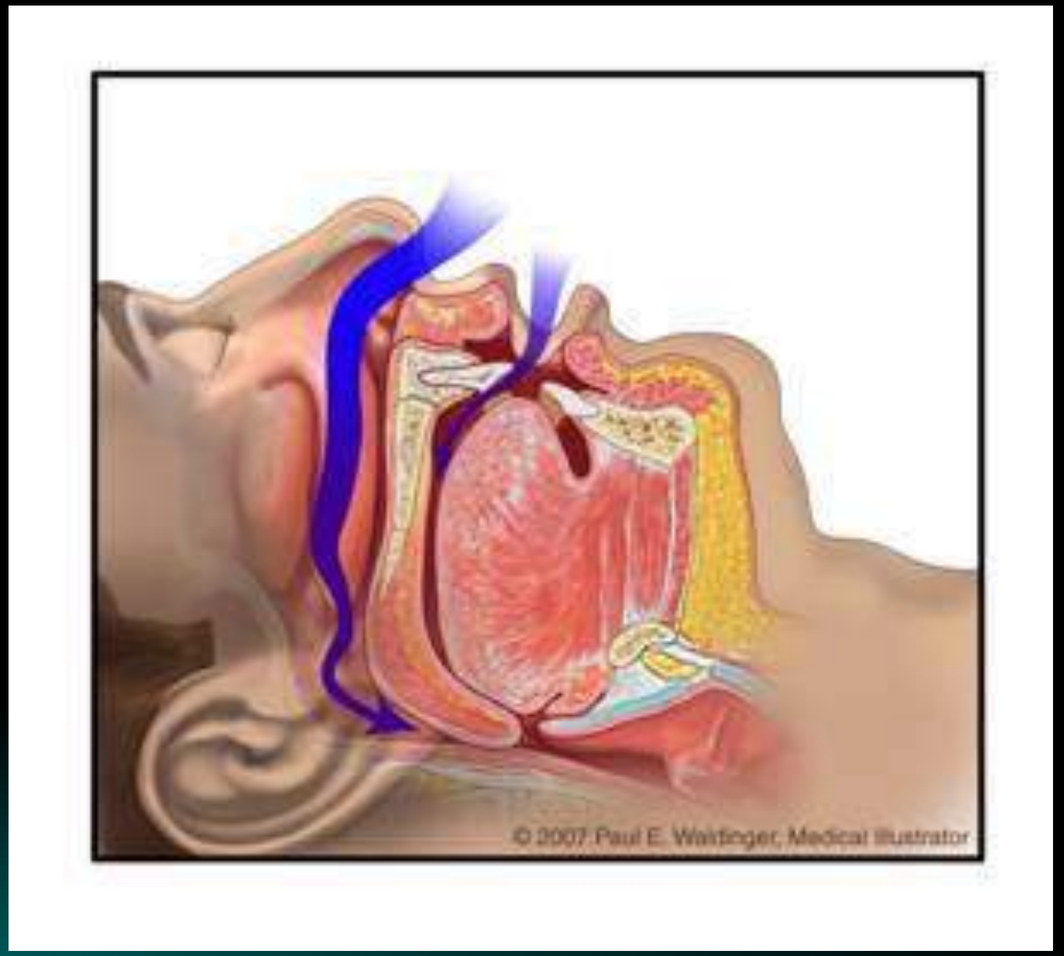
priority



Anatomy of Snoring and Sleep Apnea

Pharyngeal Patency





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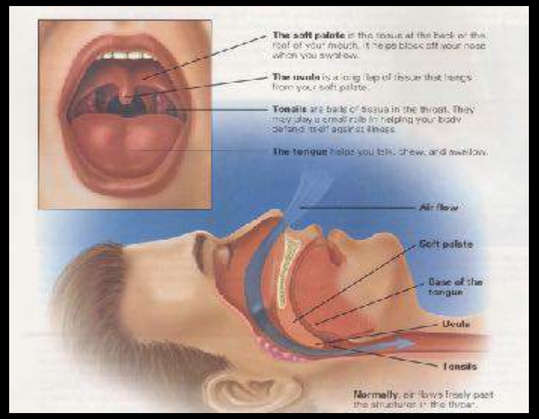
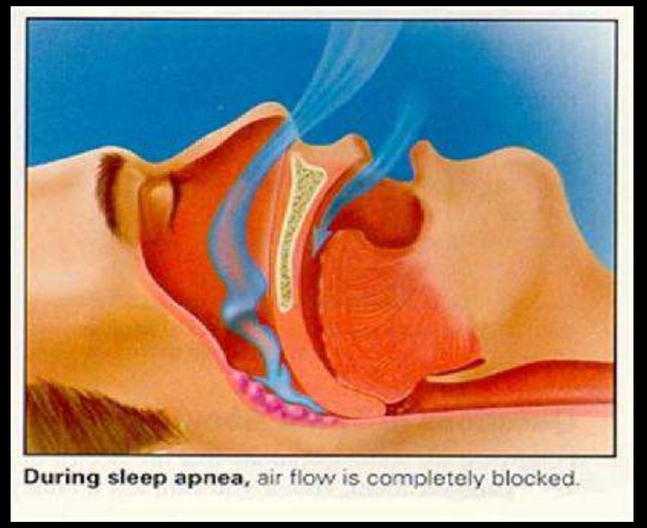
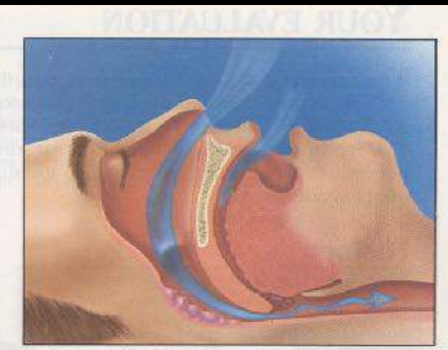




During sleep apnea, air flow is completely blocked.



During snoring, air flow is partially blocked.

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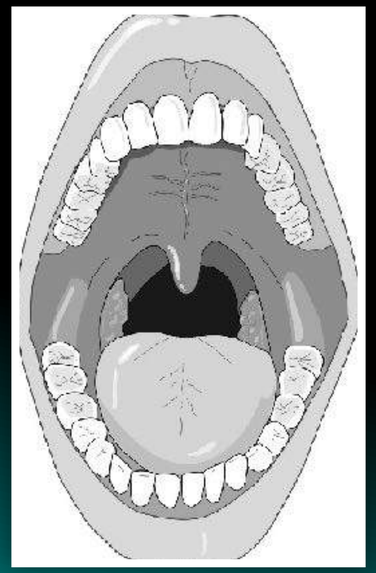
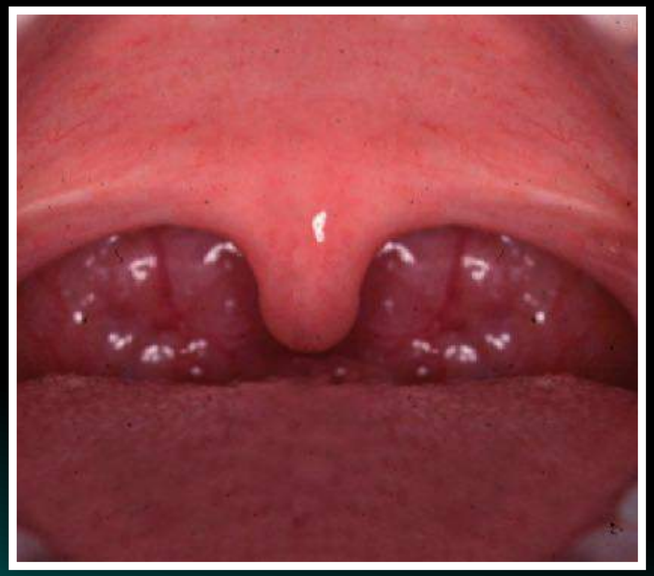
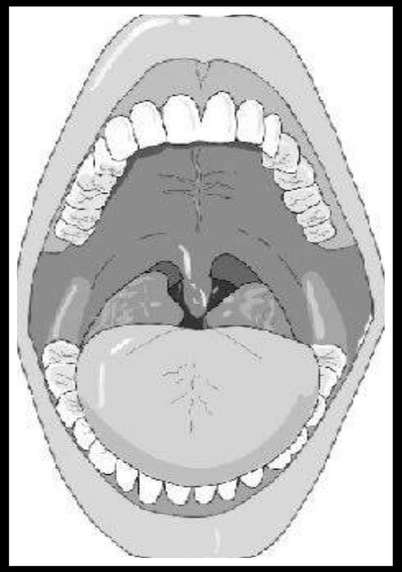
Normal vs Obstructed







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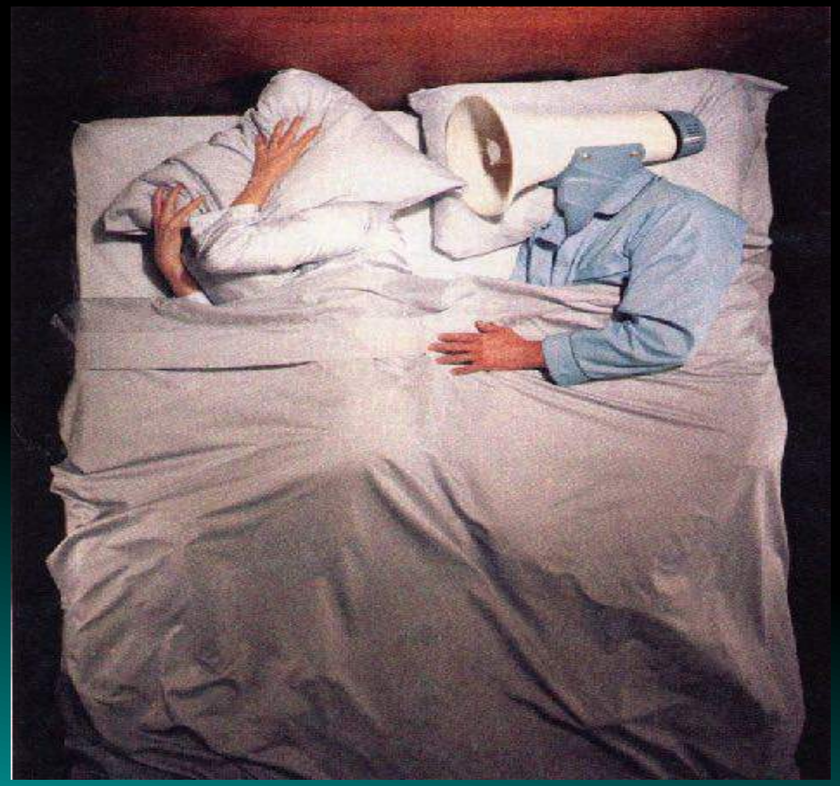
Snoring



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Does Snoring and Sleep Apnea effect the Bed Partner's Sleep?

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The effect of snoring and obstructive sleep apnea on the sleep quality of bed partners.

- MATERIALS AND METHODS: We studied 10 married couples in which 1 member was undergoing polysomnography to evaluate suspected OSA. The patients and their spouses underwent simultaneous polysomnography. Midway through the 1-night study, the patients received nasal continuous positive airway pressure (CPAP) with the pressure adjusted to eliminate snoring and obstructive breathing events.

Beninati W, Harris CD, Herold DL, Shepard JW Jr.
Mayo Clin Proc. 1999 Oct;74(10):955-8

Jamison Spencer

The effect of snoring and obstructive sleep apnea on the sleep quality of bed partners.

- RESULTS: The patients (all male) demonstrated a median (range) apnea-hypopnea index of 26 (3-75) that decreased to 7 (0-34) during the trial of nasal CPAP therapy ($P < .05$).
- During the CPAP trial, the median (range) arousal index of the spouses decreased from 21 (14-34) to 12 (4-27) ($P < .01$), and the spouses' median (range) sleep efficiency increased from 74% (56%-80%) to 87% (64%-95%) ($P < .01$).

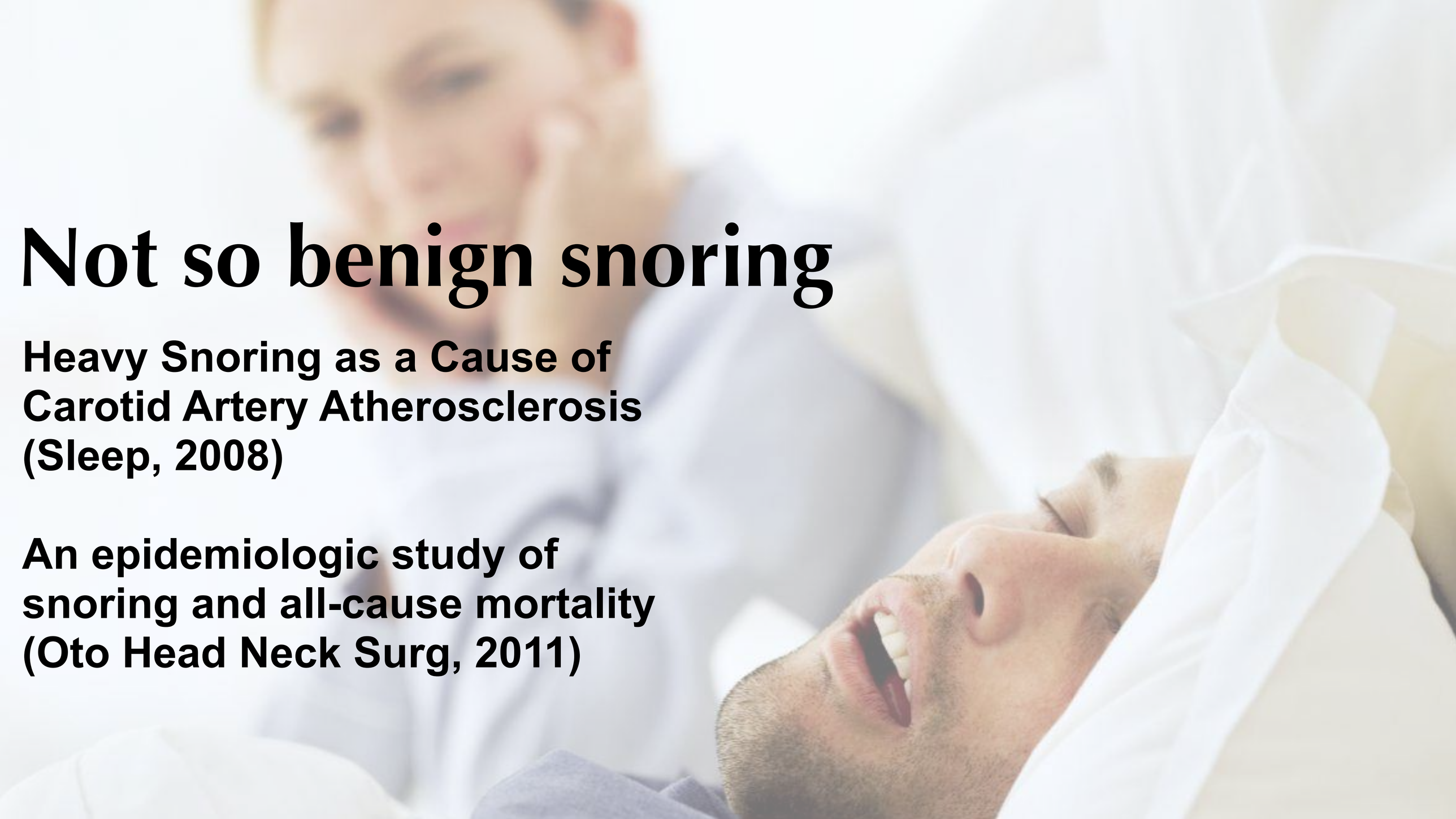
Beninati W, Harris CD, Herold DL, Shepard JW Jr.
Mayo Clin Proc. 1999 Oct;74(10):955-8

Jamison Spencer

The effect of snoring and obstructive sleep apnea on the sleep quality of bed partners.

- CONCLUSION: The elimination of snoring and OSA in these patients was associated with an improvement in the quality of their bed partners' sleep, as indicated by improved sleep efficiency and continuity, even when the spouses had been habitually exposed to snoring and OSA. Assuming that 480 minutes were spent in bed for sleep, a 13% improvement in sleep efficiency (i.e., from 74% to 87%) translates to an additional 62 minutes of sleep per night for the spouses of snorers with OSA.

Beninati W, Harris CD, Herold DL, Shepard JW Jr.
Mayo Clin Proc. 1999 Oct;74(10):955-8



Not so benign snoring

Heavy Snoring as a Cause of Carotid Artery Atherosclerosis (Sleep, 2008)

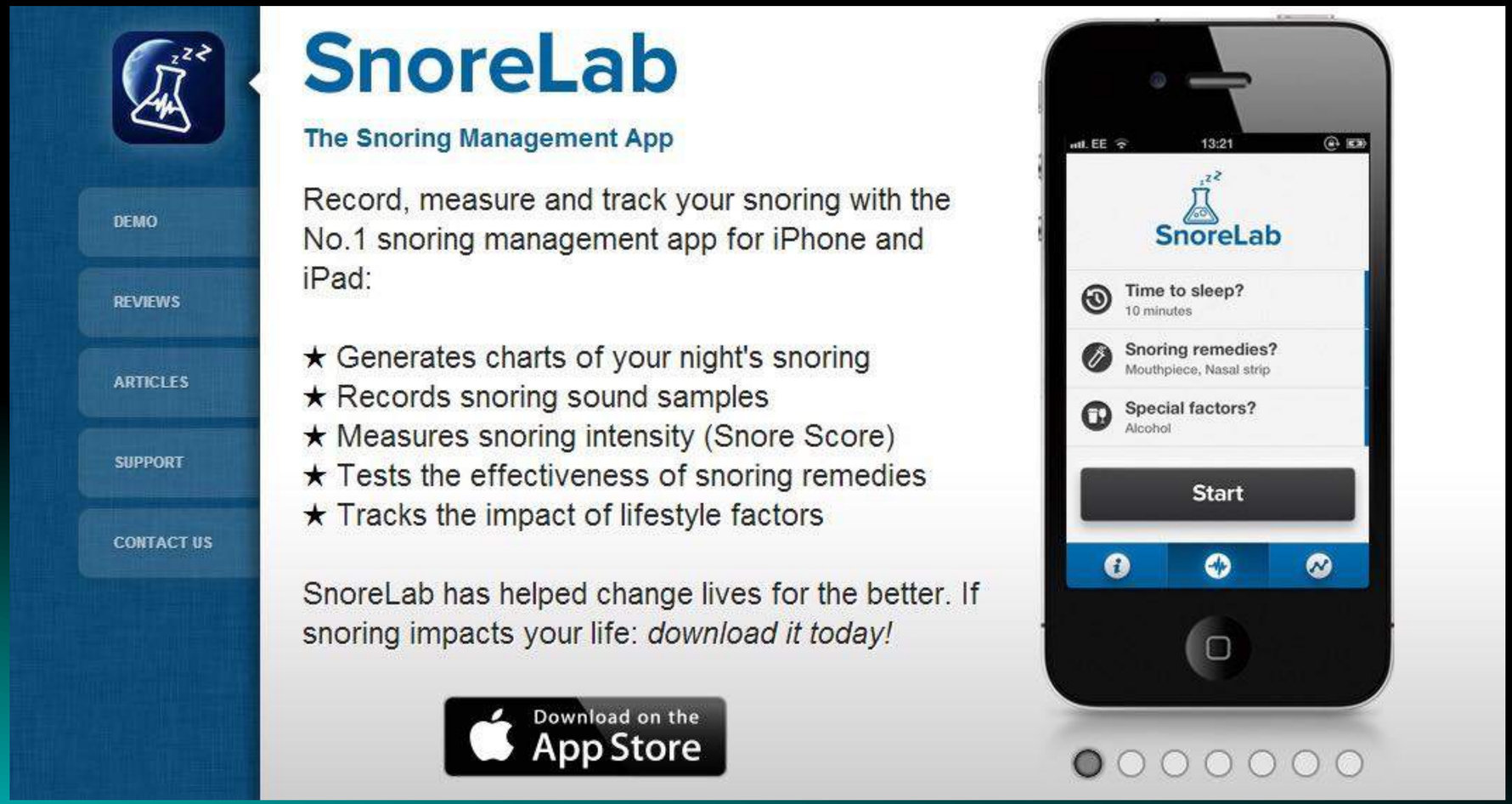
An epidemiologic study of snoring and all-cause mortality (Oto Head Neck Surg, 2011)

Everyone who snores will eventually have sleep apnea

James O'Brien, M.D.

Jamison Spencer

Snoring Recording Apps



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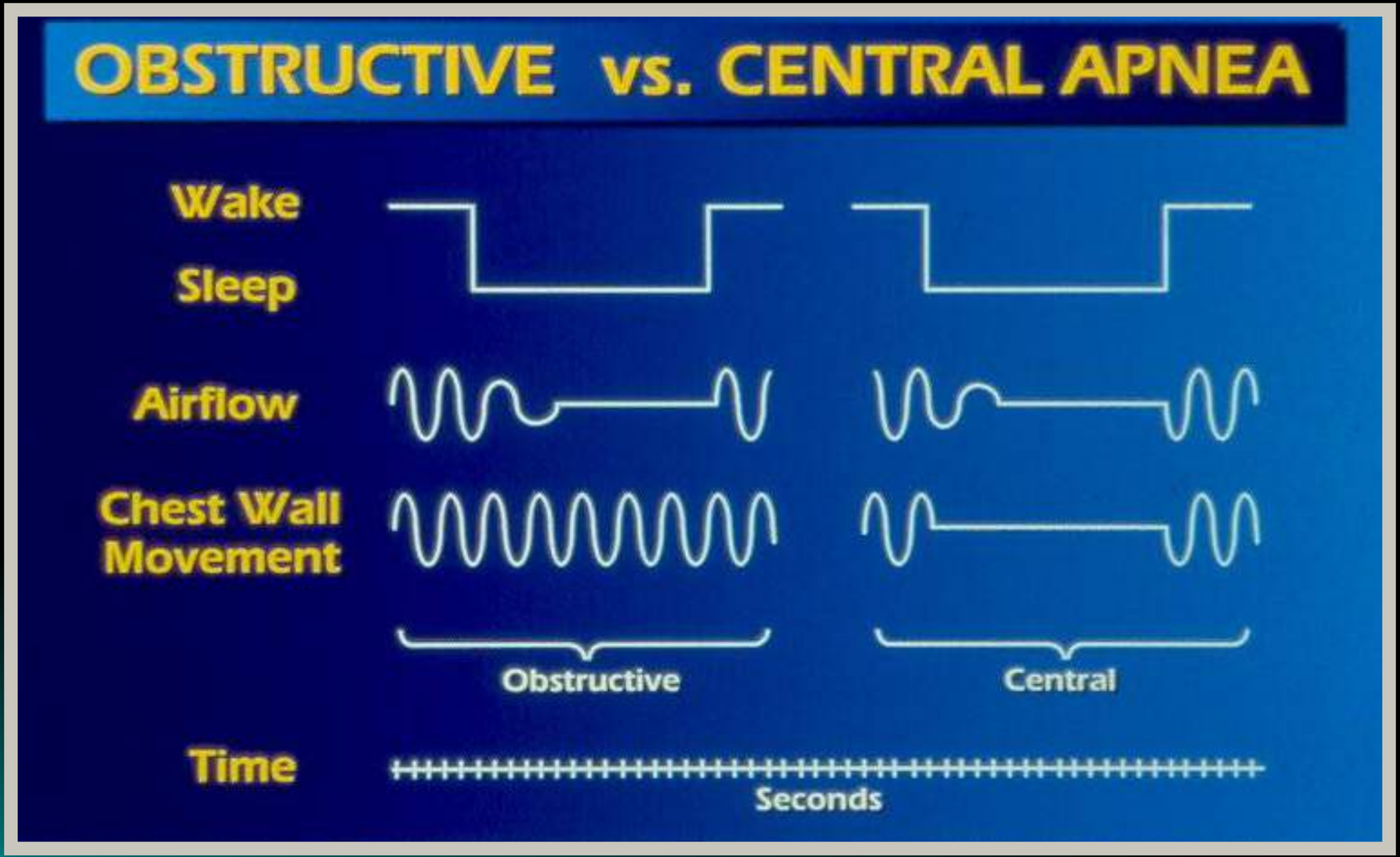
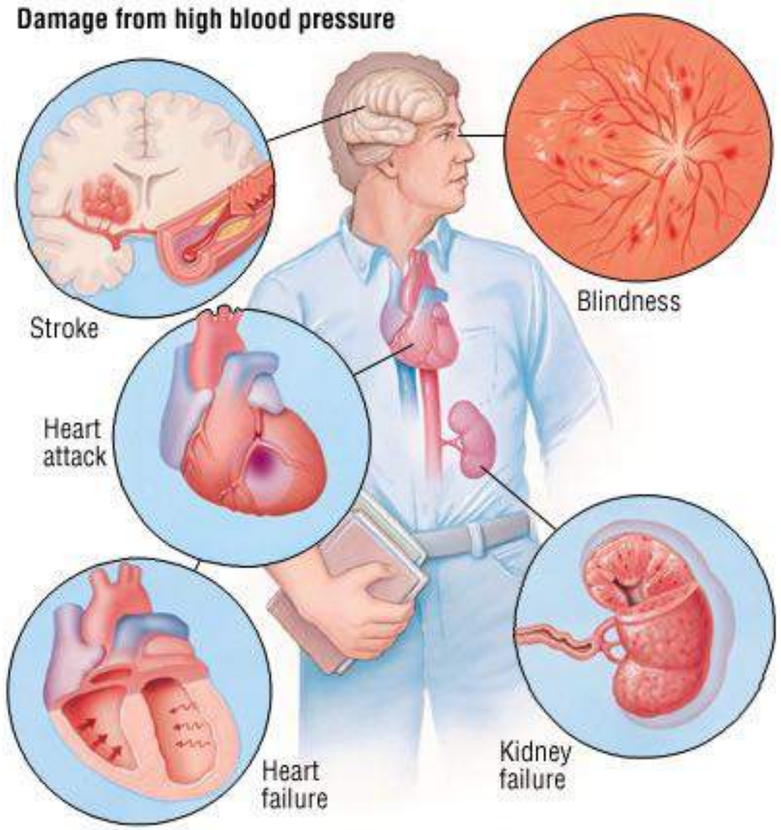
Sleep Apnea


OBSTRUCTIVE vs. CENTRAL APNEA
Wake
Sleep
Airflow
Chest Wall Movement
Obstructive
Central
Time
Seconds

Sleep Apnea Increases Risk of



High blood pressure
Heart failure
Heart rhythm disturbances
Atherosclerotic heart disease
Pulmonary hypertension
Insulin resistance
Sudden death
Memory problems
Depression
Anxiety
Gastroesophageal reflux disease (GERD)

Heart Disease in the US

- 610,000 die per year (more than 1 PER MINUTE!!!)
- 325,000 sudden cardiac death
- 735,000 heart attacks per year

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Sleep Apnea in an Adult

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Nighttime Symptoms

- Snoring: intermittent with pauses
- Snorting, gasping
- Awakening with gasping or choking
- Apnea, pauses in breathing
- Frequent awakening
- Sweating
- Fragmented, non-refreshing, light sleep
- Thrashing in bed
- Insomnia
- BRUXISM

Daytime Symptoms

- Excessive Daytime Sleepiness (EDS)
- Non-restorative sleep
- Poor memory, clouded intellect
- Poor concentration and performance
- Fatigue
- Morning headache
- Decreased sex drive, impotence
- Depression, irritability
- Gastro-esophageal reflux (GERD)

Sleep Apnea in Children

Snoring
Hyperactivity (ADHD)
Developmental delay
Poor concentration
Enuresis
Nightmares
Night terrors
Headaches
Restless sleep
Obesity
Large tonsils
Noisy breathers
Chronic runny noses
Frequent upper airway infections
Earaches
BRUXISM

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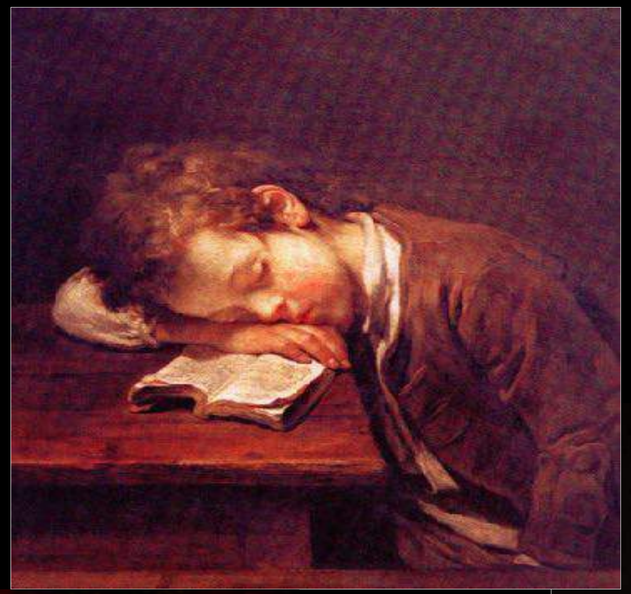
Sleep apnea in Children



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Sleep Apnea in Children

"Girls with adenoids"

From Walter Moore's

People's Health,

New-York McMillan, 1913

Hypertrophy (enlargement) of the tonsils and adenoids is the most common cause of obstructive sleep apnea in children.

Int J Pediatr Otorhinolaryngol 1987 Aug;13(2):149-56.

Tonsil removal may improve school performance.

Pediatrics 1988 Sep;102(3 Pt1):616-20.

A rapid maxillary expander is an effective appliance for treating children with OSAS.

Sleep Med. 2007 January 17.

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Attention Deficit Hyperactivity Disorder

- Snoring is associated with higher levels of inattention and hyperactivity.
- 81% of snoring children with ADHD (25%) could have their ADHD eliminated if their habitual snoring were effectively treated.

Sleep 20(12): 1185-1192.

- Children with ADHD are 2-½ times more likely to be bed wetters.

South Med J, 1997 May;90(5):503-5.

Medical News That Matters

Second Opinion™

By Dr. Isadore Rosenfeld

A reason to remove tonsils?

About 4.4 million children have been diagnosed with attention-deficit/hyperactivity disorder. Since 1991, the number of prescriptions to treat the condition has increased by 500%. Now there may be another treatment option: removing the tonsils and/or adenoids of ADHD sufferers.

Years ago, most children had their tonsils removed if they often got sore throats. Today, the surgery usually is done only if a child is troubled by repeated ear and throat infections or obstructed breathing, especially while sleeping. A recent study at the University of Michigan found that respiratory symptoms improved in children after their tonsils and adenoids were removed. And about half of those with ADHD before surgery no longer qualified for that diagnosis one year later. The researchers theorize that the positive effect on ADHD may be the result of better sleep.

If your child has ADHD and trouble breathing, tonsils may be to blame.

Doctors caution that these operations should not be done solely for ADHD but only if the tonsils and adenoids are causing serious respiratory problems. That's because tonsils function as part of the immune system.

PARADE • APRIL 8, 2007 • PAGE 15

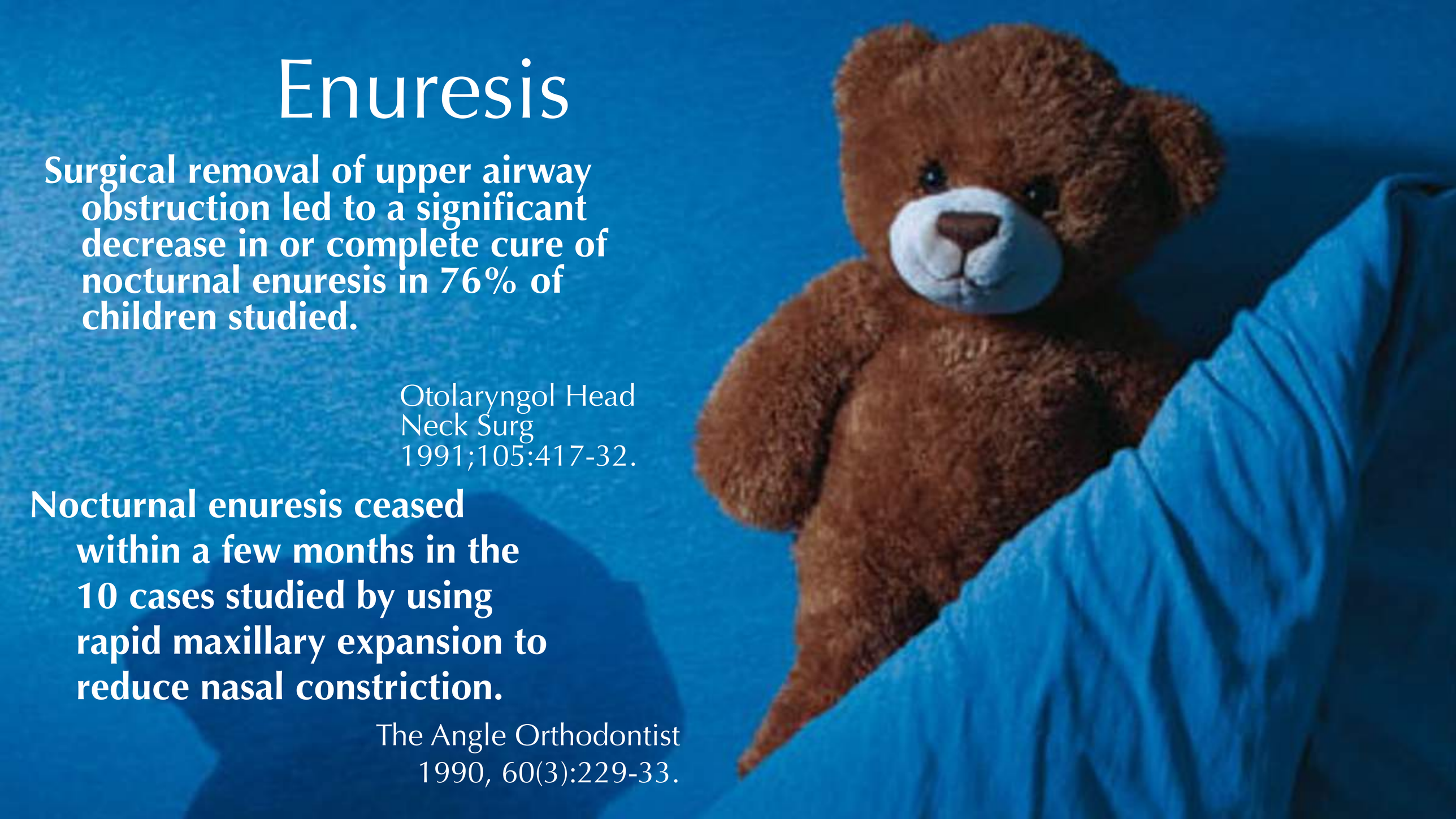
Enuresis

Surgical removal of upper airway obstruction led to a significant decrease in or complete cure of nocturnal enuresis in 76% of children studied.

Otolaryngol Head Neck Surg
1991;105:417-32.

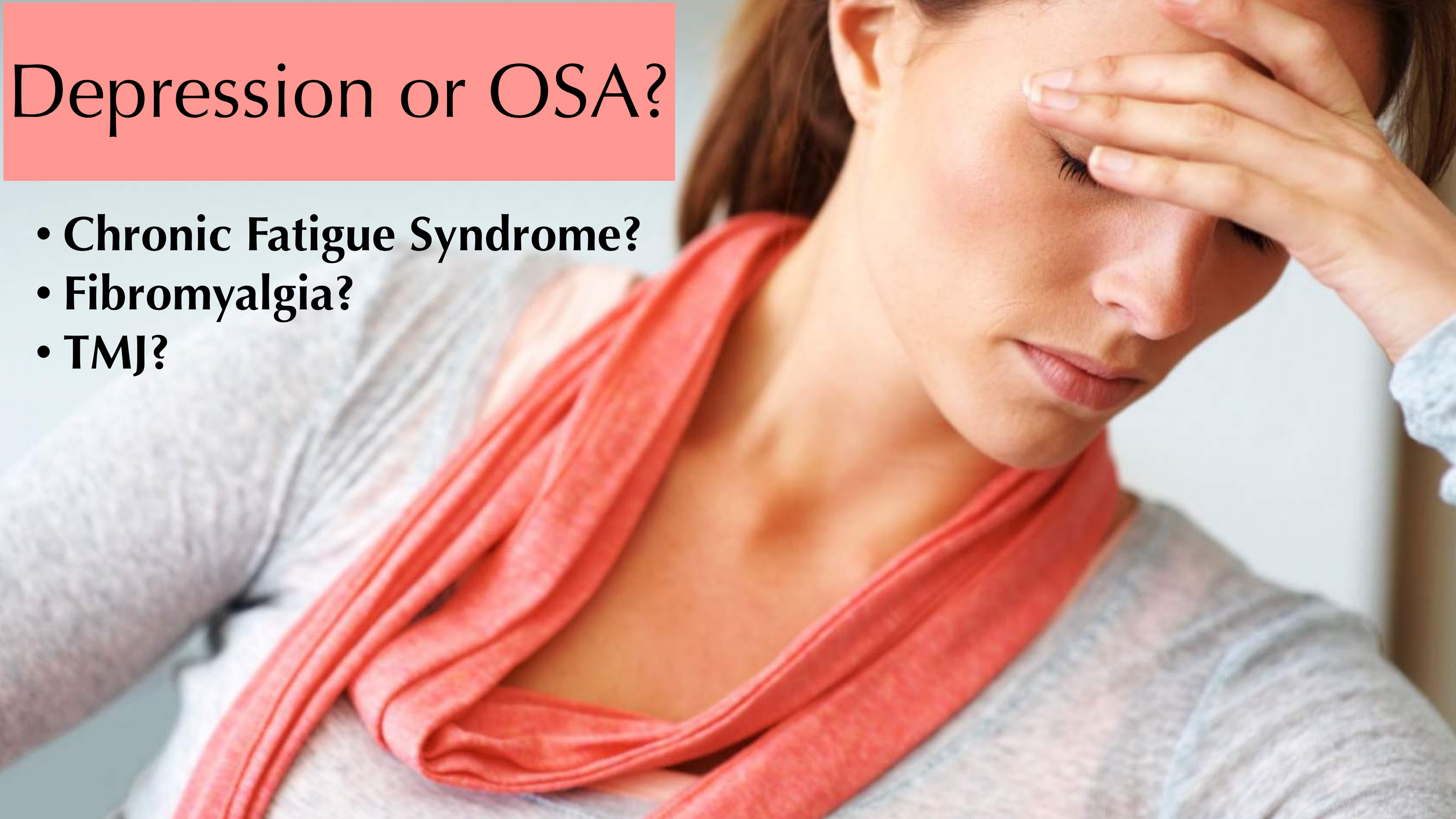
Nocturnal enuresis ceased within a few months in the 10 cases studied by using rapid maxillary expansion to reduce nasal constriction.

The Angle Orthodontist
1990, 60(3):229-33.



Depression or OSA?

- **Chronic Fatigue Syndrome?**
- **Fibromyalgia?**
- **TMJ?**




Bruxism or OSA?


Parafunction…
or Protective Function?

Parafunction

- Physical behavior that is without functional purpose and may be potentially harmful.

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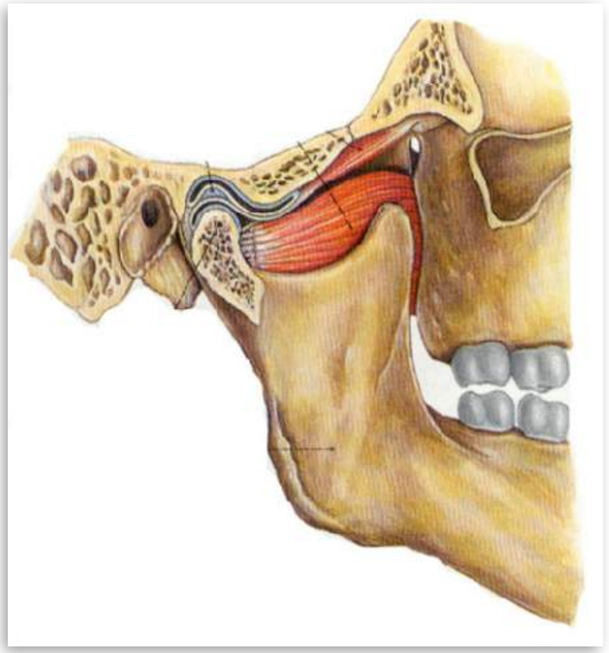
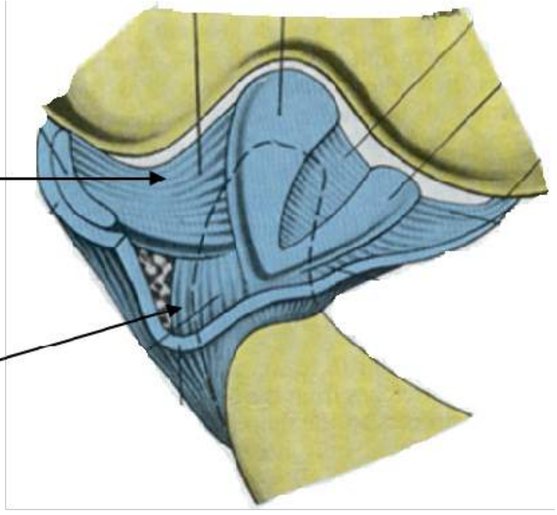
What might parafunction lead to?

Damage to the Teeth **(and restorations)**

TMJ Disorders & Muscle Pain

Capsulitis





Posterior temporal attachment or "superior lamina"

Posterior mandibular attachment or "inferior lamina"

Normal

RDD

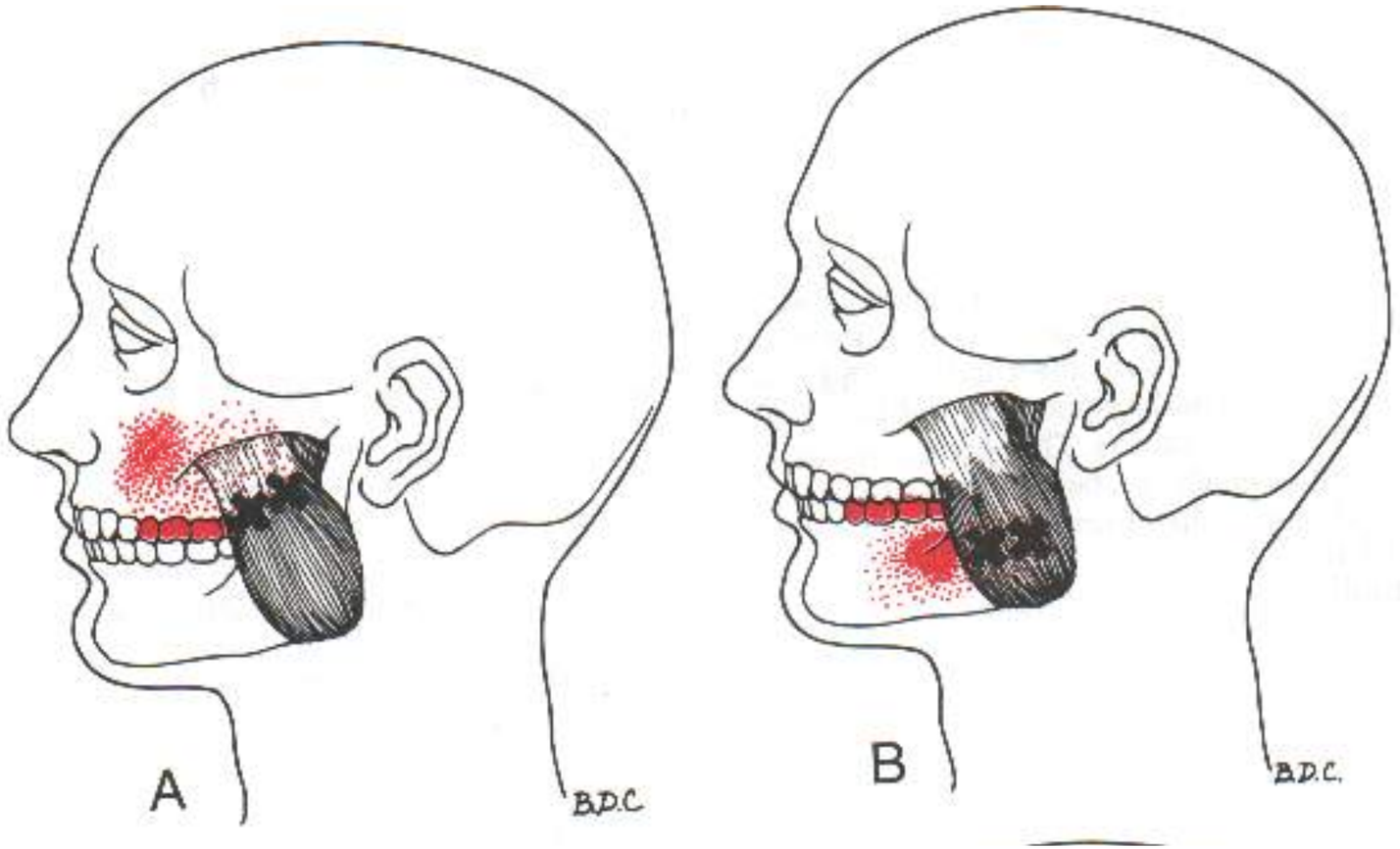
NRDD

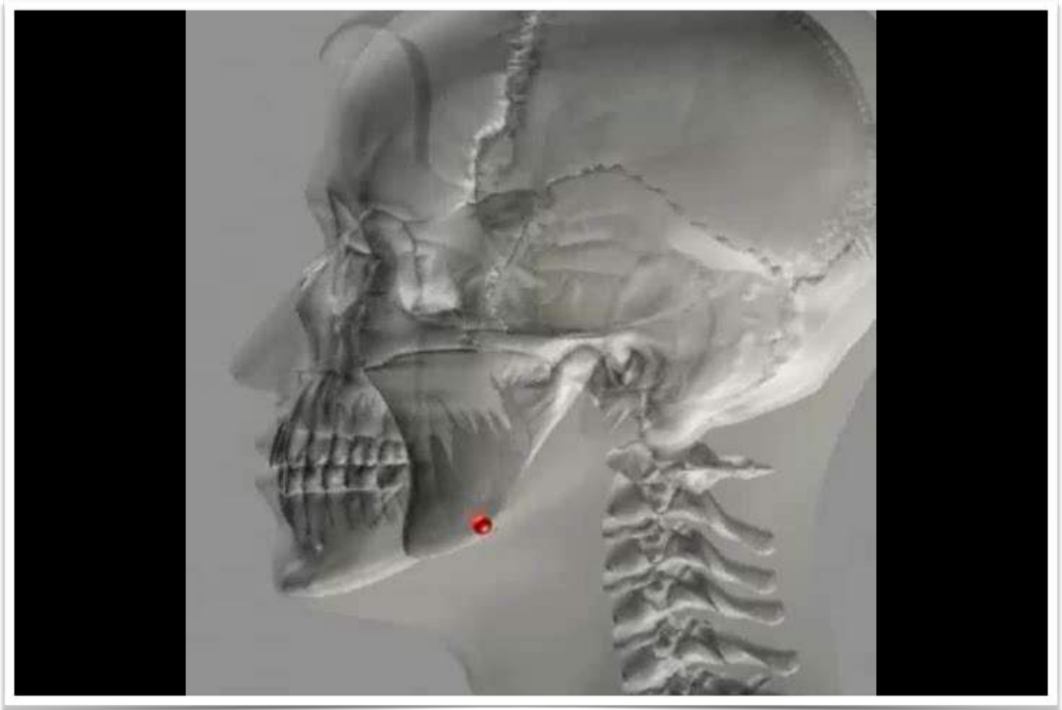
Dr. Per-Lennart Westesson and Dr. Lars Eriksson
University of Lund, Sweden.

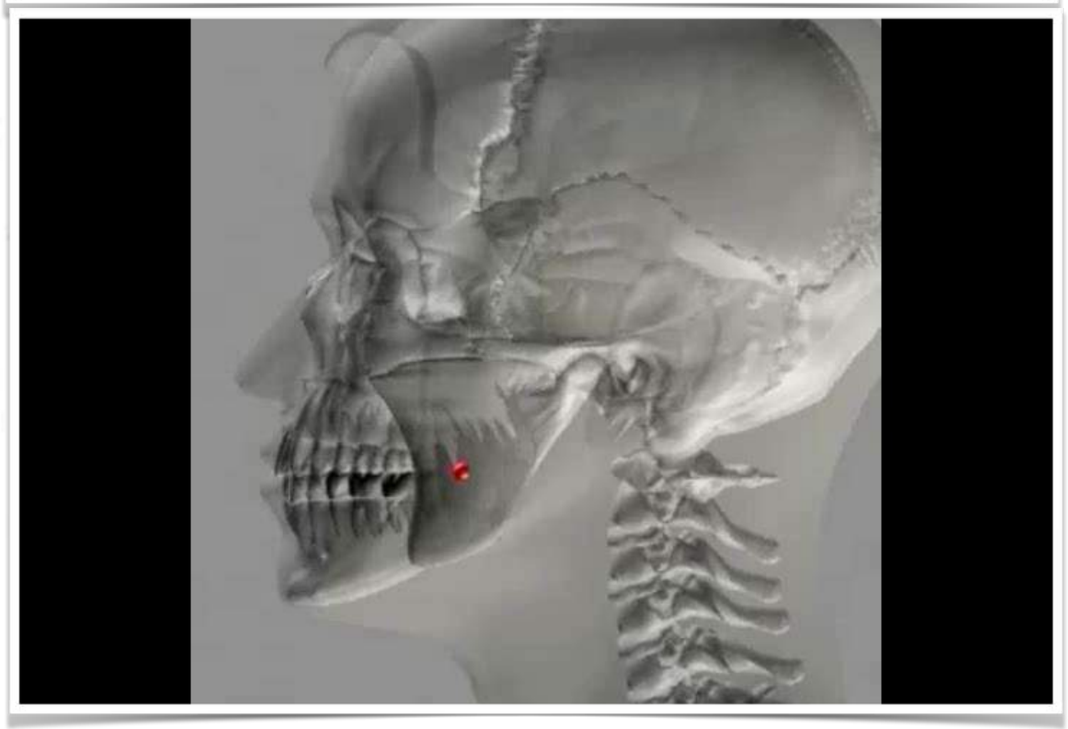
Internal Derangements

DJD

Myofascial Pain Dysfunction







But what if it isn't parafunction?

A new Paradigm regarding the Etiology of many TMJ Disorders and Craniofacial Pain Problems

Protective Function?

Physical behavior that is intended, whether conscious or subconscious, to improve survival

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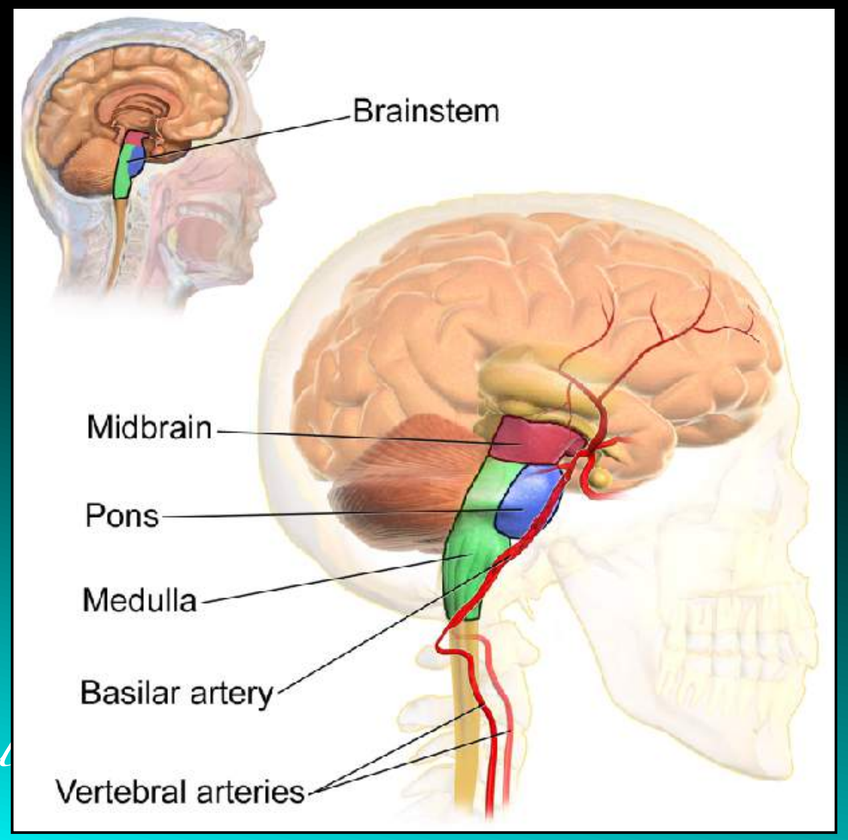
Nocturnal Bruxism

Sleep bruxism muscle activity is associated with a rise in respiration within arousal.

Chest. 2008 Aug;134(2):332-7. Epub 2008 May 19.
A significant increase in breathing amplitude precedes sleep bruxism.
Khoury S, Rouleau GA, Rompré PH, Mayer P, Montplaisir JY, Lavigne GJ.

Sleep bruxism episodes during sleep are under the influences of brief and transient activity of the brainstem arousal-reticular ascending system

Arch Oral Biol. 2007 Apr;52(4):381-4. Epub 2007 Feb 20.
Genesis of sleep bruxism: motor and autonomic-cardiac interactions.
Lavigne GJ, Huynh N, Kato T, Okura K, Adachi K, Yao D, Sessle B.



- there is an association between obstructive sleep apnea and parafunctional activity, [and] sleep position affects the incidence of both sleep disordered breathing and parafunctional activity

Chest. 1986 Sep;90(3):424-9.
Effect of sleep position on sleep apnea and parafunctional activity.
Phillips BA, Okeson J, Paesani D, Gilmore R.

- 74% of rhythmic masticatory muscle activity were scored in the supine position compared to 23% in the lateral decubitus position

Sleep. 2003 Jun 15;26(4):461-5.
Association between sleep bruxism, swallowing-related laryngeal movement, and sleep positions.
Miyawaki S, Lavigne GJ, Pierre M, Guitard F, Montplaisir JY, Kato T.

Why do people clench and grind their teeth?

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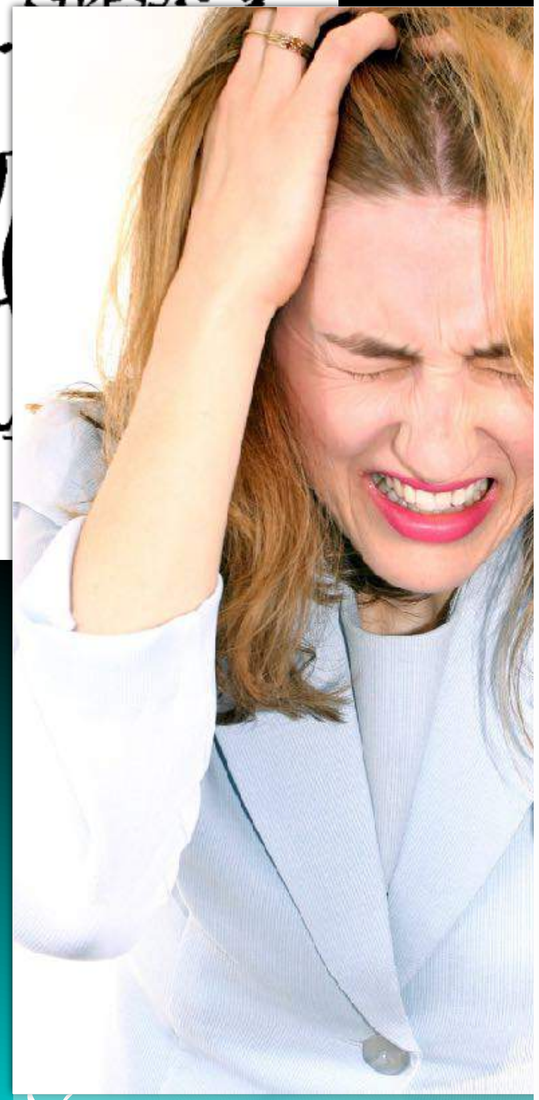

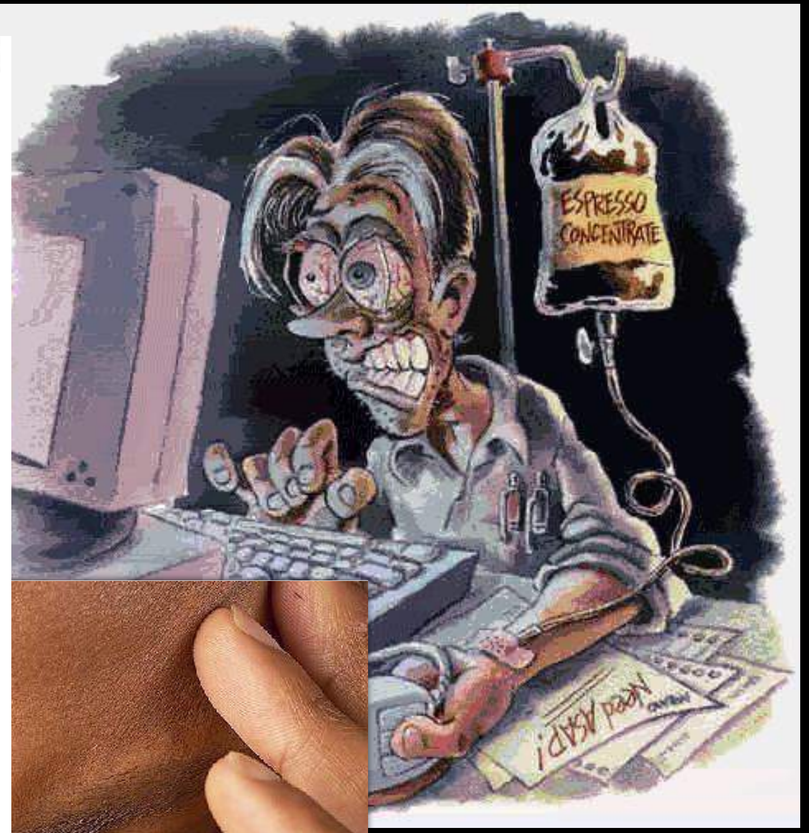

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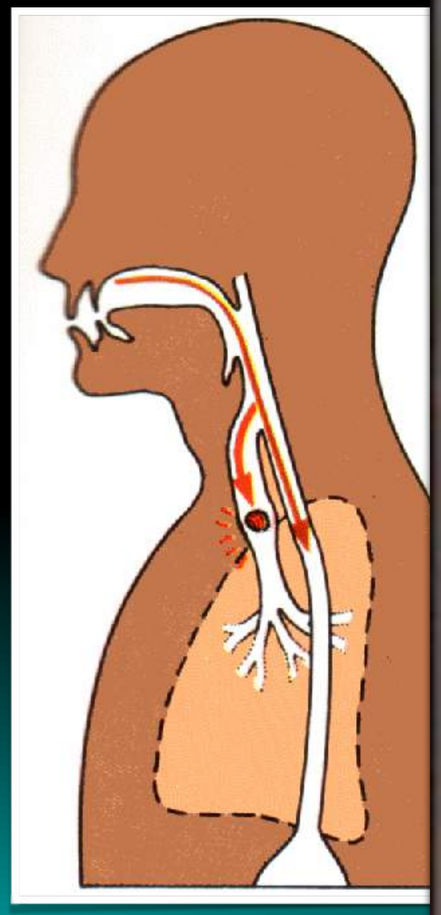
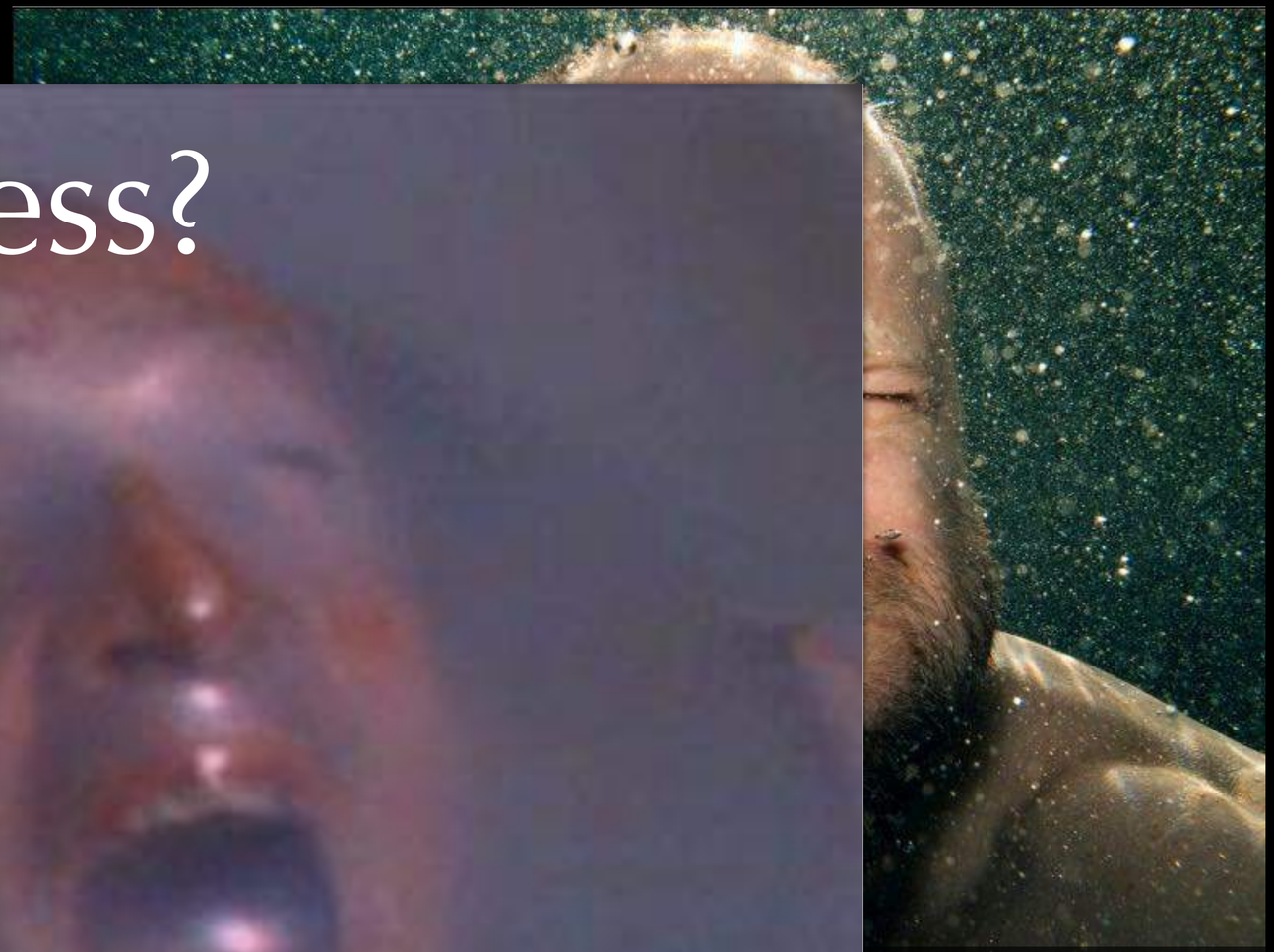
Stress?





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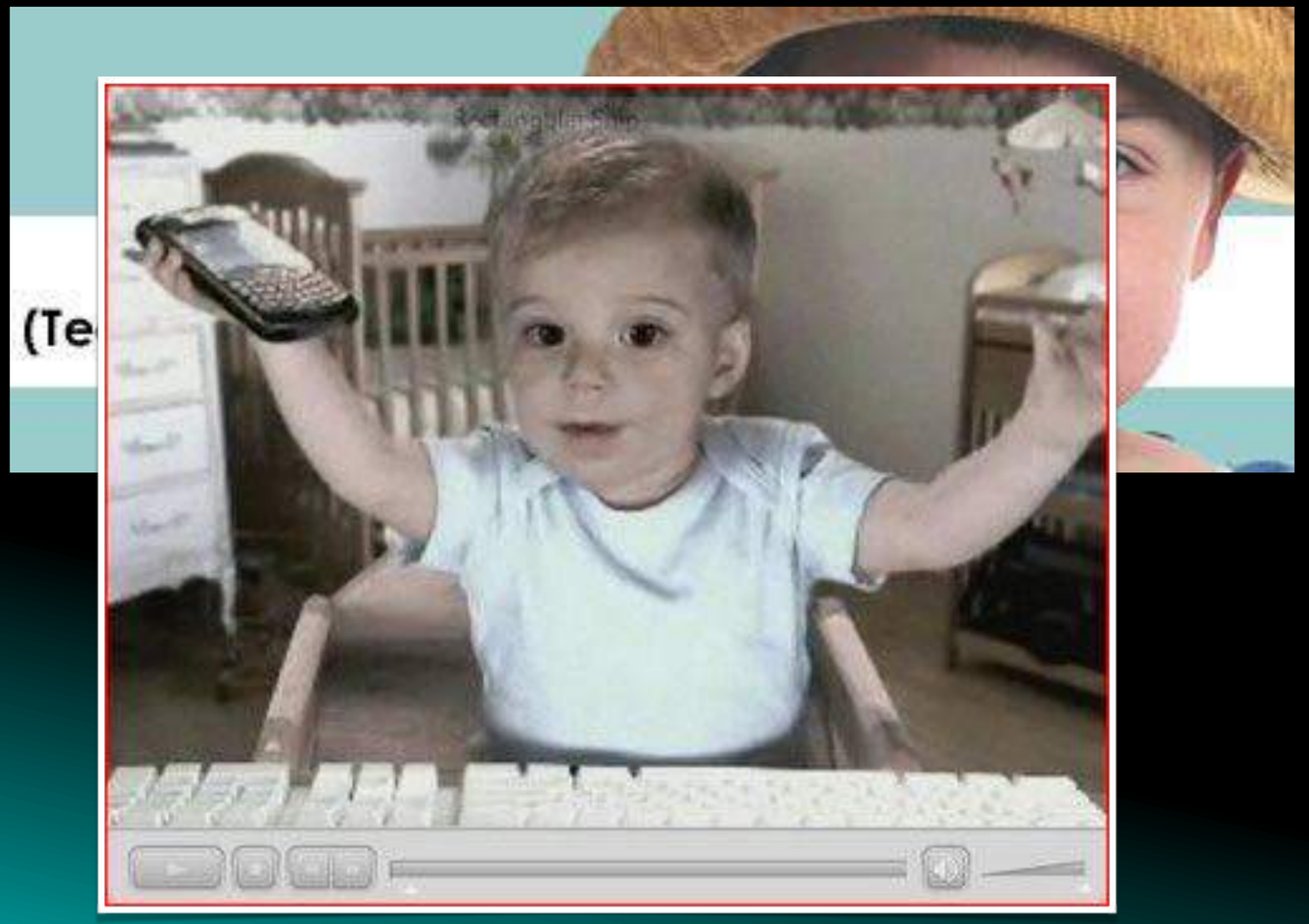
Bruxism and Sleep Apnea in Children



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A significant and independent association was found between poor school performance and hyperactivity, nocturnal enuresis, tooth grinding

Med Princ Pract. 2009;18(6):458-65. Epub 2009 Sep 30.

Habitual snoring in primary school children: prevalence and association with sleep-related disorders and school performance.

Sahin U, Ozturk O, Ozturk M, Songur N, Bircan A, Akkaya A.

All of the children diagnosed with severe OSAHS also presented snoring and bruxism.

J Bras Pneumol. 2008 Jun;34(6):356-61.

Symptoms of obstructive sleep apnea-hypopnea syndrome in children

Gregório PB, Athanazio RA, Bitencourt AG, Neves FB, Terse R, Hora F.

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- This study suggests that there is a positive correlation between sleep-disordered breathing and bruxism. There was an important improvement of bruxism after T & A surgery.

Int J Pediatr Otorhinolaryngol. 2004 Apr;68(4):441-5. Improvement of bruxism after T & A surgery. DiFrancesco RC, Junqueira PA, Trezza PM, de Faria ME, Frizzarini R, Zerati FE.

- This study suggests that adenotonsillectomy could improve bruxism significantly in children who have obstructive symptoms due to adenotonsillar hypertrophy.

Int J Pediatr Otorhinolaryngol. 2008 Apr;72(4):509-11. Pub 2008 Feb 20. Bruxism and adenotonsillectomy. Eftekharian A, Raad N, Gholami-Ghasri N.

Treatment of Nocturnal Bruxism

Jamison Spencer


Continuous Positive Airway Pressure
(CPAP)

During the CPAP titration night most breathing abnormalities were eliminated and a complete eradication of the tooth grinding events was observed. The results of this study suggest that when sleep bruxism is related to apnea/ hypopneas, the successful treatment of these breathing abnormalities may eliminate bruxism during sleep.

Sleep Med. 2002 Nov;3(6):513-5.
Sleep bruxism related to obstructive sleep apnea:
the effect of continuous positive airway pressure.
Oksenberg A, Arons E.

Jamison Spencer

Treatment of Nocturnal Bruxism?

Stress Reduction

Bang Head Here

Directions:
1. Place on FIRM surface.
2. Follow directions in circle.
3. Repeat step 2 as necessary, or until unconscious.
4. If unconscious, cease stress reduction activity.

Jamison Spencer

- RESULTS: No statistically significant difference in AHI was noted between baseline and splint nights.

- However, four patients experienced an aggravation in apnea diagnosis category on the night they used the splint. The AHI was increased by more than 50% in 5 of the 10 patients. The RDI showed a 30% increase from baseline to splint nights. The percentage of sleeping time with snoring also increased by 40% with the splint.

Int J Prosthodont. 2004 Jul-Aug;17(4):447-53.
Aggravation of respiratory disturbances by the use of an occlusal splint in apneic patients: a pilot study.
Gagnon Y, Mayer P, Morisson F, Rompré PH, Lavigne GJ.
Faculty of Dental Medicine, University of Montreal, Canada.

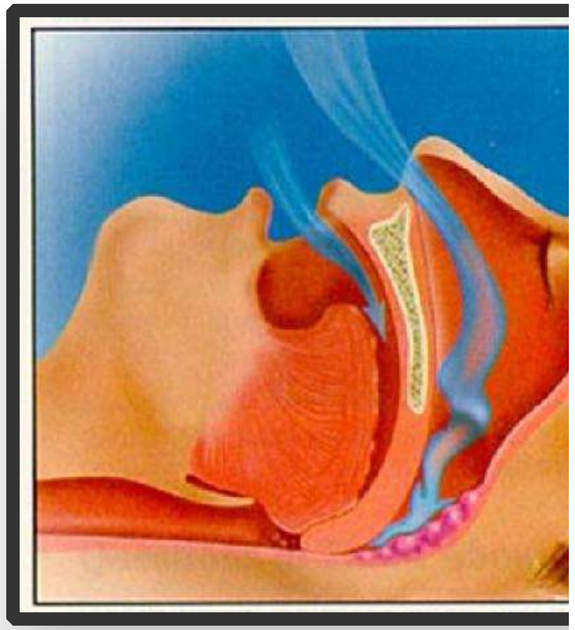
- CONCLUSION: This open study suggested that the use of an occlusal splint is associated with a risk of aggravation of respiratory disturbances. It may therefore be relevant for clinicians to question patients about snoring and sleep apnea when recommending an occlusal splint.

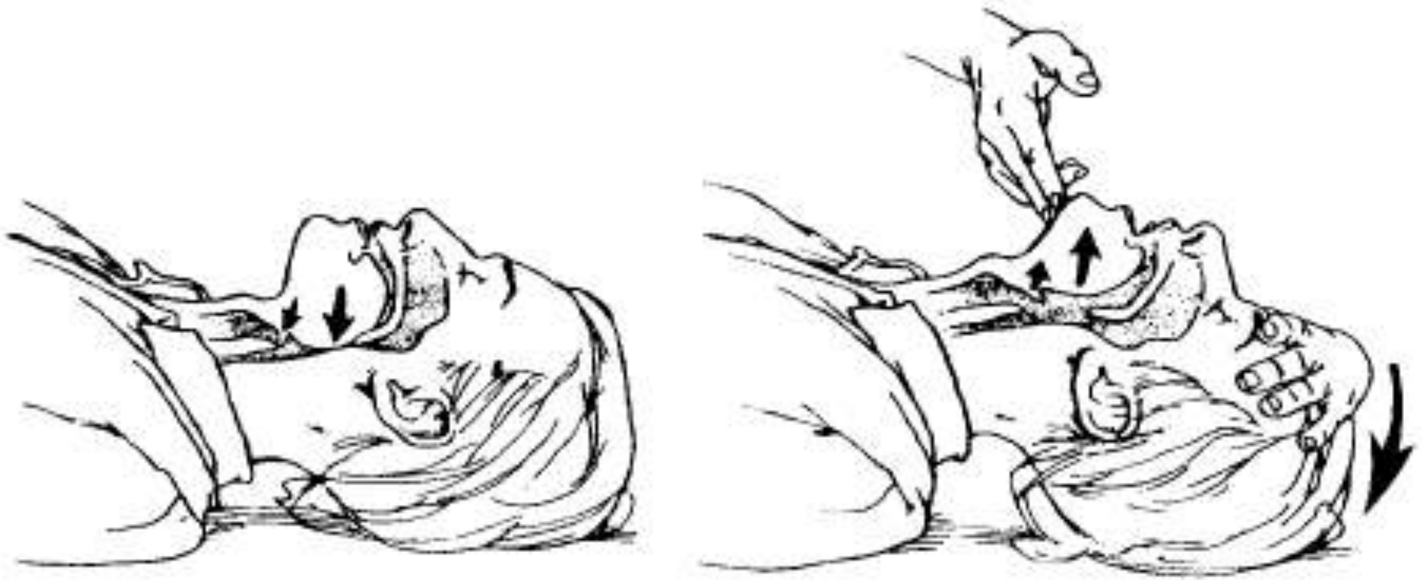
Int J Prosthodont. 2004 Jul-Aug;17(4):447-53.
Aggravation of respiratory disturbances by the use of an occlusal splint in apneic patients: a pilot study.
Gagnon Y, Mayer P, Morisson F, Rompré PH, Lavigne GJ.
Faculty of Dental Medicine, University of Montreal, Canada.

Treatment of Nocturnal Bruxism?

CPAP Treatment

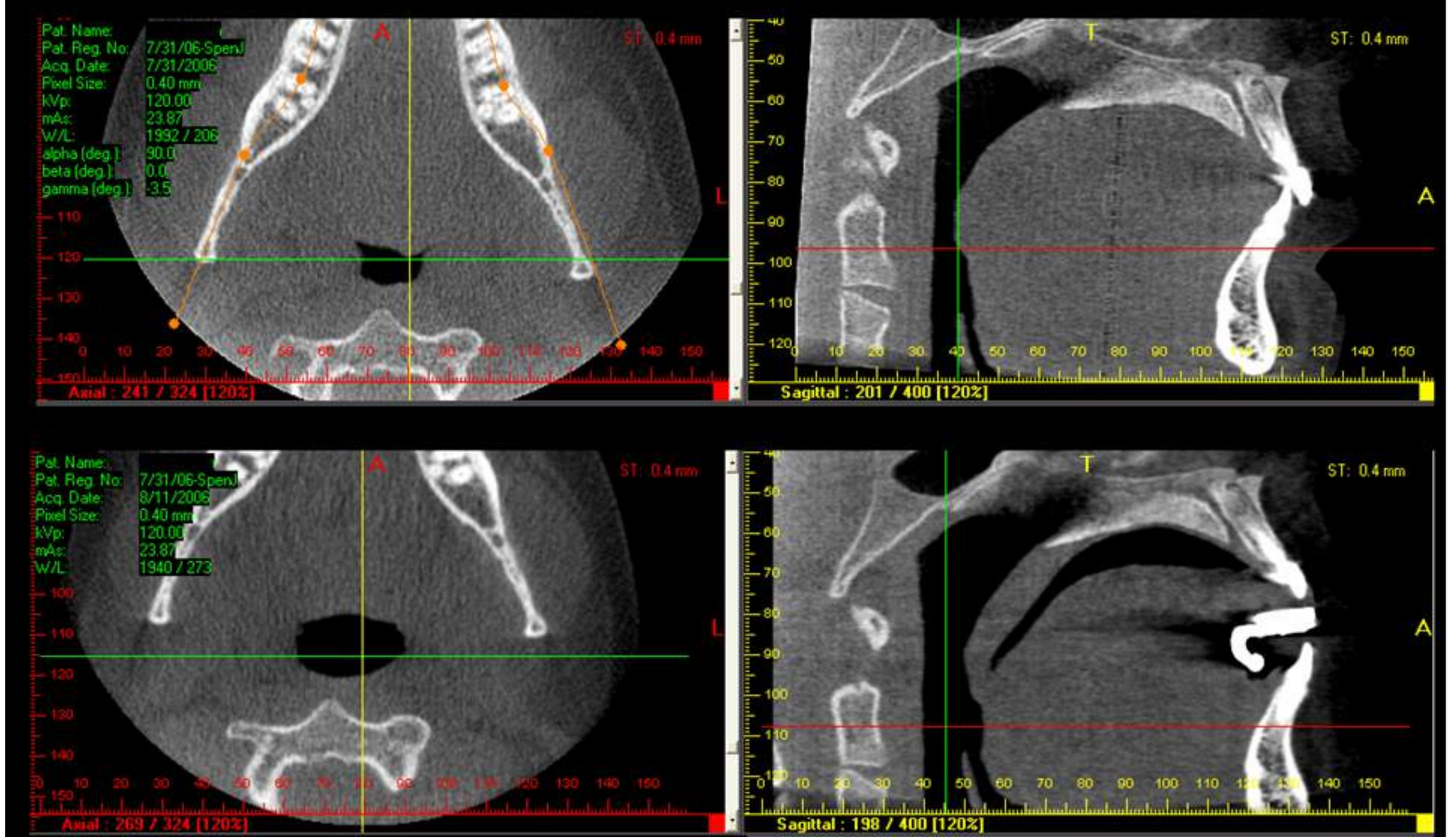
OA Treatment





SOURCE: Copyright. **American Heart Association.** *Instructor's Manual for Basic Life Support.* Dallas: American Heart Association, 1987.

★ ***Figure 2-5. Head-tilt/chin-lift technique of opening airway.***



Cone Beam CT showing pre treatment and with TAP II in place

- Twelve subjects

- 5 nights in a sleep laboratory. After habituation and baseline nights, 3 more nights were spent with an MAA in either a slight (25%) or pronounced (75%) mandibular protrusion position or with an MOS (control).

- CONCLUSION: Short-term use of an MAA is associated with a significant reduction in SB motor activity without any appliance breakage. A reinforced MAA design may be an alternative for patients with concomitant tooth grinding and snoring or apnea during sleep.

Int J Prosthodont. 2009 May-Jun;22(3):251-9.
Effect of an adjustable mandibular advancement appliance on sleep bruxism: a crossover sleep laboratory study.
Landry-Schönbeck A, de Grandmont P, Rompré PH, Lavigne GJ.

Thirteen intense and frequent bruxors

The MOS was used as the active control condition and the MAD was used as the experimental treatment condition.

Designed to temporarily manage snoring and sleep apnea, the MAD was used in 3 different configurations.

CONCLUSIONS: Short-term use of a temporary custom-fit MAD is associated with a remarkable reduction in sleep bruxism motor activity.

Int J Prosthodont. 2006 Nov-Dec;19(6):549-56.
Reduction of sleep bruxism using a mandibular advancement device: an experimental controlled study.
Landry ML, Rompré PH, Manzini C, Guitard F, de Grandmont P, Lavigne GJ.

Jamison Spencer

OSA Prevelance

OSA Prevelance

Naresh M. Punjabi "The Epidemiology of Adult Obstructive Sleep Apnea", Proceedings of the American Thoracic Society, Vol. 5, No. 2 (2008), pp. 136–143.

TABLE 1. STUDIES ON THE PREVALENCE OF OBSTRUCTIVE SLEEP APNEA

Country	First Author (Reference)	N	ethnicity	Diagnostic method	Prevalence	
					Men	Women
United States	Young (7)	602	White	Polysomnography	4.0%	2.0%
	Bixler (9)	1,741	White	Polysomnography	3.9%	1.2%
Australia	Bearpark (10)	485	White	MESAM IV*	3.1%	–
India	Udwadia (15)	250	Indian	Polysomnography	7.5%	4.5%
China	Ip (12)	258	Chinese	Polysomnography	4.1%	–
	Ip (13)		Chinese	Polysomnography	–	2.1%
Korea	Kim (14)	457	Korean	Polysomnography	4.5%	2.3%

Jamison Spencer

OSA Prevelance

Data previously published in the American Journal of Epidemiology show that the estimated prevalence rates of obstructive sleep apnea have increased substantially over the last two decades, most likely due to the obesity epidemic. It is now estimated that 26 percent of adults between the ages of 30 and 70 years have sleep apnea.

American Academy of Sleep Medicine, 2014

Jamison Spencer

Obstructive sleep apnea in non-obese patients: age, gender and severity

Teimur Yeligulashvili, PhD

- Results confirmed that OSA in non-obese patients is most prevalent in middle-aged men with larger neck sizes. Fifty-four percent (2,906) of 5,426 non-obese patients were OSA positive, and most of them were middle age (57 percent). An equal number of patients had mild OSA (50.4%) or moderate to severe OSA (49.6%). Male prevalence and neck size were significantly higher in the group with moderate to severe OSA.

Abstract presented at SLEEP 2009

Jamison Spencer

Sleep apnoea is a common occurrence in females

Karl A. Franklin et. al.

- We investigated 400 females from a population-based random sample of 10,000 females aged 20–70 years. They answered a questionnaire and performed overnight polysomnography.

European Respiratory Journal, August 2012

Jamison Spencer

Sleep apnoea is a common occurrence in females
Karl A. Franklin et. al.

- Obstructive sleep apnoea (apnoea-hypopnoea index ≥ 5) **was found in 50% (95% CI 45–55%) of females aged 20–70 years.** Sleep apnoea was related to age, obesity and hypertension but not to daytime sleepiness. Severe sleep apnoea (apnoea-hypopnoea index ≥ 30) was scored in 14% (95% CI 8.1–21%) of females aged 55–70 years and in 31% (95% CI 12–50%) of obese females with a body-mass index of >30 kg·m–2 aged 50–70 years.

European Respiratory Journal, August 2012

Jamison Spencer

THE Laryngoscope™
The Triological Society
FOUNDED IN 1896

Results: The majority of the Far-East Asian men were found to be nonobese (mean BMI, 26.7 +/- 3.8) but had severe OSAS (mean RDI, 55.1 +/- 35.1). When controlled for age, RDI, and LSAT, the white men were substantially more obese (mean BMI, 29.7 +/- 5.8, P = .0055). When controlled for age and BMI, the white men had less severe illness (RDI, 34.1 +/- 17.9, P = .0001). Although the posterior airway space and the distance from the mandibular plane to hyoid bone were less abnormal in the Far-East Asian men, the cranial base dimensions were significantly decreased.

Laryngoscope. 110(10):1689-1693, October 2000.

Jamison Spencer

Diagnosis of Sleep Apnea

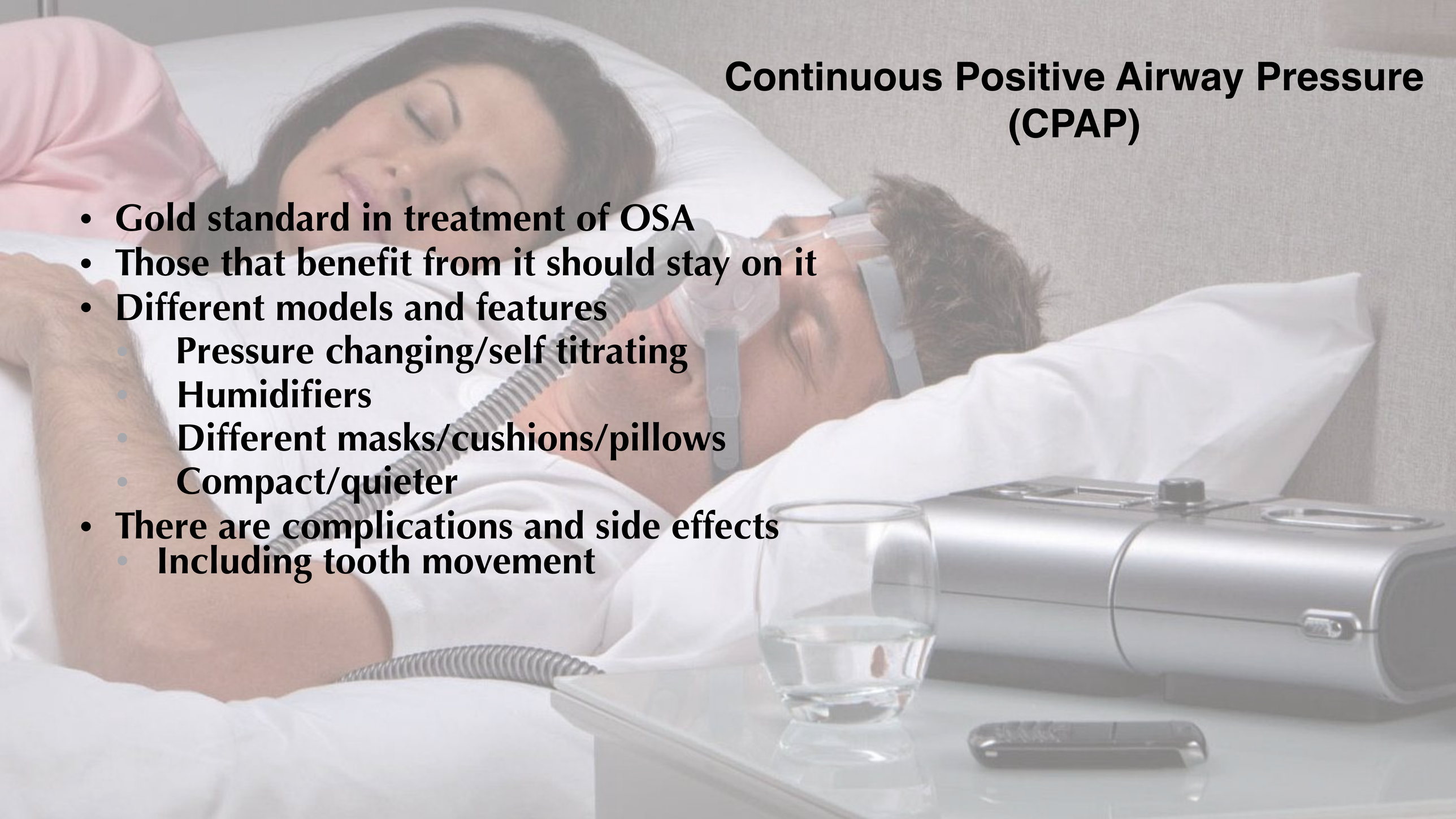
Jamison Spencer

Jamison Spencer

You can NOT rule out sleep apnea with a home test

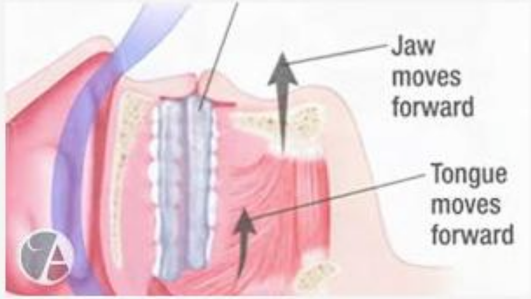
Jamison Spencer

Continuous Positive Airway Pressure (CPAP)



- Gold standard in treatment of OSA
- Those that benefit from it should stay on it
- Different models and features
  - Pressure changing/self titrating
  - Humidifiers
  - Different masks/cushions/pillows
  - Compact/quieter
- There are complications and side effects
  - Including tooth movement

The Dentist's Role in the Management of Snoring and Obstructive Sleep Apnea



Dentistry's Role

- Obstructive Sleep Apnea (OSA) is a life-threatening medical disorder
- Dentists are not medically qualified nor legally permitted to diagnose sleep disorders.
- Diagnosis must be made by a physician

Dentistry's Role

- Screening and referral
- Provide and monitor oral appliance therapy as part of treatment team with physician
- Monitor and treat potential side effects of oral appliance therapy
- Follow-up

An American Academy of Sleep Medicine and American Academy of Dental Sleep Medicine Clinical Practice Guideline

JDSM Vol 2, No. 3, 2015

Recommendations:

1. We recommend that sleep physicians prescribe oral appliances, rather than no therapy, for adult patients who request treatment of primary snoring (without obstructive sleep apnea). (STANDARD)

2. When oral appliance therapy is prescribed by a sleep physician for an adult patient with obstructive sleep apnea, we suggest that a qualified dentist use a custom, titratable appliance over non-custom oral devices. (GUIDELINE)

3. We recommend that sleep physicians consider prescription of oral appliances, rather than no treatment, for adult patients with obstructive sleep apnea who are intolerant of CPAP therapy or prefer alternate therapy. (STANDARD)

4. We suggest that qualified dentists provide oversight—rather than no follow-up—of oral appliance therapy in adult patients with obstructive sleep apnea, to survey for dental-related side effects or occlusal changes and reduce their incidence. (GUIDELINE)

5. We suggest that sleep physicians conduct follow-up sleep testing to improve or confirm treatment efficacy, rather than conduct follow-up without sleep testing, for patients fitted with oral appliances. (GUIDELINE)

6. We suggest that sleep physicians and qualified dentists instruct adult patients treated with oral appliances for obstructive sleep apnea to return for periodic office visits—as opposed to no follow-up—with a qualified dentist and a sleep physician. (GUIDELINE)

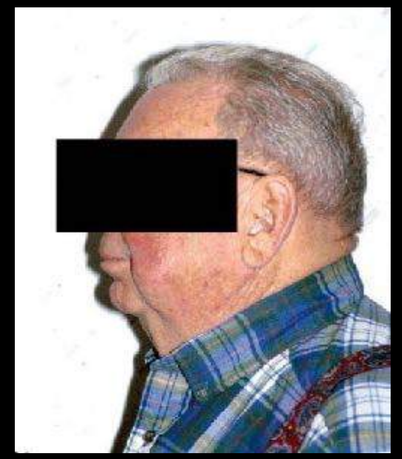
Screening Your Patients

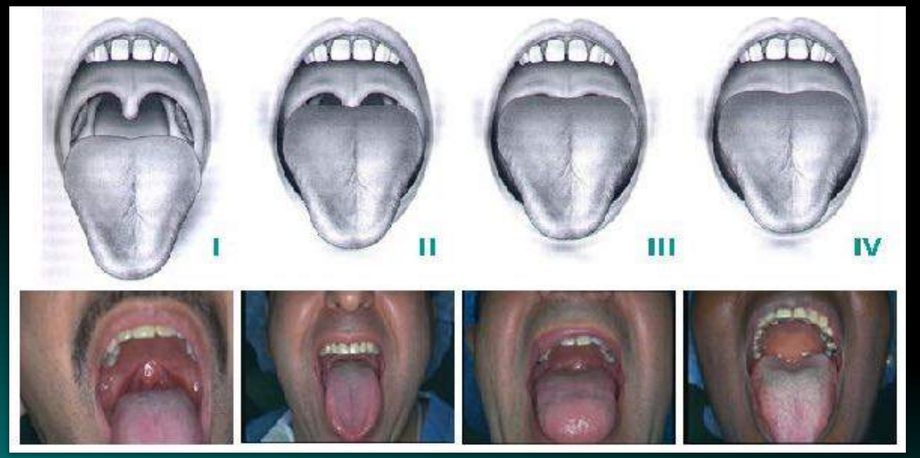
How do we best screen for OSA?

- **History**
  - Snoring
  - Witnessed apneas
  - Non-restorative sleep
  - Excessive Daytime Sleepiness / Fatigue
- **Co morbidities**
  - Hypertension
  - GERD
  - Headaches
  - BRUXISM

OSA Risk Factors

- BMI>30
- Neck circumference >17in
- High arched palate
- Micro/retrognathia
- Mallampati class III / IV airway





Jamison Spencer

Epworth Sleepiness Scale

EPWORTH SLEEPINESS SCALE

How likely are you to doze off or fall asleep in the following situations? Use the following scale to choose the most appropriate number for each situation

0 = would never doze 1 = slight chance of dozing 2 = moderate chance of dozing 3 = high chance of dozing

Sitting and reading ..... _____

Watching TV ..... _____

Sitting, inactive in a public place (theater, meeting) ..... _____

As a passenger in a car for an hour without a break ..... _____

Lying down to rest in the afternoon when circumstances permit ..... _____

Sitting and talking to someone ..... _____

Sitting quietly after a lunch without alcohol ..... _____

In a car, while stopped for a few minutes in traffic ..... _____

Total

Jamison Spencer

Jamison Spencer

Sleep Screening Questionnaire

Please answer the questions below to help us assess the possibility of a sleep disorder which may be related to your dental and overall health. There is often a correlation between grinding of the teeth, TMJ disorders, breakdown of the teeth and sleep disorders. Sleep apnea may also increase your risk for many different health conditions including heart attack and stroke. If you are here with your child (under 16), please fill out the lower portion marked "For children only" for your child.

Name:_____ **Height:**_____ **Weight:**_____

Epworth Sleepiness Scale

How likely are you to doze off or fall asleep in the following situations, in contrast to just feeling tired?

0 = I would never doze
1 = I have a slight chance of dozing
2 = I have a moderate chance of dozing
3 = I have a high chance of dozing

Situation	Chance of Dozing
1. Sitting and reading	____
2. Watching TV	____
3. Sitting inactive in a public place (e.g. a theater or a meeting)	____
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 lunch without alcohol	____
8. In a car while stopped for a few minutes in traffic	____
Total Score	____

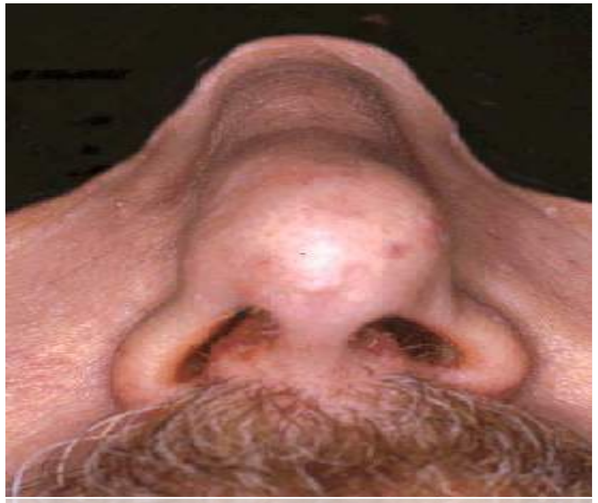
Have you ever been diagnosed with:	Yes	No
1. Impaired Cognition (i.e. difficulty concentrating or thinking)	☐	☐
2. Mood Disorders/Depression	☐	☐
3. Insomnia	☐	☐
4. Hypertension (high blood pressure)	☐	☐
5. Ischemic Heart Disease (Coronary Artery Disease/Atherosclerosis)	☐	☐
6. History of Stroke	☐	☐
7. Sleep Apnea	☐	☐
If yes: Did you try to use CPAP	☐	☐
8. TMJ problems significant enough to require treatment	☐	☐
9. Gastric Reflux (GERD) or Heartburn	☐	☐

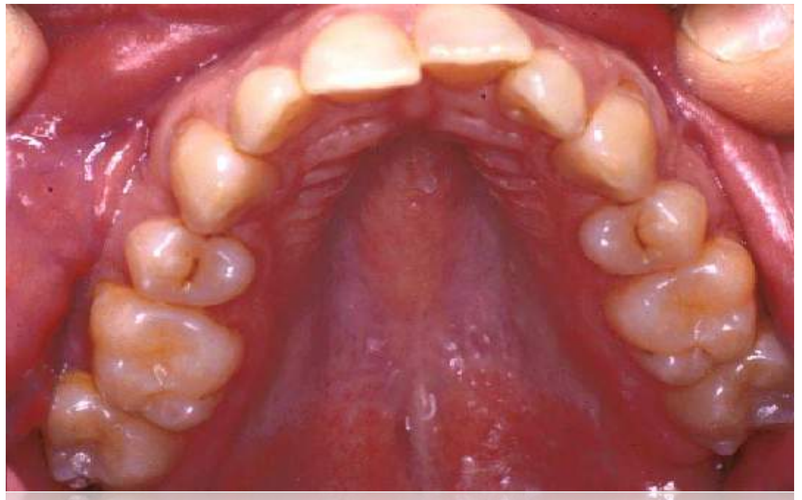
Are you aware of (or have you been told):	Yes	No
1. Snoring on a regular basis	☐	☐
2. Feeling tired or fatigued on a regular basis	☐	☐
3. Clenching or grinding your teeth (bruxism)	☐	☐
4. Having frequent headaches	☐	☐
5. Your neck size being > 17 inches (male) or > 16 inches (female)	☐	☐
6. Anyone in your family having sleep apnea	☐	☐
7. Stopping breathing when sleeping/awakening with a gasp	☐	☐

For children only (filled out by parent or guardian)

Are you aware of your child:	Yes	No
1. Snoring/noisy breathing while sleeping	☐	☐
2. Grinding his or her teeth	☐	☐
3. Wetting the bed	☐	☐
4. Having difficulty in school/learning	☐	☐
5. Being treated for ADD or ADHD	☐	☐
6. Breathing primarily through their mouth	☐	☐
7. Having frequent nightmares/night terrors	☐	☐
8. Having frequent ear aches	☐	☐

Dental Exam Findings:			
	☐ Evidence of Bruxism	☐ Scalloping of the tongue	☐ Crowded airway
	☐ Tori or Bone Loss	☐ Anterior wear	☐ Retrognathia / Class II





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8. In a car while stopped for a few minutes in traffic	____
Total Score	____

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2. Mood Disorders/Depression	☐	☐
3. Insomnia	☐	☐
4. Hypertension (high blood pressure)	☐	☐
5. Ischemic Heart Disease (Coronary Artery Disease/Atherosclerosis)	☐	☐
6. History of Stroke	☐	☐
7. Sleep Apnea	☐	☐
If yes: Did you try to use CPAP	☐	☐
8. TMJ problems significant enough to require treatment	☐	☐
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4. Having frequent headaches	☐	☐
5. Your neck size being > 17 inches (male) or > 16 inches (female)	☐	☐
6. Anyone in your family having sleep apnea	☐	☐
7. Stopping breathing when sleeping/awakening with a gasp	☐	☐

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3. Wetting the bed	☐	☐
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5. Being treated for ADD or ADHD	☐	☐
6. Breathing primarily through their mouth	☐	☐
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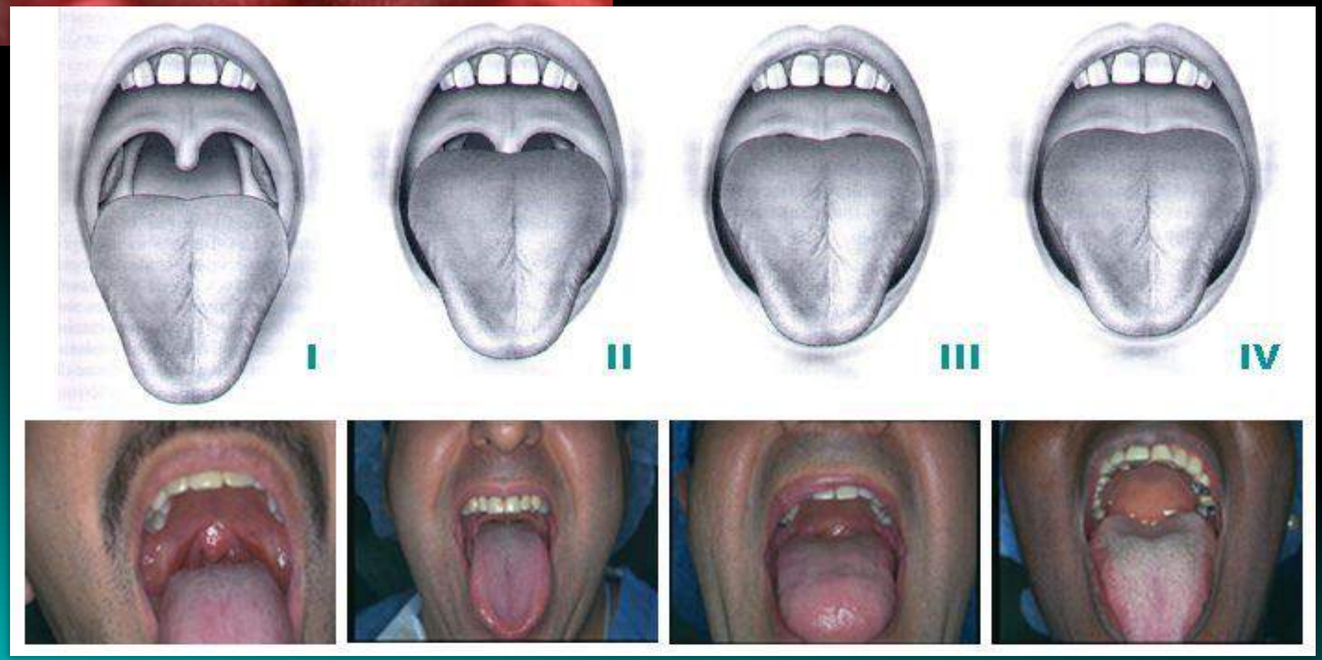
8. Having frequent ear aches	☐	☐

Dental Exam Findings:
☐ Evidence of Bruxism ☐ Scalloping of the tongue ☐ Crowded airway
☐ Tori or Bone Loss ☐ Anterior wear ☐ Retrognathia / Class II



Jamison Spencer

Perio and OSA?

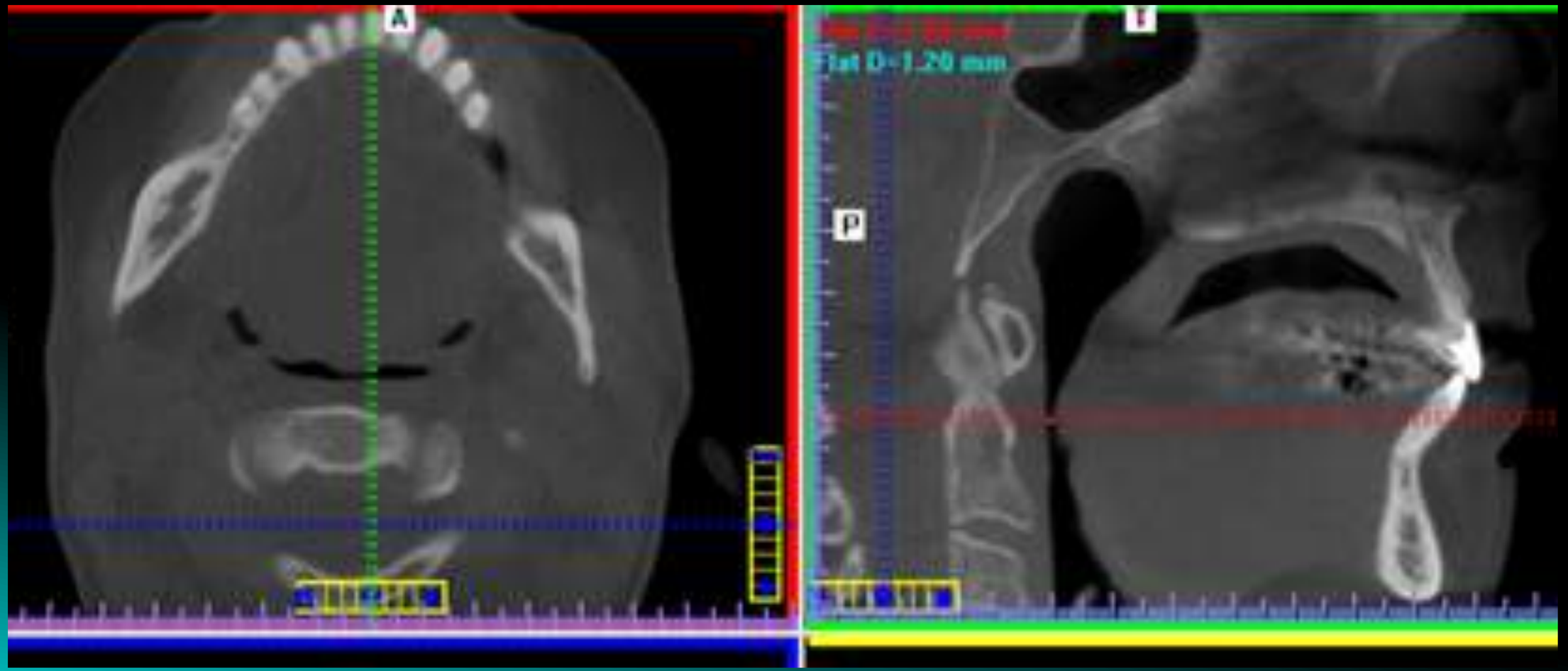
The association between periodontitis and obstructive sleep apnea: a preliminary study.
Seo WH, et al. J Periodontal Res. 2013.

MATERIAL AND METHODS:
- 687 participants (460 men and 227 women)
- 47-77 years of age
- standard polysomnography
- clinical periodontal examination
- Periodontitis was defined as clinical attachment level (CAL) ≥ 6 mm and probing pocket depth ≥ 4 mm.

RESULTS: The results showed that 17.5% of the participants had periodontitis, 46.6% had OSA and 60.0% who were diagnosed with periodontitis had OSA.

CONCLUSION: There is a significant association between OSA and periodontal disease. Further research is needed to clarify the causal relationship between the two conditions.

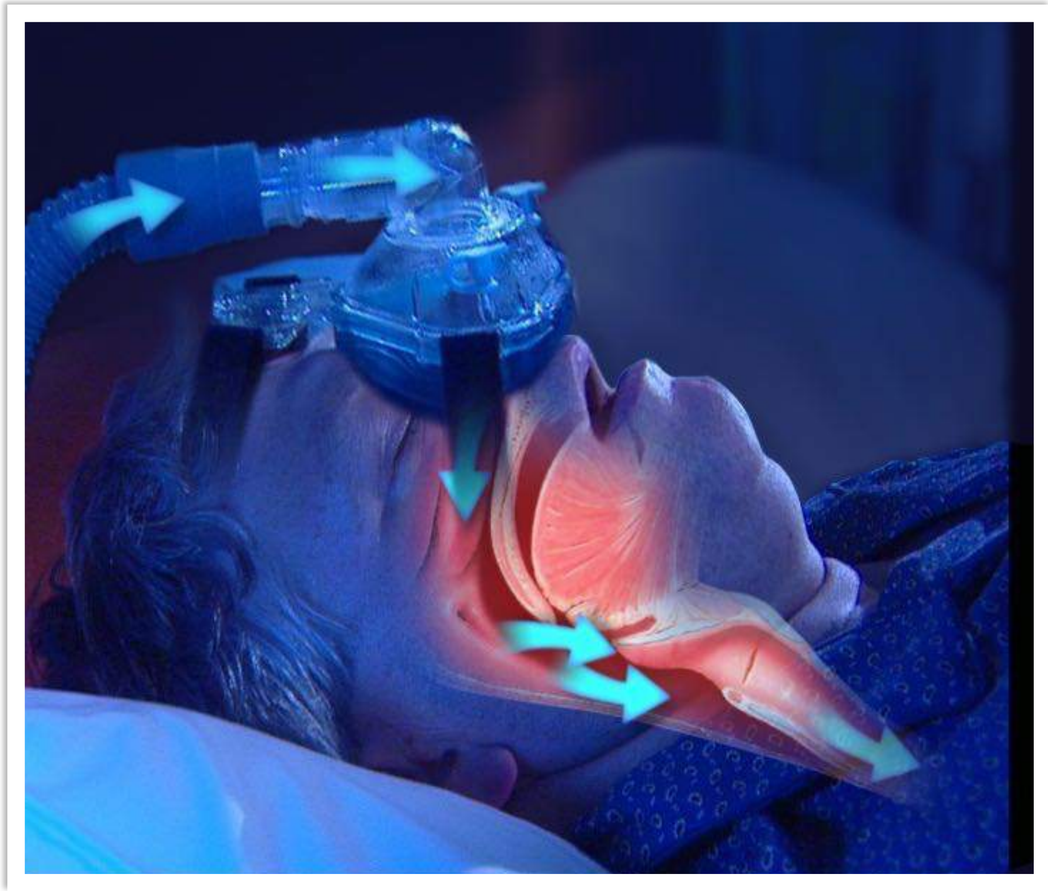
1.2mm Airway!!!



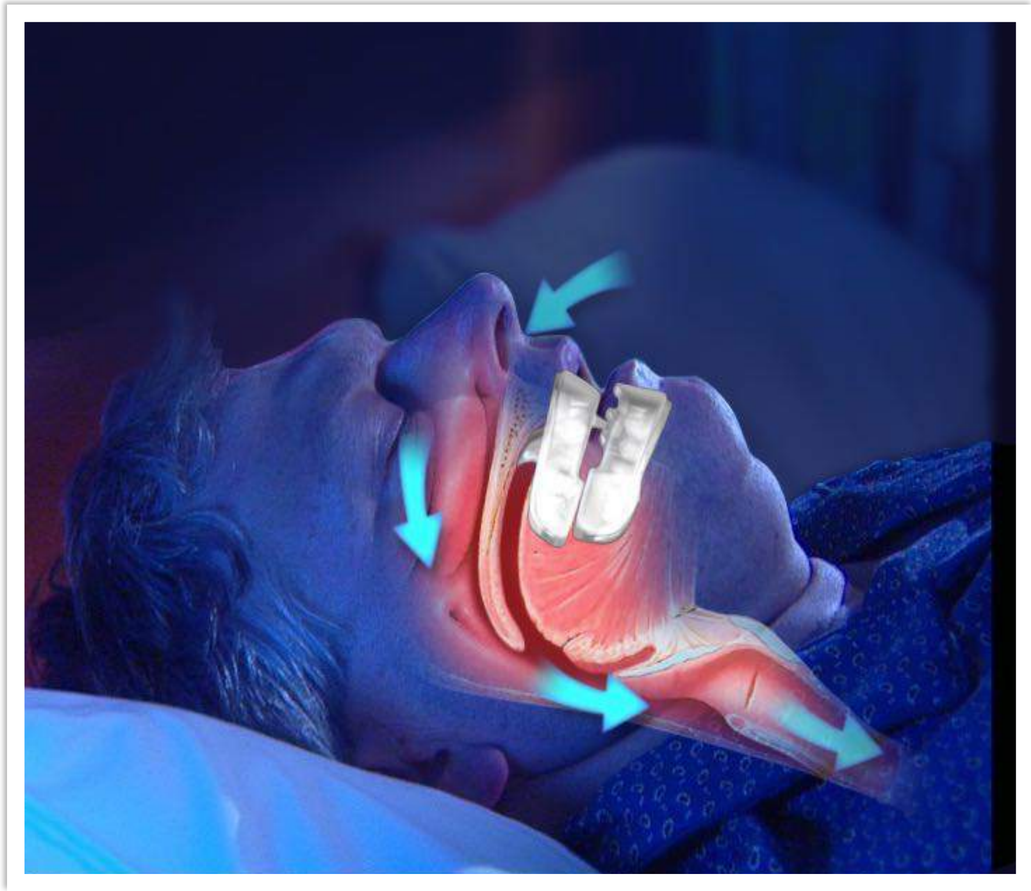
Jamison Spencer


mm/inch
OFF
ON
ZERO

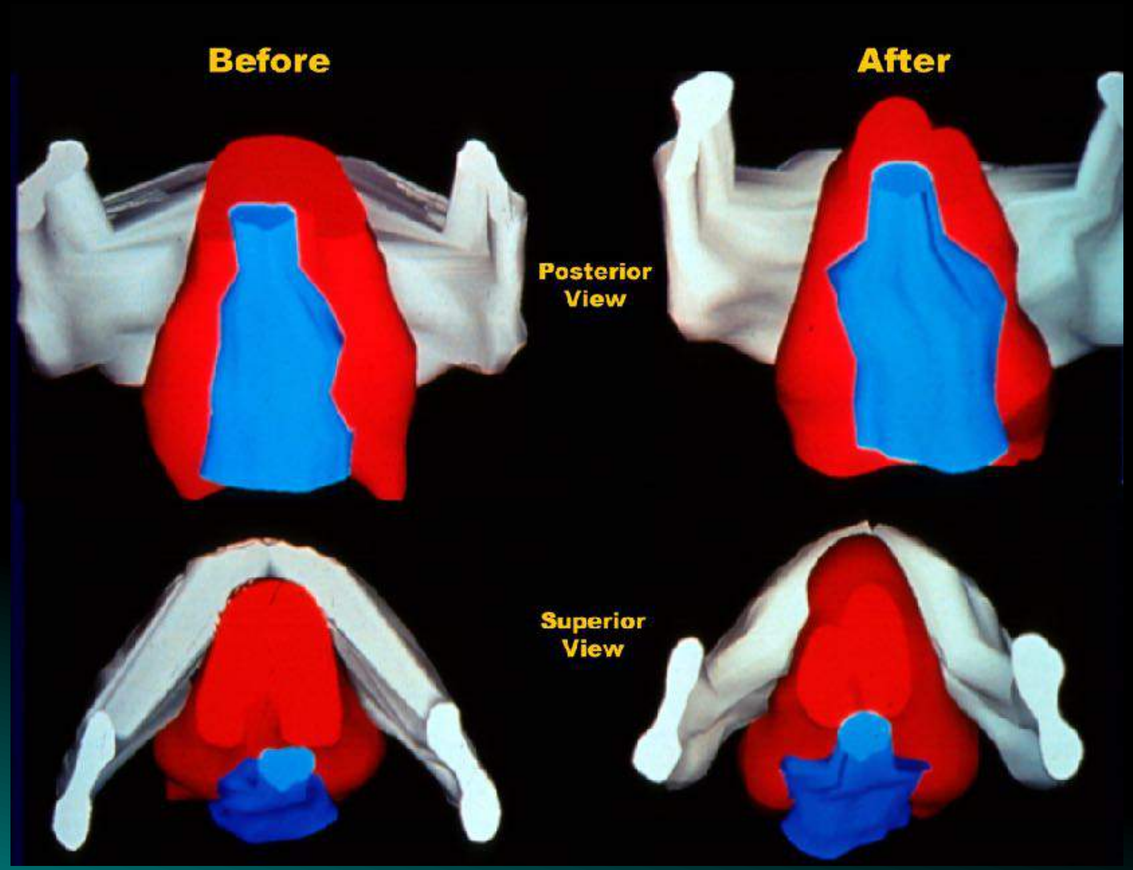
Oral Appliances for the Management of Snoring and Obstructive Sleep Apnea

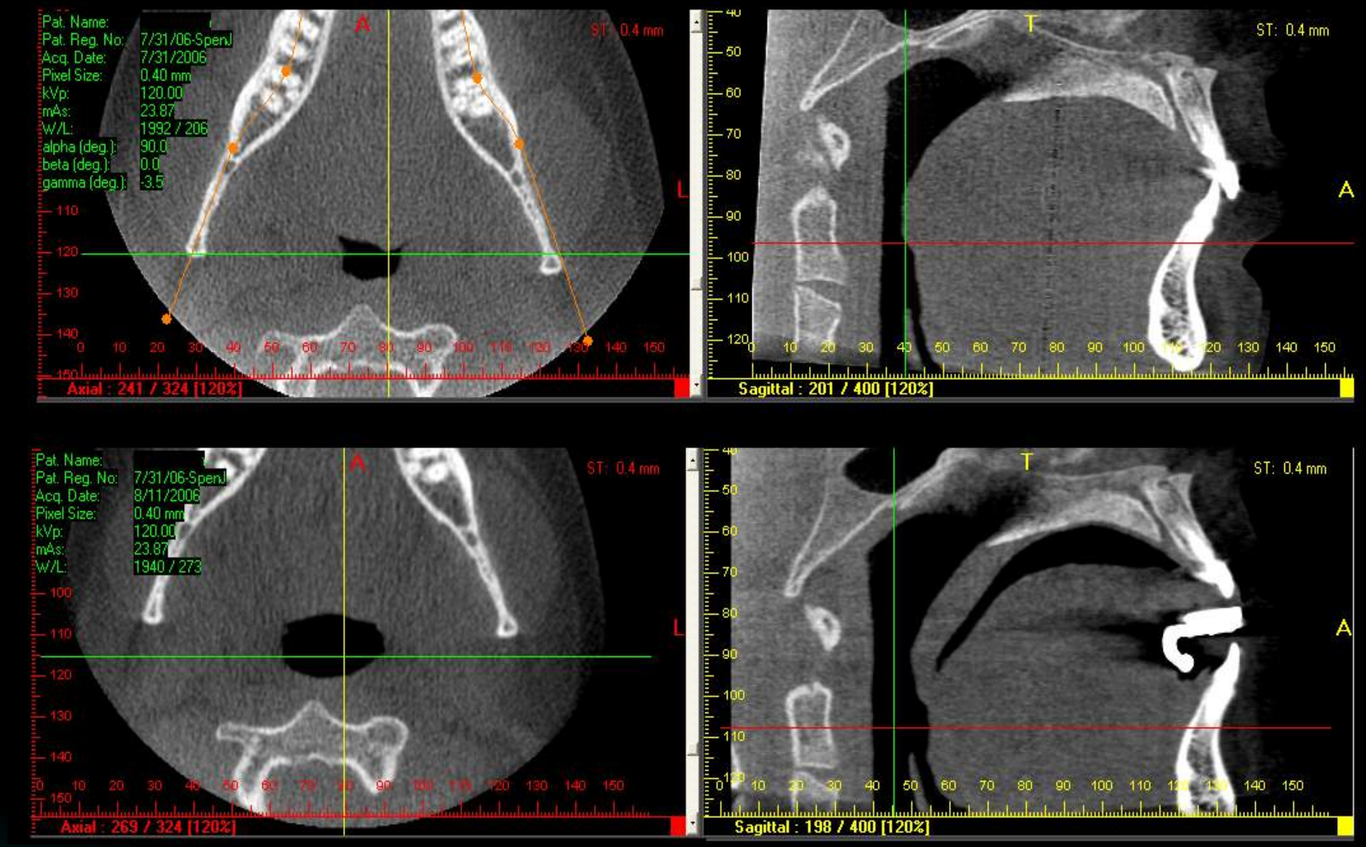


CPAP Treatment



OA Treatment





Three Dimensional reconstructions courtesy of
Alan A. Lowe, DMD, FRCD (C) , FACD

$$F \propto \frac{\Delta P \cdot r^4}{\eta \cdot L}$$

Jamison Spencer

Functional Classification of Oral Appliances

- Tongue Retaining Devices (TRD)
- Mandibular Repositioning Appliances / Mandibular Advancement Devices (MRA or MAD)

Tongue Retaining Device (TRD)

Indications for Tongue Retaining Devices

- Lack of tooth support or edentulous
- Non-apneic snorers or mild OSA
- **Patients with Down's Syndrome**

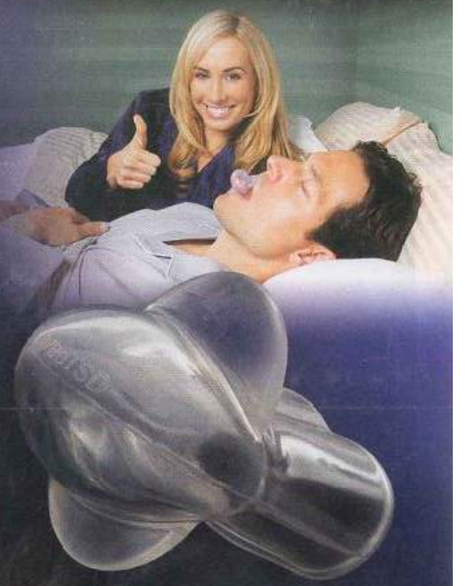
Snor X

Custom TRD

Custom TRD w/ Tubes

A simple, effective treatment for snoring.

aveoTSD®

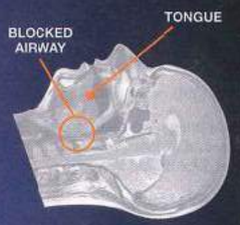


- A brilliantly simple, low-cost treatment for problem snoring.
- aveoTSD suctions onto the tongue, preventing it from falling back into the throat. It is indicated for anyone – even patients with TMJ or who are edentulous.
- Requires no impressions or adjustments. Deliver it on the same day the patient agrees to treatment and greatly improve their quality of life.

$139 each‡

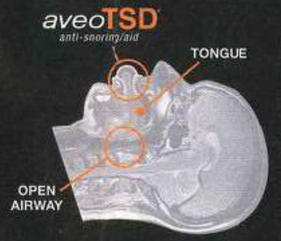
Ask for your free patient education materials

How aveoTSD works



In this MRI image, the tongue falls into the back of the airway as a person sleeps. This blocks the airway, leading to snoring.*

**Magretic Resonance Imaging GE Signa Profile EXCITE 0.2T*



This MRI image shows the aveoTSD holding the tongue gently forward, preventing it from falling back and obstructing the airway. Note how the airway is now open and clear. This stops or greatly reduces snoring.

‡ aveo TSD volume pricing/unit: (1–4) $139; (5–9) $129; (10–19) $119; (20+) $115, plus shipping.

aveoTSD is a registered trademark of Innovative Health Technologies (NZ) Limited.

800-334-1979

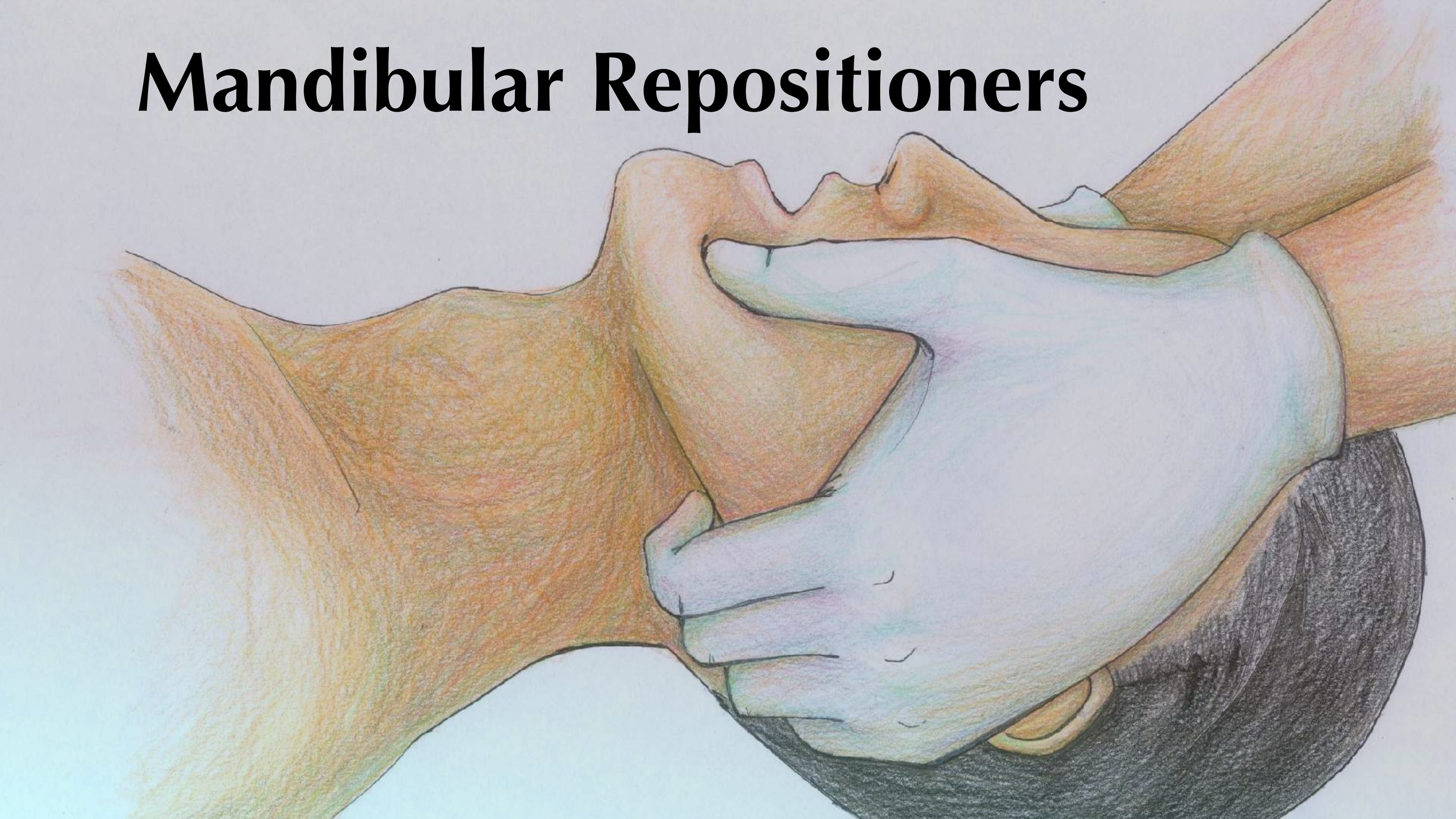
getaveo.com

glidewelldental.com

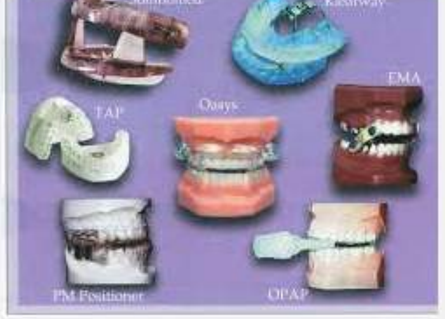
GLIDEWELL LABORATORIES

"The Standard of Care"

Mandibular Repositioners




3504 × 2336 - kramerfamilydentistry.com



EMA
TAP
Oasys
PM Positioner
OPAP







OR
Oral Appliance
CPAP



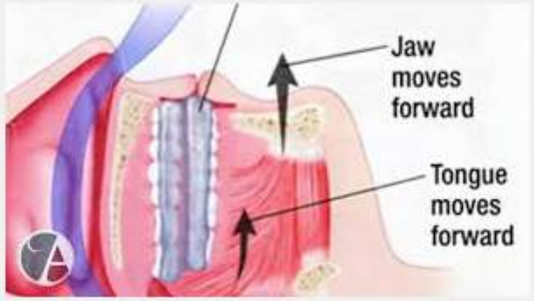


new dental sleep appliance
VeneerVideo.com









Jaw moves forward
Tongue moves forward





Appliance Selection

- **Things to consider**
  - **Lateral bruxer**
  - Desire to keep their mouth closed
  - Desire the ability to open their mouth
  - Retention issues (too little or too much)
  - **Missing teeth**
  - Restorations and future restorative
  - Distance the patient has to travel
  - Ability to return for follow up
  - Manual dexterity and vision
  - **Metal allergies/sensitivity**
  - Prior experience with oral appliance therapy
  - Current or history of TMJ problems

Types of Adjustable Appliances

- Anterior pull/push (TAP, Silencer, MDSA, etc.)
- Bilateral Push (Herbst, SUAD, etc.)
- Bilateral Pull (EMA, Silent Night, Narval, etc.)
- Interlocking (Somnomed, Dorsal, Respire, etc.)
- Mono block (Moses, PM Positioner, Klearway, etc.)

- Temporary/Trial (Boil and Bites, Silent Sleep, etc.)

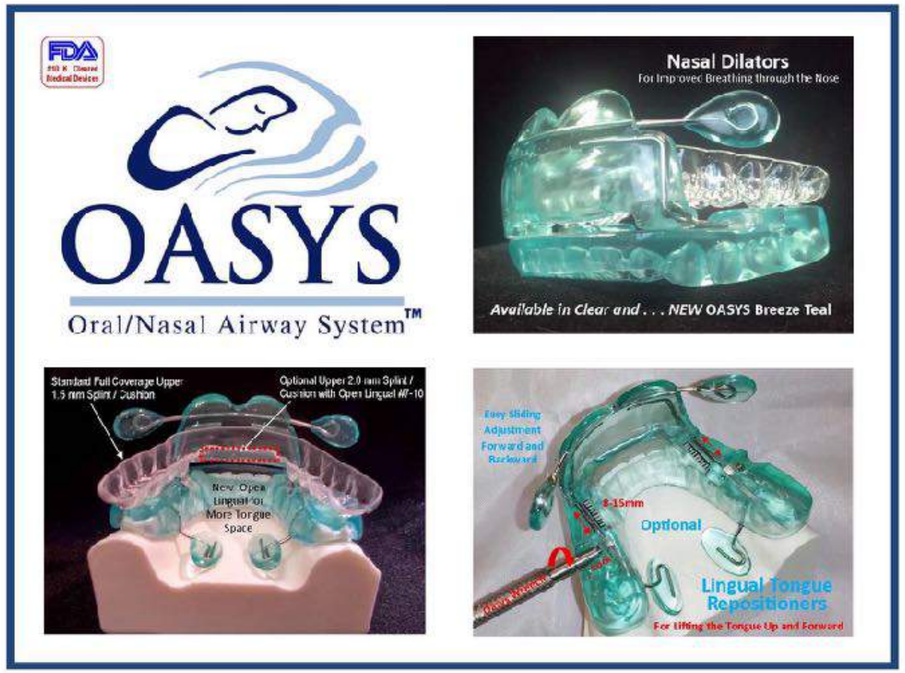
Anterior Pull/Push

Bilateral Push

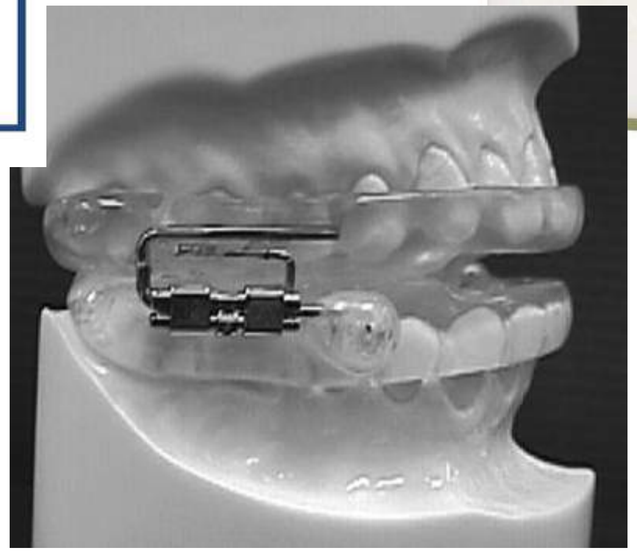
Bilateral Pull

Interlocking

Mono Block


FDA
OASYS
Oral/Nasal Airway System™
Nasal Dilators
For Improved Breathing through the Nose
Available in Clear and . . . NEW OASYS Breeze Teal
Standard Full Coverage Upper
1.5 mm Splint / Cushion
Optional Upper 2.0 mm Splint /
Cushion with Open Lingual MT-10
New Open
Lingual for
More Tongue
Space
Easy Sliding
Adjustment
Forward and
Backward
8-15mm
Optional
Lingual Tongue
Repositioners
For Lifting the Tongue Up and Forward


The Moses®



Temporary/Trial

Appliance Selection Simplified

- **Lateral Bruxer**

- **Limited Retention**

“Dr. Spencer’s Starting 4 + 1”

“Combination Therapy”

The Best Combination Therapy?

+

Whatever oral appliance you feel is the best choice for the patient

Whatever CPAP mask works best for the patient

Oral Appliance Therapy as an Adjunct to CPAP

- For use during travel
- For use when electricity is not readily available (camping/hunting)

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Myofunctional Therapy

Conclusion: Current literature demonstrates that myofunctional therapy decreases apnea-hypopnea index by approximately 50% in adults and 62% in children. Lowest oxygen saturations, snoring, and sleepiness outcomes improve in adults. Myofunctional therapy could serve as an adjunct to other obstructive sleep apnea treatments.

pii: sp-00423-14 http://dx.doi.org/10.5665/sleep.4652

MYOFUNCTIONAL THERAPY TO TREAT OSA: REVIEW AND META-ANALYSIS

Myofunctional Therapy to Treat Obstructive Sleep Apnea: A Systematic Review and Meta-analysis

Macario Camacho, MD[1]; Victor Certal, MD[2]; Jose Abdullatif, MD[3]; Soroush Zaghi, MD[4]; Chad M. Ruoff, MD, RPSGT[1]; Robson Capasso, MD[5]; Clete A. Kushida, MD, PhD[1]

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Objective: To systematically review the literature for articles evaluating myofunctional therapy (MT) as treatment for obstructive sleep apnea (OSA) in children and adults and to perform a meta-analysis on the polysomnographic, snoring, and sleepiness data.

Data Sources: Web of Science, Scopus, MEDLINE, and The Cochrane Library.

Review Methods: The searches were performed through June 18, 2014. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement was followed.

Results: Nine adult studies (120 patients) reported polysomnography, snoring, and/or sleepiness outcomes. The pre- and post-MT apnea-hypopnea indices (AHI) decreased from a mean ± standard deviation (M ± SD) of 24.5 ± 14.3/h to 12.3 ± 11.8/h, mean difference (MD) −14.26 [95% confidence interval (CI) −20.98, −7.54], P < 0.0001. Lowest oxygen saturations improved from 83.9 ± 6.0% to 86.6 ± 7.3%, MD 4.19 (95% CI 1.85, 6.54), P = 0.0005. Polysomnography snoring decreased from 14.05 ± 4.89% to 3.87 ± 4.12% of total sleep time, P < 0.001, and snoring decreased in all three studies reporting subjective outcomes. Epworth Sleepiness Scale decreased from 14.8 ± 3.5 to 8.2 ± 4.1. Two pediatric studies (25 patients) reported outcomes. In the first study of 14 children, the AHI decreased from 4.87 ± 3.0/h to 1.84 ± 3.2/h, P = 0.004. The second study evaluated children who were cured of OSA after adenotonsillectomy and palatal expansion, and found that 11 patients who continued MT remained cured (AHI 0.5 ± 0.4/h), whereas 13 controls had recurrent OSA (AHI 5.3 ± 1.5/h) after 4 y.

Conclusion: Current literature demonstrates that myofunctional therapy decreases apnea-hypopnea index by approximately 50% in adults and 62% in children. Lowest oxygen saturations, snoring, and sleepiness outcomes improve in adults. Myofunctional therapy could serve as an adjunct to other obstructive sleep apnea treatments.

Keywords: exercise therapy/methods, myofunctional therapy/methods, obstructive sleep apnea, sleep apnea syndromes

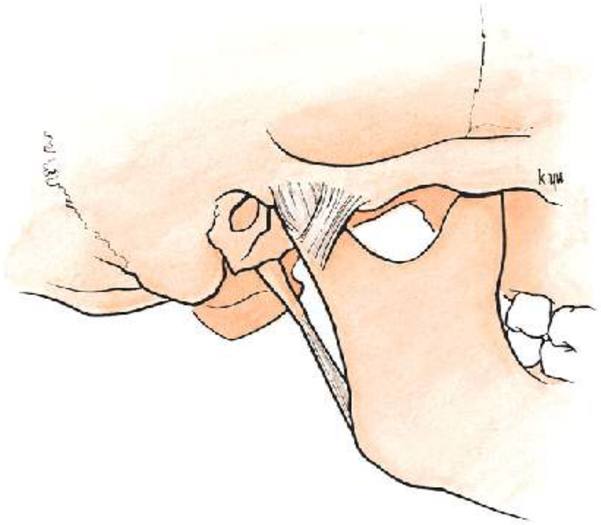
Citation: Camacho M, Certal V, Abdullatif J, Zaghi S, Ruoff CM, Capasso R, Kushida CA. Myofunctional therapy to treat obstructive sleep apnea: a systematic review and meta-analysis. *SLEEP* 2015;38(5):669–675.

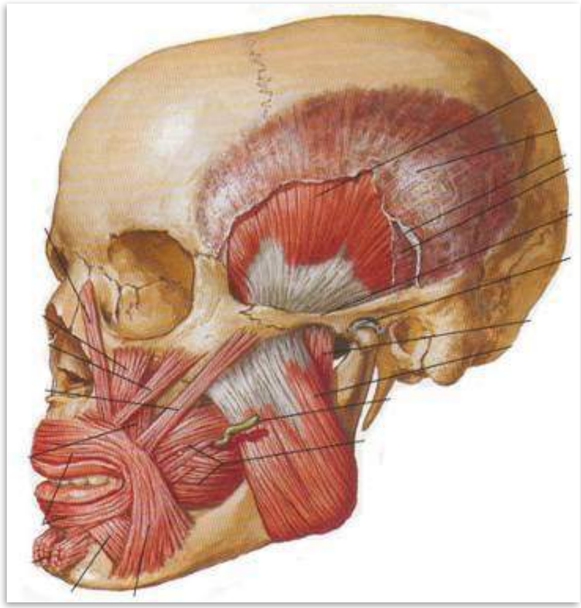
Possible Side Effects

"Jaw Pain"
Tooth Movement
Bite Changes

“Jaw Pain”

- Have the patient point <u>with 1 finger</u> to where the pain is.
- Determine if the pain is more likely in the TMJ (joint pain) or in the masseter or temporalis (muscle pain).





“Jaw Pain”
Rules of Thumb

- If the patient has muscle pain, reduce the vertical or add posterior support if there wasn’t any.
- If the patient has TM joint pain, check the protrusion and/or check to see if the midline is being shifted.

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Non-Intuitive Exception to the Rules of Thumb

- If the patient's airway is not being kept patent by the oral appliance, they may "fight" the appliance (the brain trying to maintain an airway) and as such may have muscle and/or TMJ pain.
- Ask the patient:
  - Are you still snoring?
  - How do you feel you are sleeping?
- If the patient is still snoring or not sleeping well (unless they aren't sleeping well due to pain), consider taking the appliance farther forward, or adding vertical, in an attempt to open the airway.

Non-Intuitive Exception to the Rules of Thumb

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  - How do you feel you are sleeping?
- If the patient is still snoring or not sleeping well (unless they aren't sleeping well due to pain), consider taking the appliance farther forward, or adding vertical, in an attempt to open the airway.
- If you do this, ask the patient to set their alarm for 3 or so hours after they go to bed so they can wake up and make sure that their pain isn't worse.

- Also, remember that snoring may be nasal.

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Normal

RDD

NRDD

Dr. Per-Lennart Westesson and Dr. Lars Eriksson
University of Lund, Sweden.

Internal Derangements

DJD

Avoiding Problems

- Patients with a reducing disc displacement
  - Jaw may desire to stay more anterior
- Patients with a non-reducing disc displacement
  - Added stress may result in previously asymptomatic problem becoming symptomatic…and/or they may start clicking
- These patients still need to be treated—just inform them!!

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Avoiding Problems

- Patient Instructions for Avoiding Common Side Effects of OAT
  - **Tooth Movement**
    - **Wrap the distal of the most distal lower tooth**
    - **“World’s Greatest Flosser”**

Spencer Study Club

Avoiding Problems

- Patient Instructions for Avoiding Common Side Effects of OAT
  - Tooth Movement
    - Wrap the distal of the most distal lower tooth
    - “World’s Greatest Flosser”
  - **Jaw Position Changes/Bite Changes**
    - **Morning repositioner**
    - **Check your bite every night when you brush**

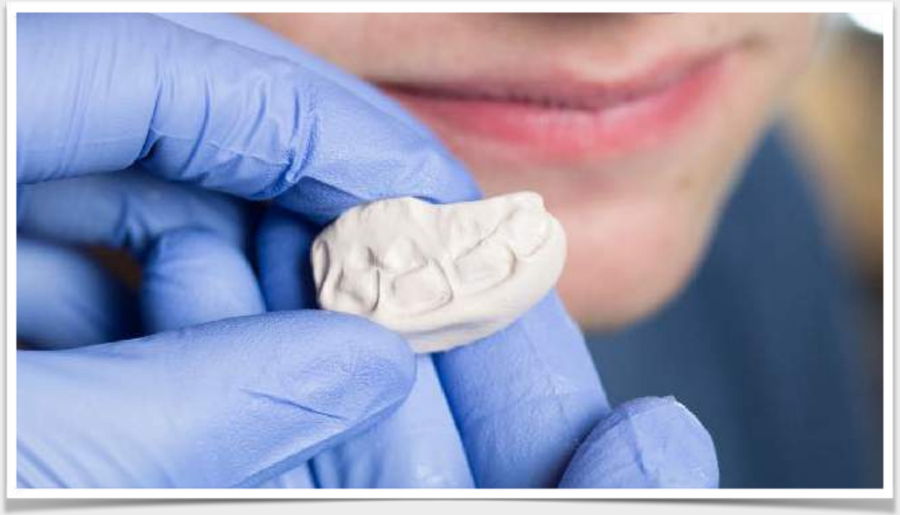
Morning Repositioner

Spencer Study Club

Morning Repositioner

Spencer Study Club

Morning Repositioner



Spencer Study Club

Avoiding Problems

- Consent, Educate and Consent Some More!!
  - Explain to the patient that side effects will most likely occur
  - Explain that if the patient pays attention to side effects and communicates with you that serious side effects can be avoided
  - **Reinforce this at each follow up appointment**

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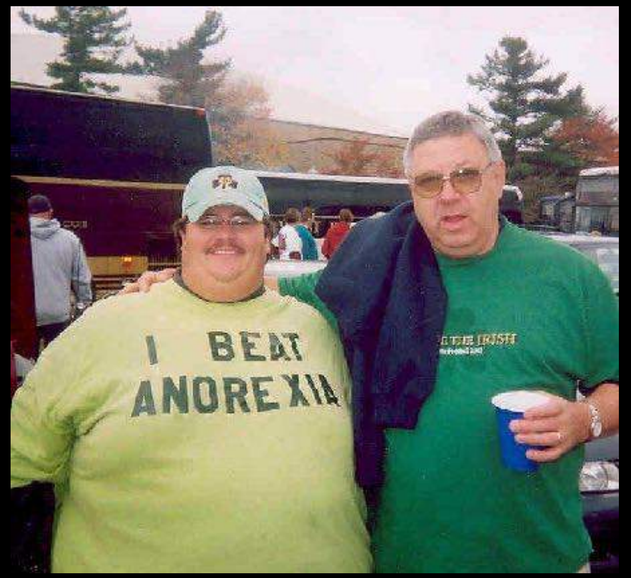
"Nothing is Free"

- There are side effects with almost every treatment
- There are "side effects" with no treatment (for example, dying)
- Which side effects are the patient willing to ***Live*** with?

Oral Appliance Therapy Protocol

- Screen and refer patient to MD for evaluation
- MD refers patient for sleep study (in lab or home study)
- Referral from physician for oral appliance therapy
- Initial exam
- Records (study models, bite registrations, imaging, other)
- Fitting of appliance
- Follow up visits for comfort and efficacy
- Referral back to physician for follow up PSG with titration of the appliance in the sleep lab (or HST confirmation of effective treatment)
- Alteration of the appliance for long term success
- Long term follow up with regular maintenance and replacement of the appliance every 3 to 5 years



The Mystery is in the History…

Jamison Spencer