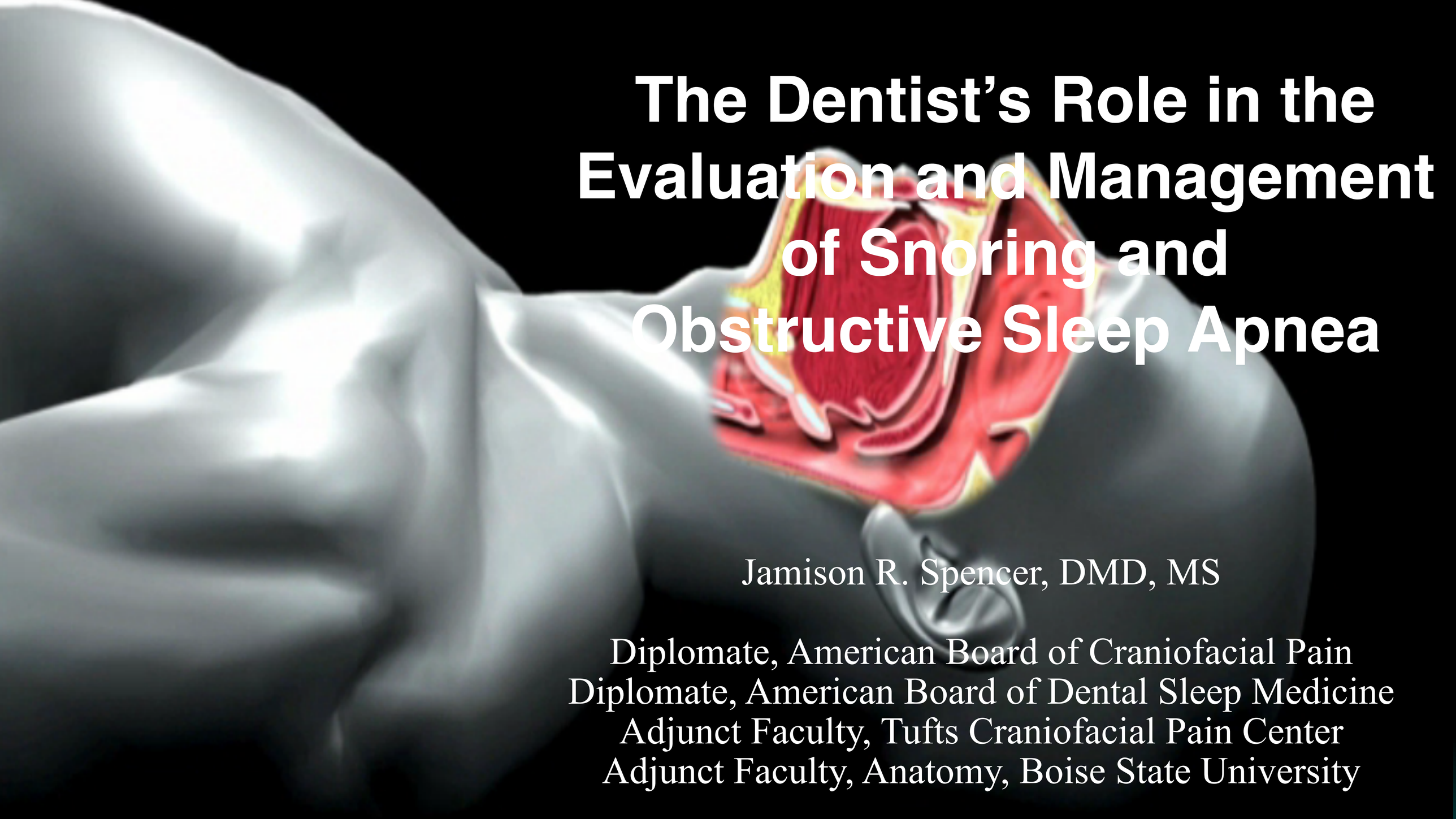

The Dentist's Role in the Evaluation and Management of Snoring and Obstructive Sleep Apnea

Jamison R. Spencer, DMD, MS

Diplomate, American Board of Craniofacial Pain
Diplomate, American Board of Dental Sleep Medicine
Adjunct Faculty, Tufts Craniofacial Pain Center
Adjunct Faculty, Anatomy, Boise State University

- Scary video by WatchPAT

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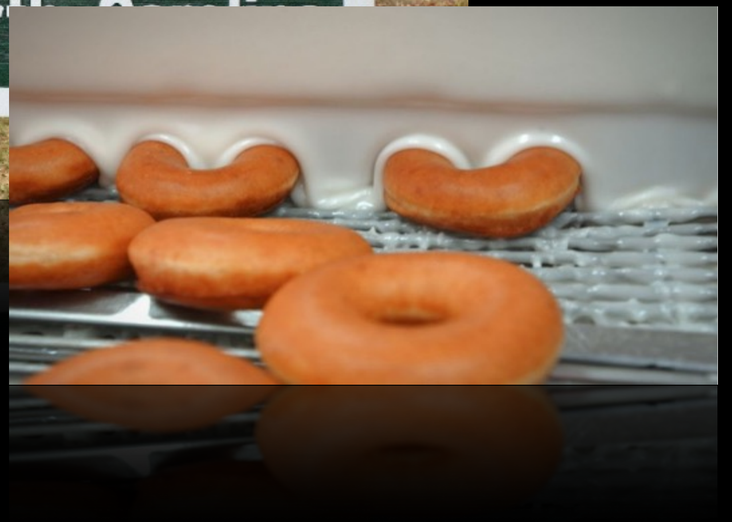
Idaho Potatoes
GROWN IN ®
IDAHO


Corn



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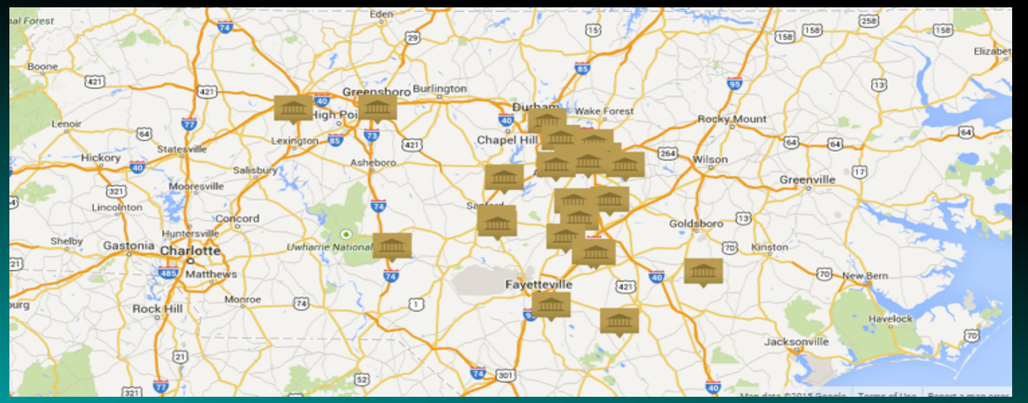
THE CENTER FOR
SLEEP APNEA &
TMJ

SnoreByte

LANE & ASSOCIATES
Family Dentistry

AMERICAN ACADEMY OF CRANIOFACIAL PAIN
AACP
Est. 1985



1852
Tufts
UNIVERSITY
School of
Dental Medicine

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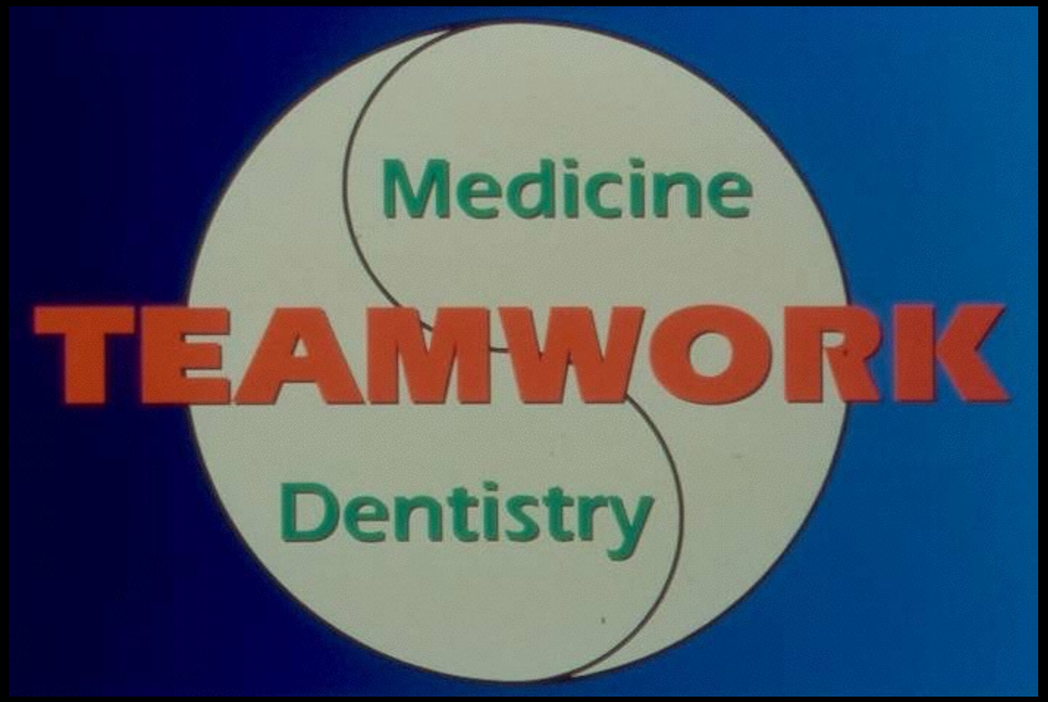
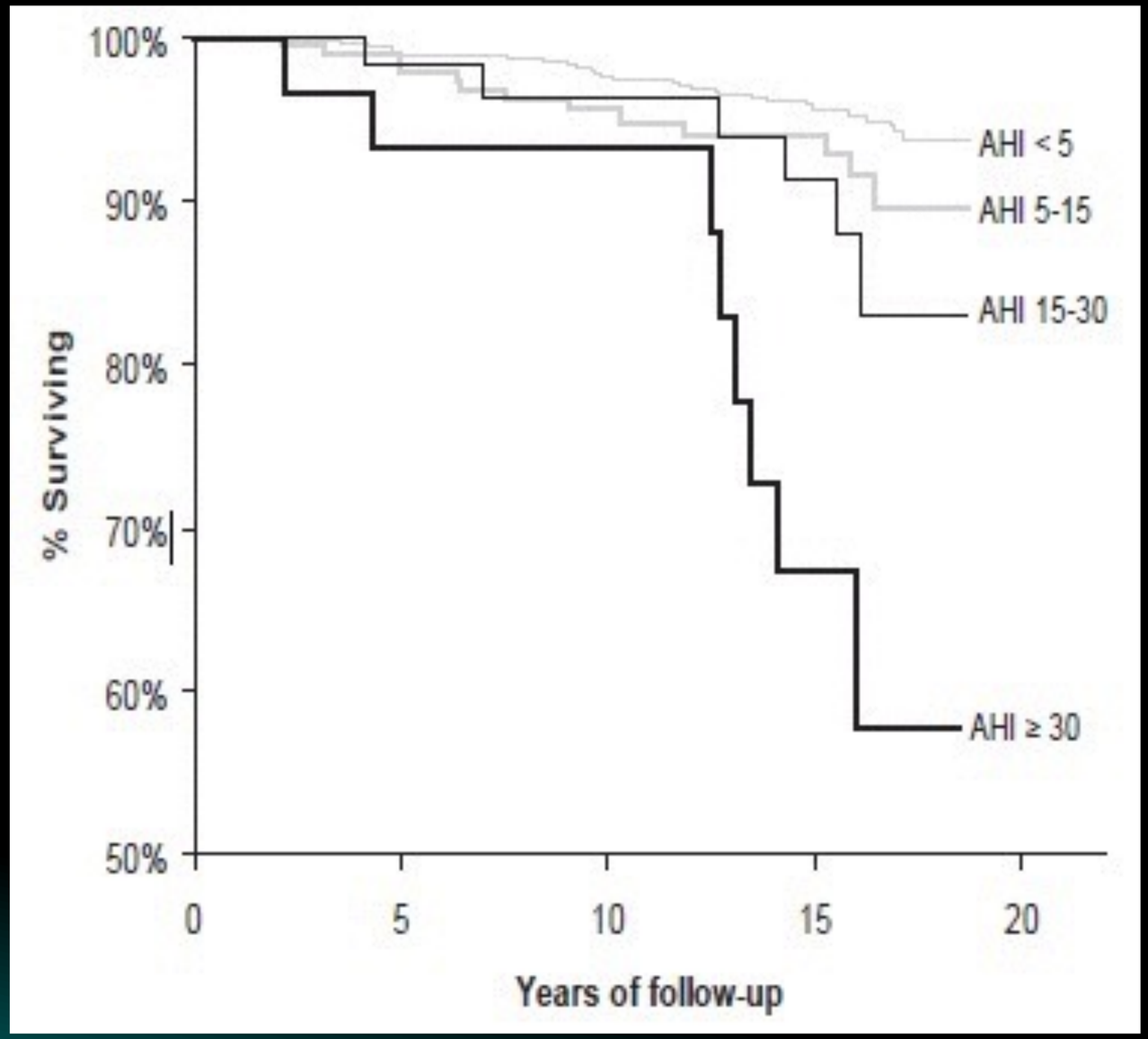
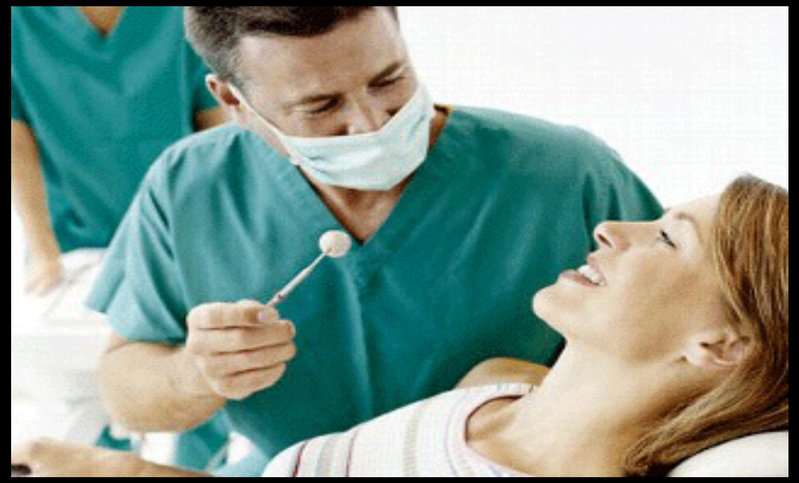




Sleep Disordered Breathing and Mortality: Eighteen-Year Follow-up of the Wisconsin Sleep Cohort: SLEEP, Vol. 31, No. 8, 2008

Jamison Spencer



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Today we will cover

- The Basics of Normal Sleep
- Snoring and Sleep Apnea
- Screening and Evaluation
- Oral Appliance Therapy

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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.

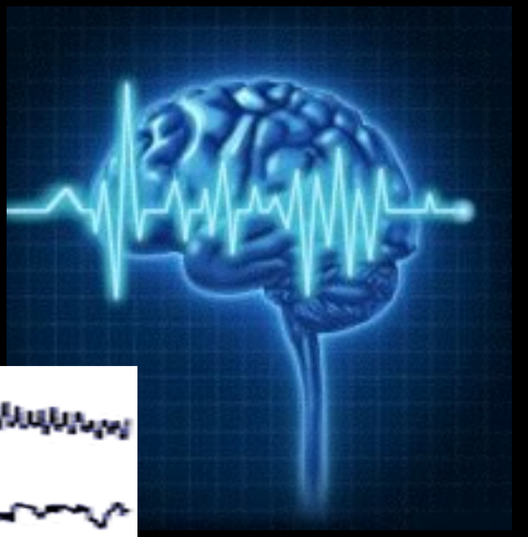
Apnea Hypopnea Index (AHI)

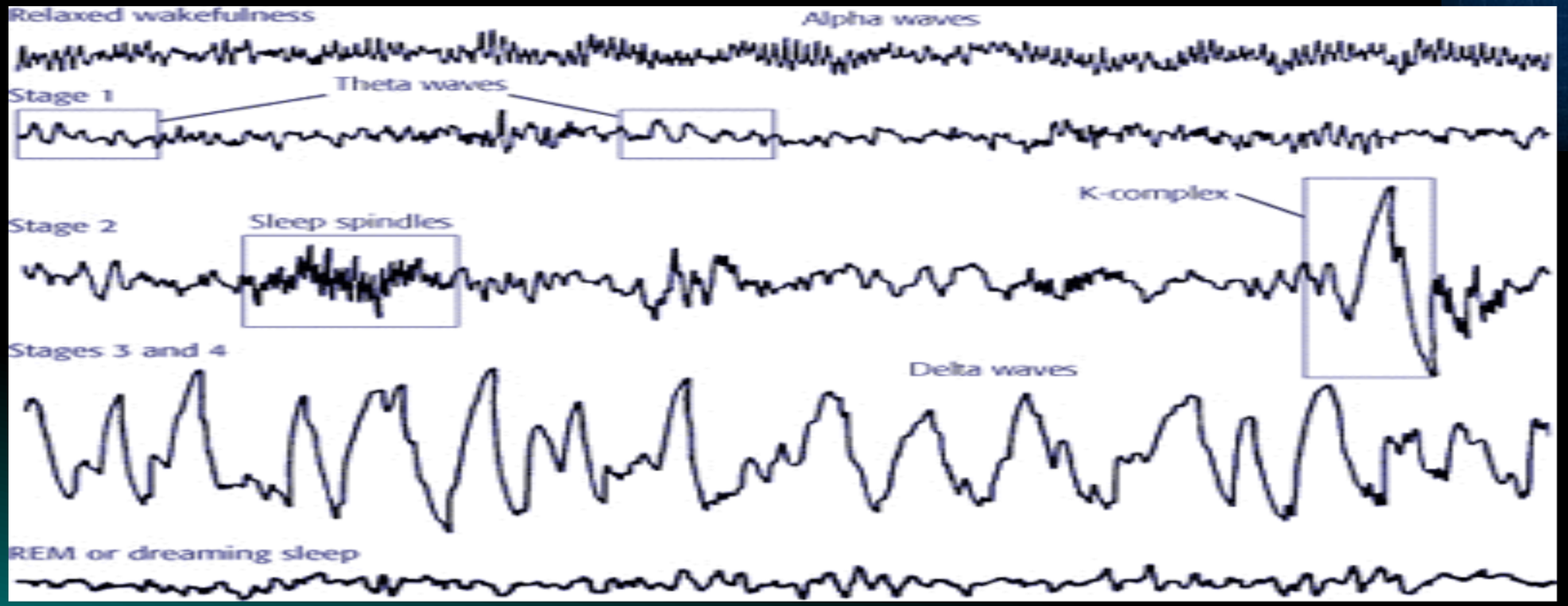
- Normal: less than 5 events per hour
- Mild: 5-15 events per hour
- Moderate: 16-30 events per hour
- Severe: over 30 events per hour

Sleep Stages

- Non-REM
  - N1: transition sleep, drowsiness, regular breathing, relaxed muscles(2-5%)
  - N2: onset of “true sleep”: predominant stage (45-55%) EEG sleep spindles, K-complexes
  - N3: delta, deep, slow-wave sleep, regular breathing, high arousal threshold (3-23%)
- REM Rapid eye movement, “dream sleep,” intensive EEG activity, irregular breathing, muscle paralysis (20%)

Brain Waves





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

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N1 (Stage 1)

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

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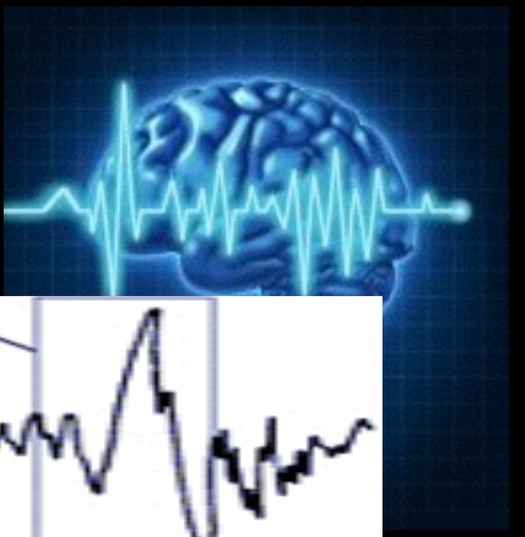
N2 (Stage 2)



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

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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; to total absence by age 40-60
- Usually appears only in the first 1/3 of the sleep episode
- Growth hormone usually released during N3 sleep

SimplyNoise App

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REM Sleep

- 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

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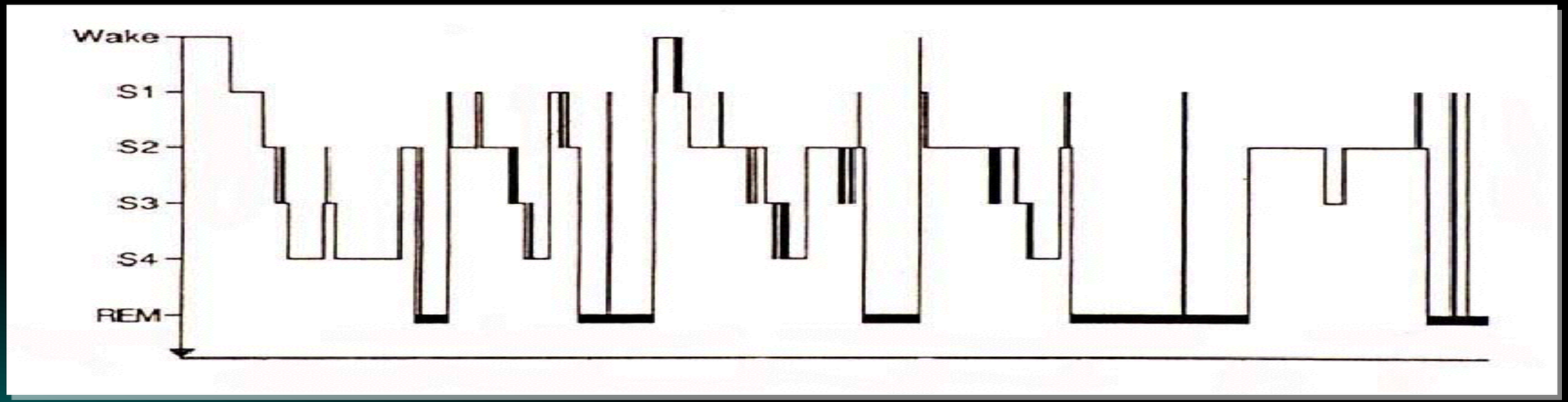
Sleep Cycle



Normal sleep histogram of healthy young adult.

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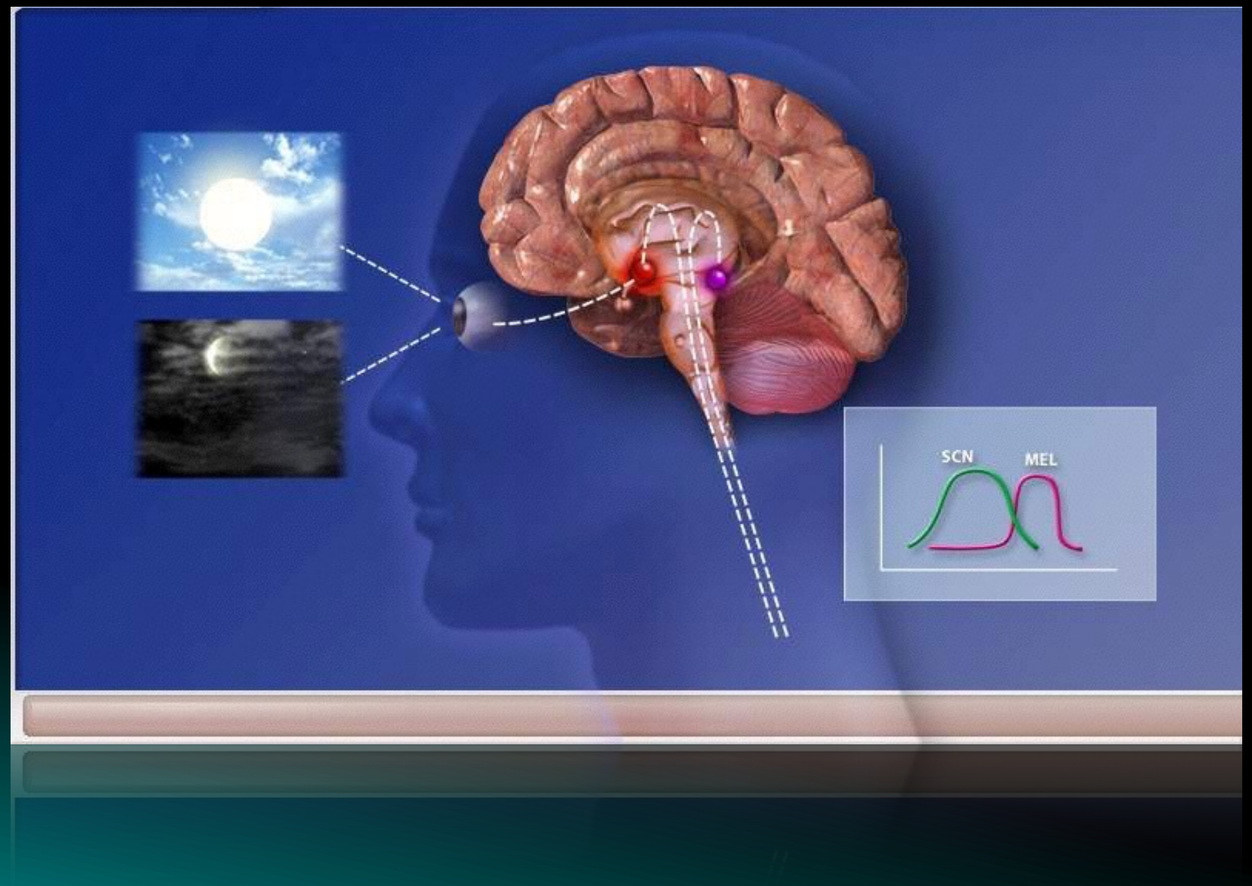
Circadian Biological Clock

- Circadian rhythms
  - Synchronized or “entrained” to 24 hour day by environmental cues
  - Light most powerful cue; leads to supression of melatonin secretion by the pineal gland
  - Peaks and troughs of alertness in 24 hours



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Snoring and Sleep Apnea

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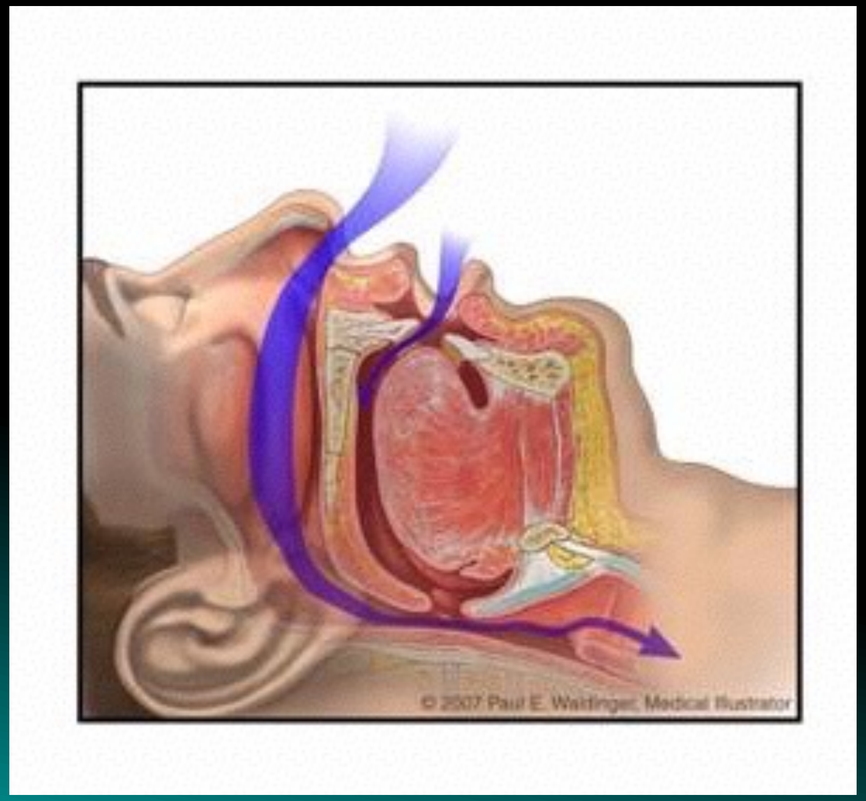
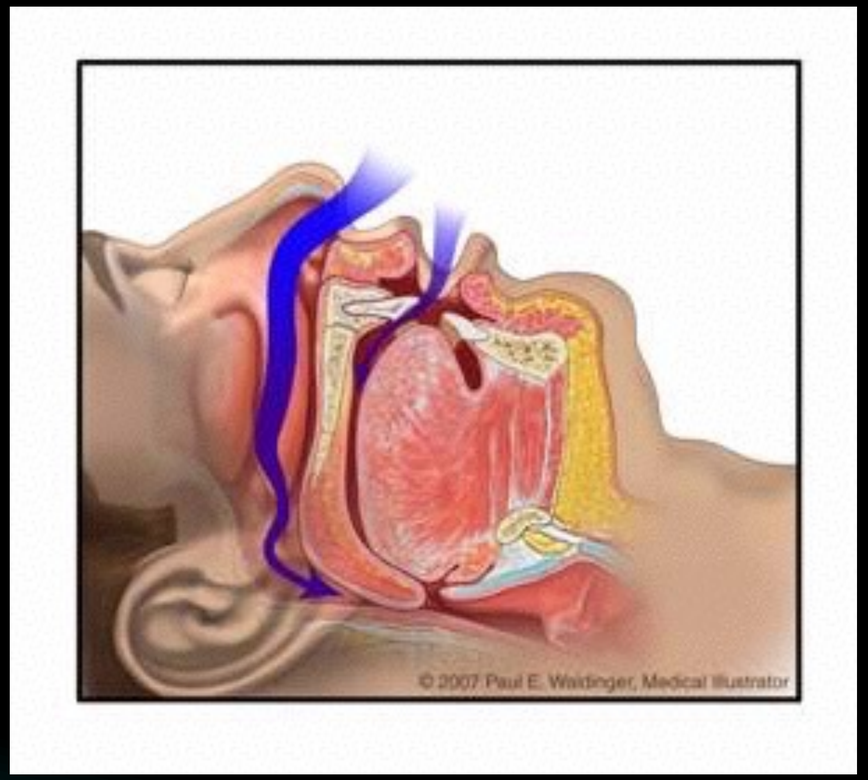
Pharyngeal Patency





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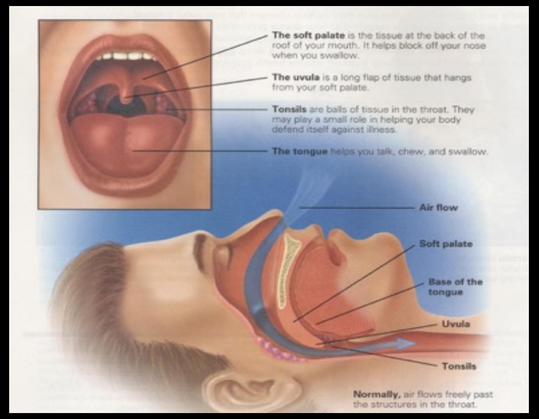

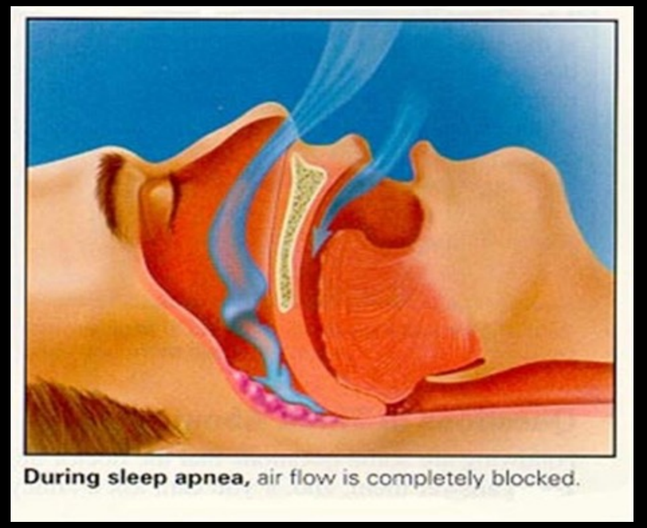

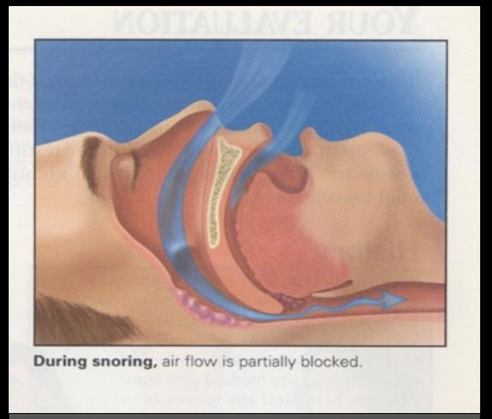

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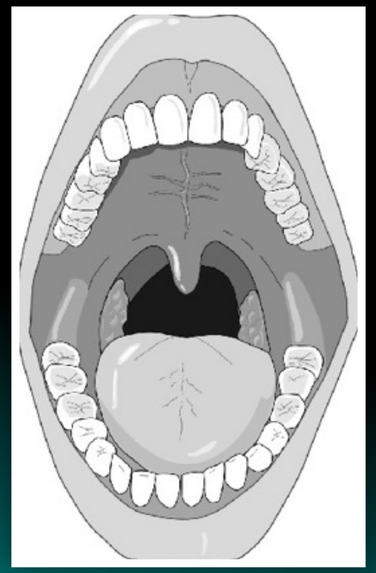
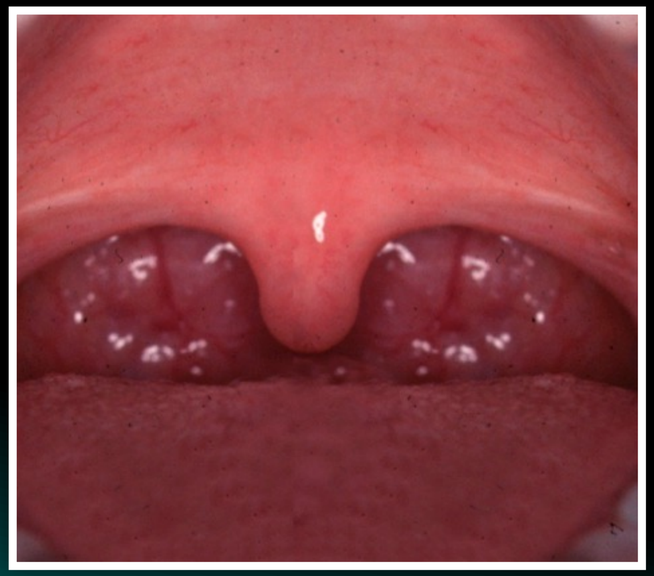
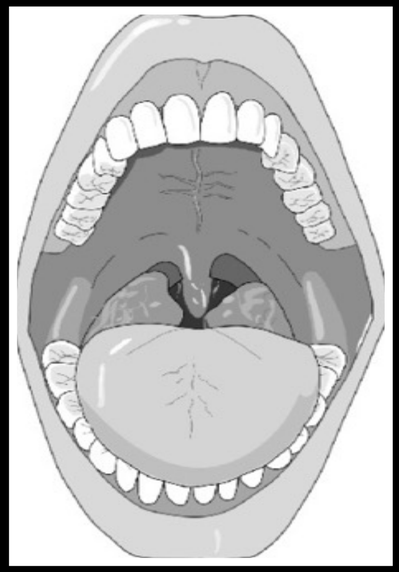
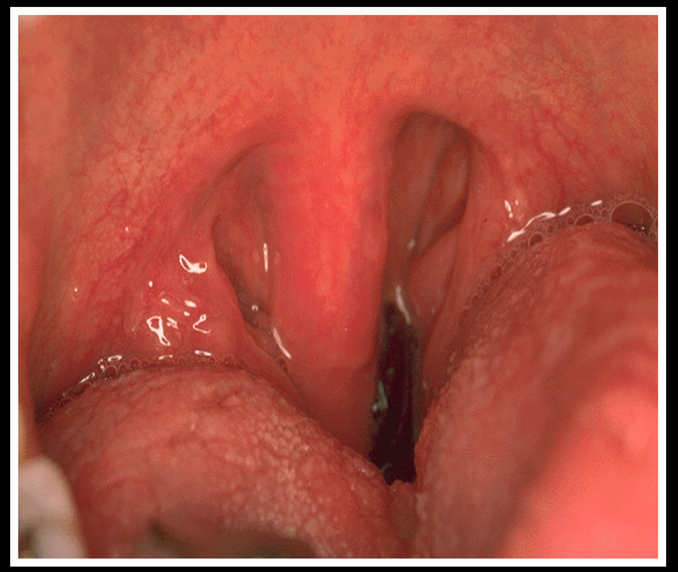
Normal vs Obstructed









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

Jamison Spencer

Mayo Clin Proc. 1999 Oct;74(10):955-8.

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

Beninati W, Harris CD, Herold DL, Shepard JW Jr.

- 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.

Mayo Clin Proc. 1999 Oct;74(10):955-8.

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

Beninati W, Harris CD, Herold DL, Shepard JW Jr.

- 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%) ($P < .01$).

Mayo Clin Proc. 1999 Oct;74(10):955-8.

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

Beninati W, Harris CD, Herold DL, Shepard JW Jr.

- 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.

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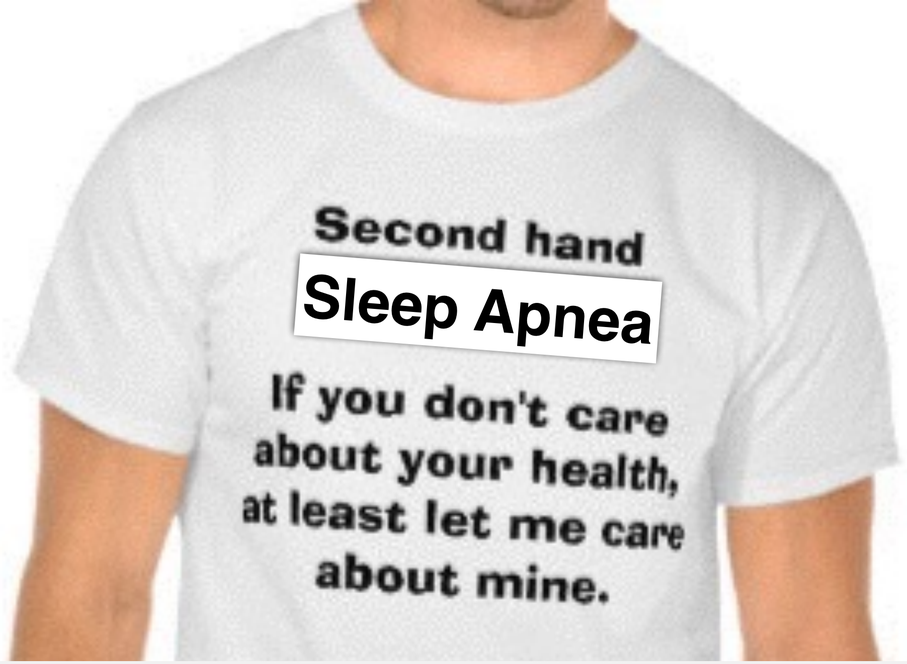
Second Hand Sleep Apnea











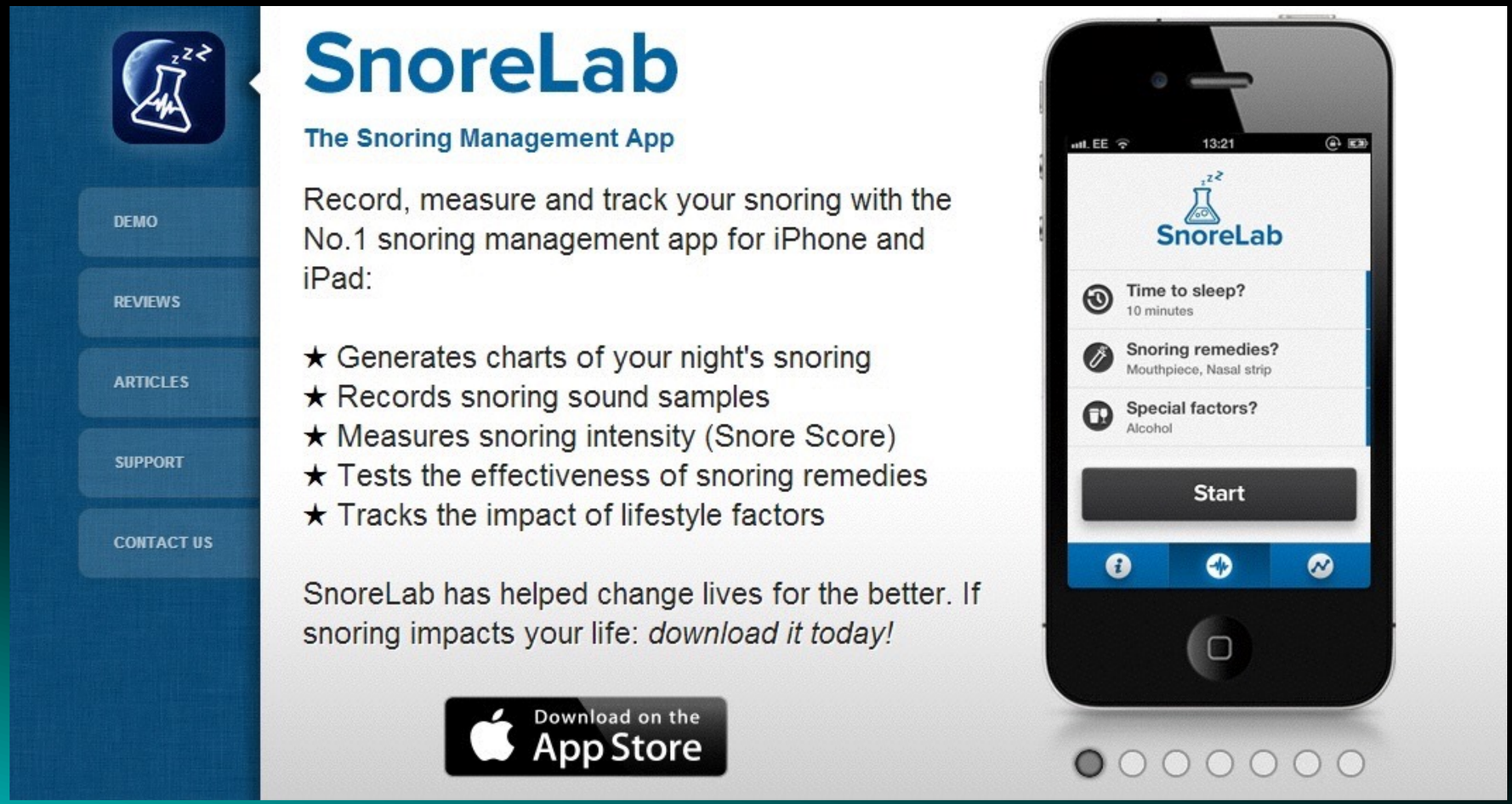

Everyone who snores will eventually have sleep apnea

James O'Brien, M.D.

Jamison Spencer

Jamison Spencer

Snoring Recording Apps



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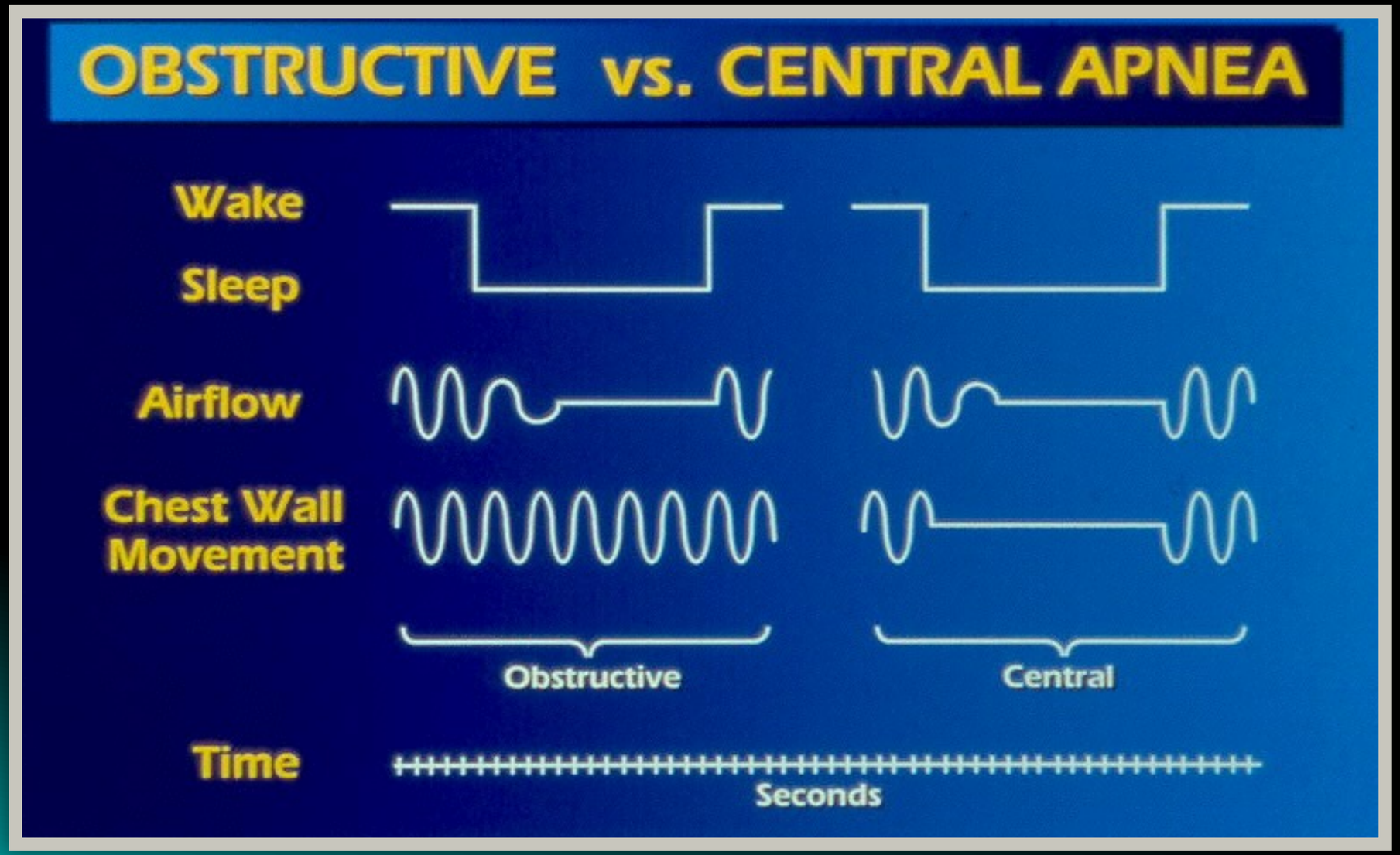
Oxygen Saturation

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



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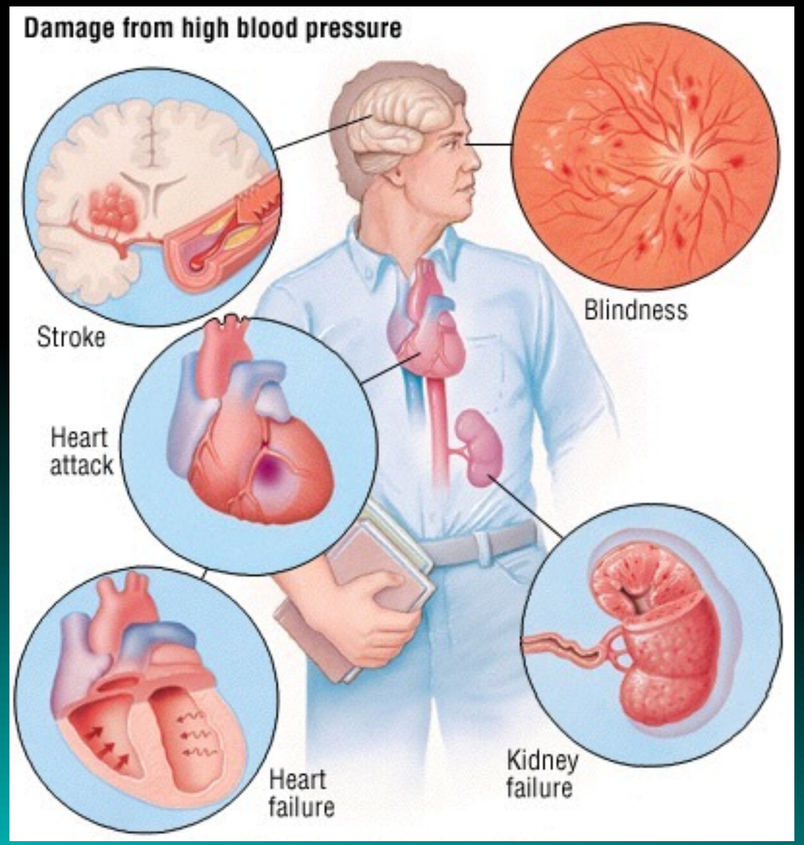
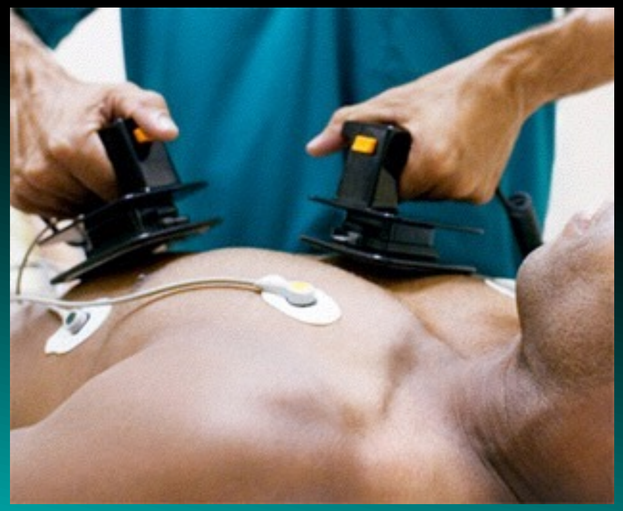
Sleep Apnea Increases Risk of





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)

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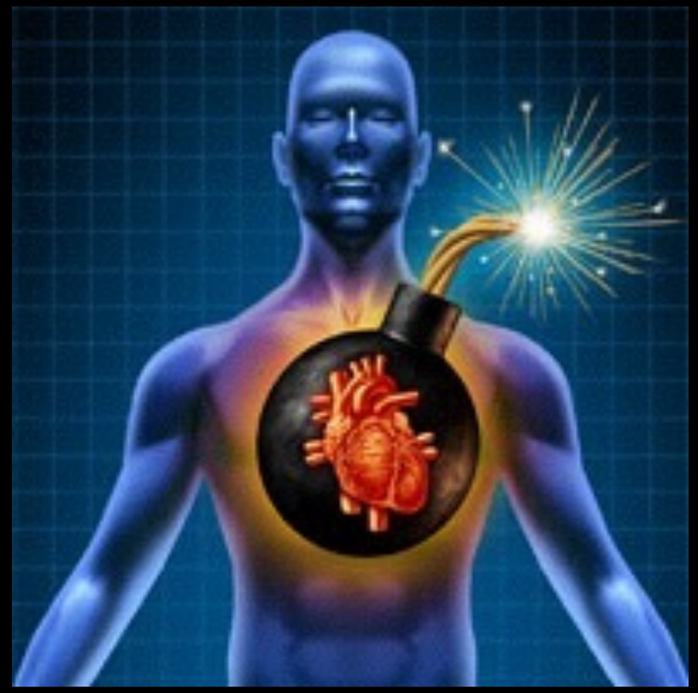
Heart Disease in the US

- 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

- **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)

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GERD or OSA?

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Depression or OSA?

- Chronic Fatigue Syndrome?
- Fibromyalgia?
- TMJ?

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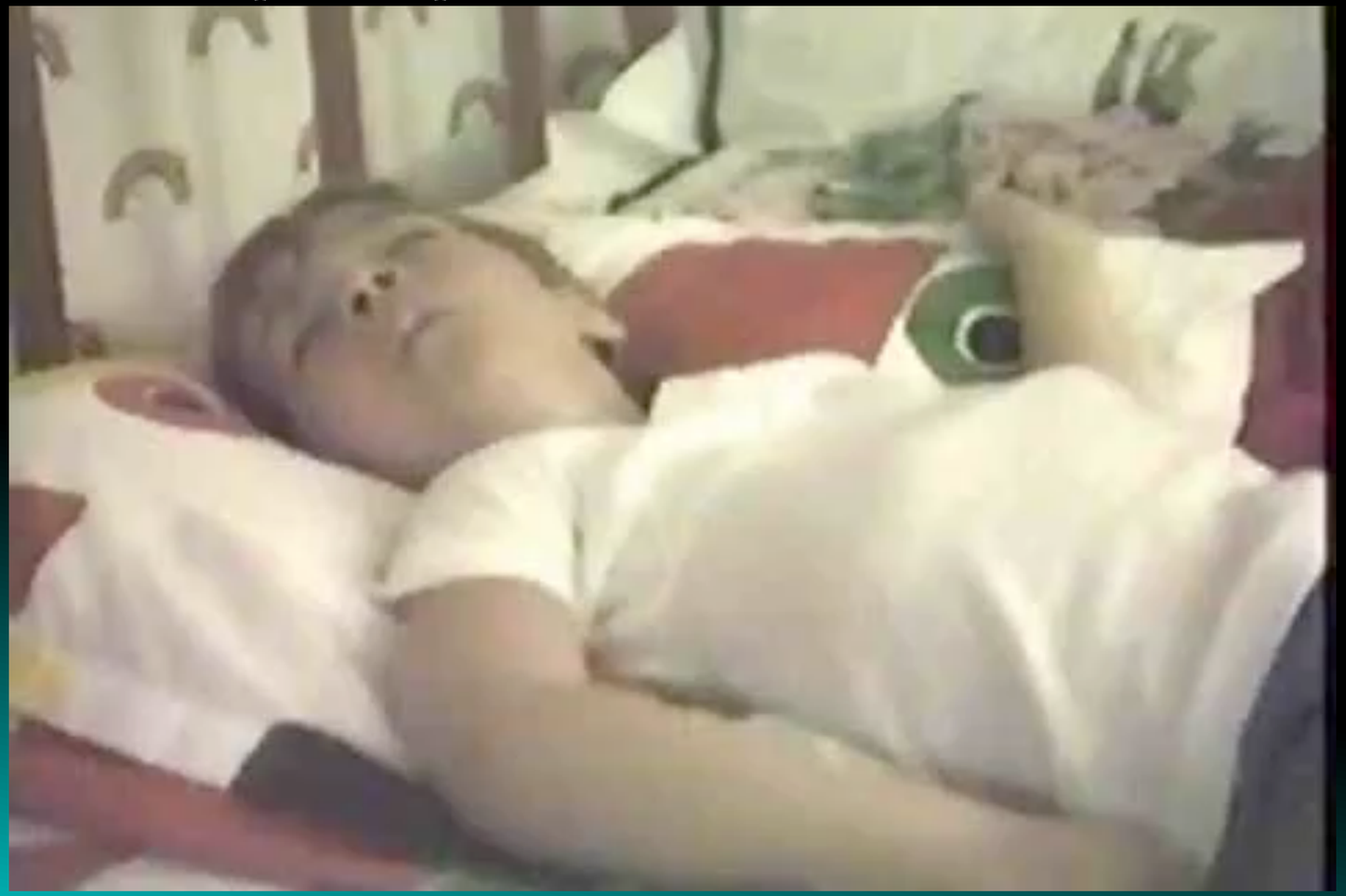
Wouldn’t it be nice?

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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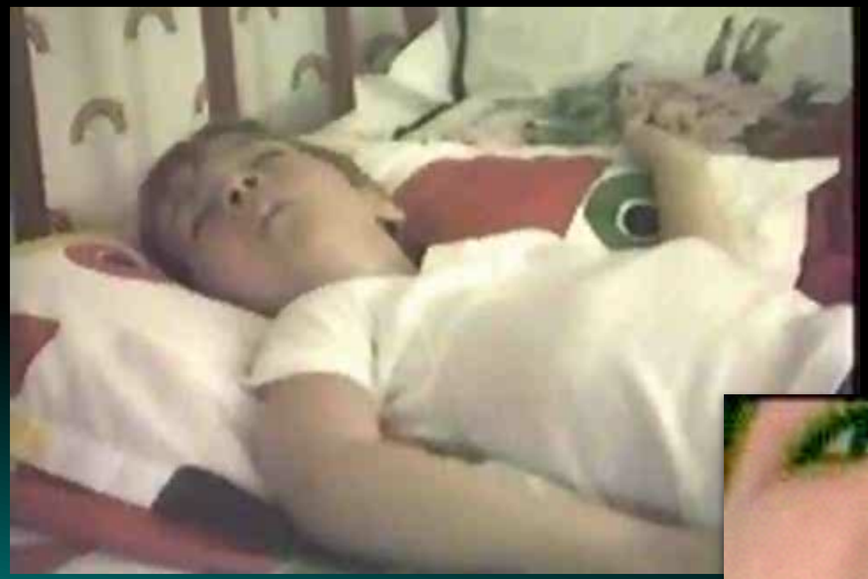
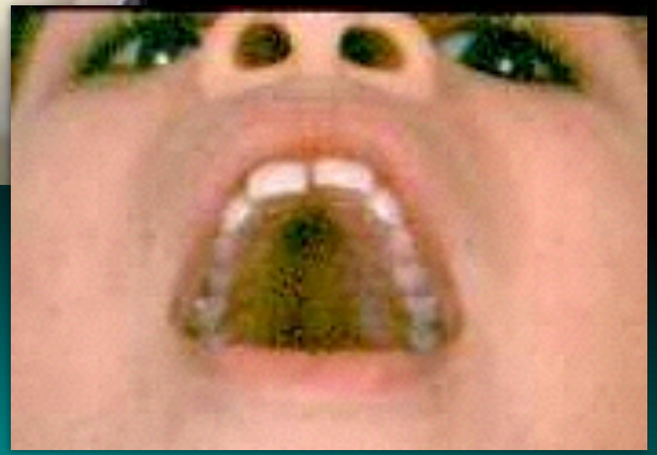
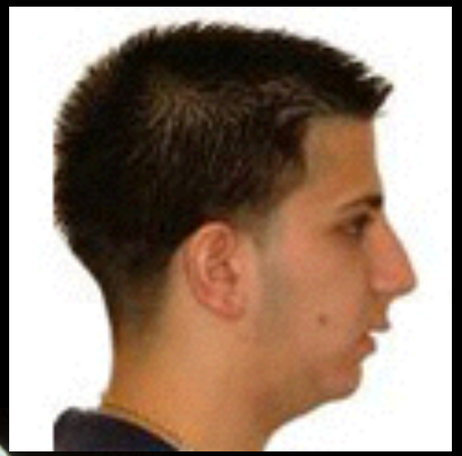
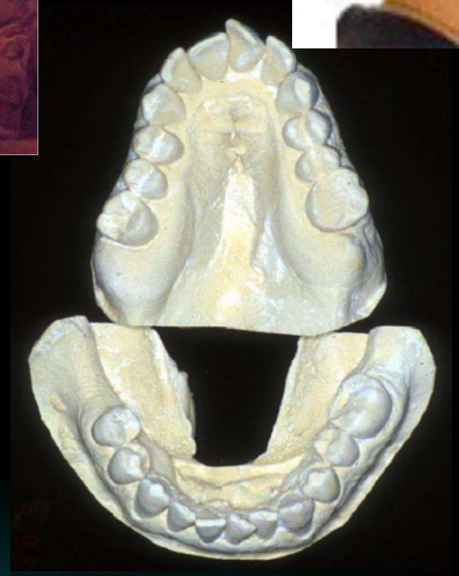
Wouldn’t it be nice?

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

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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.

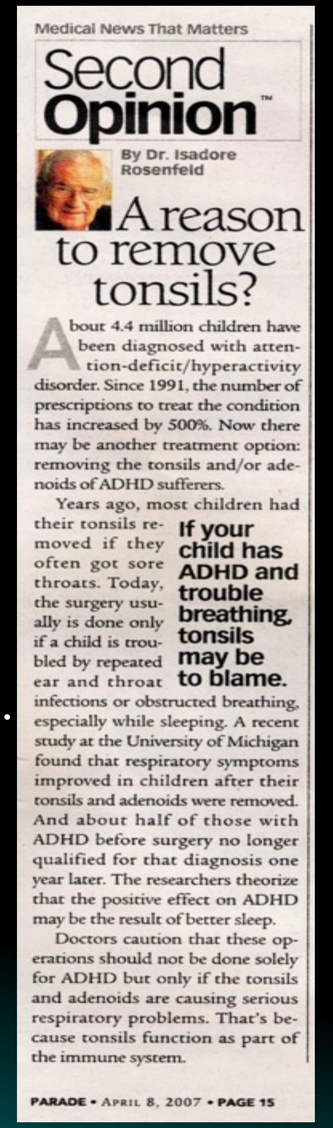
Attention Deficit Hyperactivity Disorder

- 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

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Enuresis

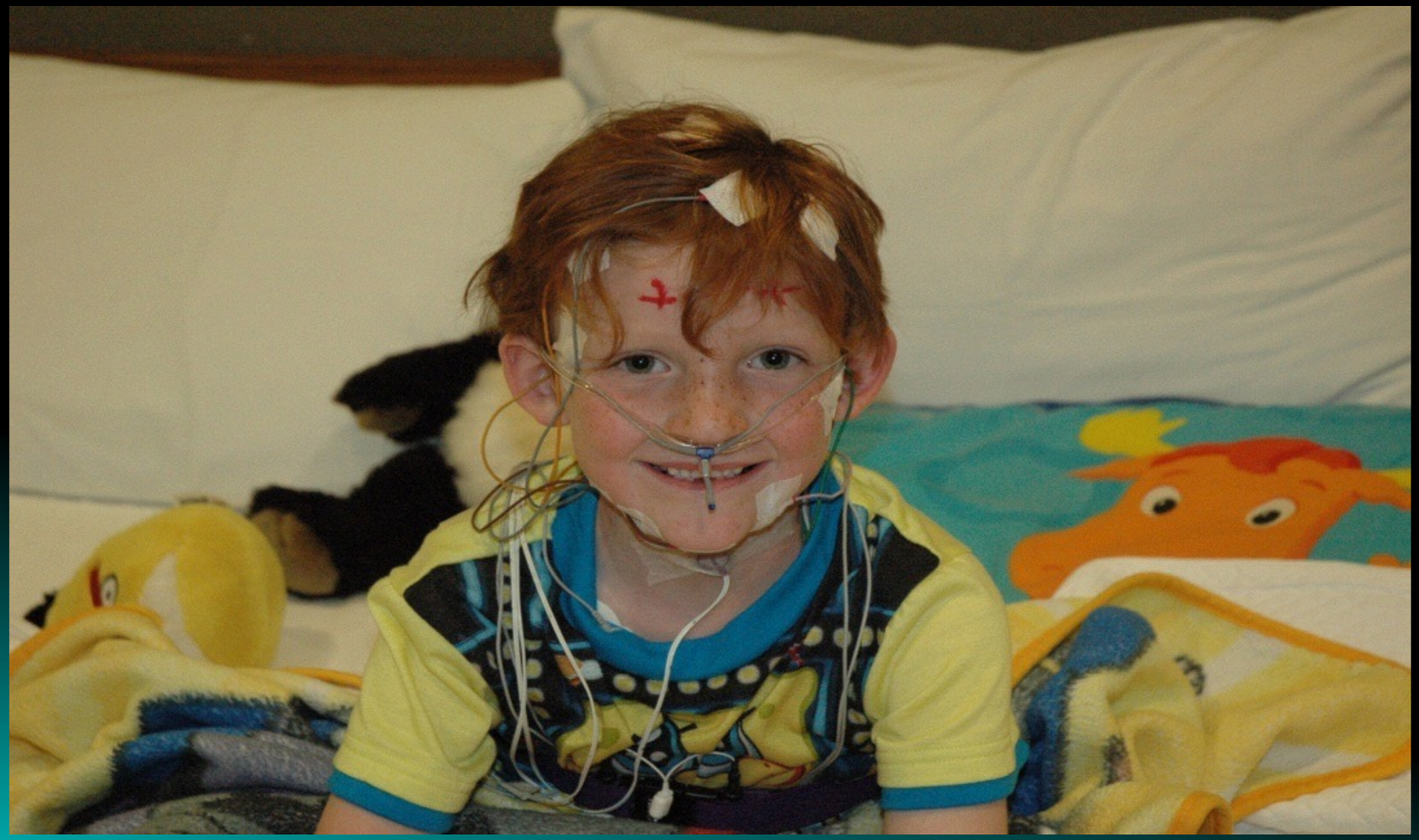
Nocturnal enuresis ceased within a few months in the 10 cases studied by using rapid maxillary expansion to reduce nasal constriction.

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

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.

Jefferson



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Wouldn’t it be nice?

Diagnosis of Sleep Apnea

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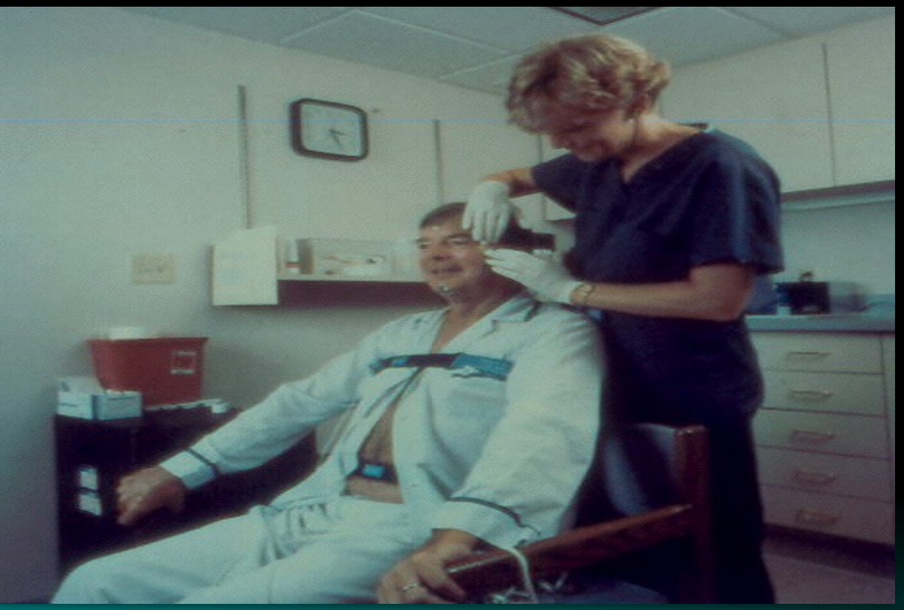

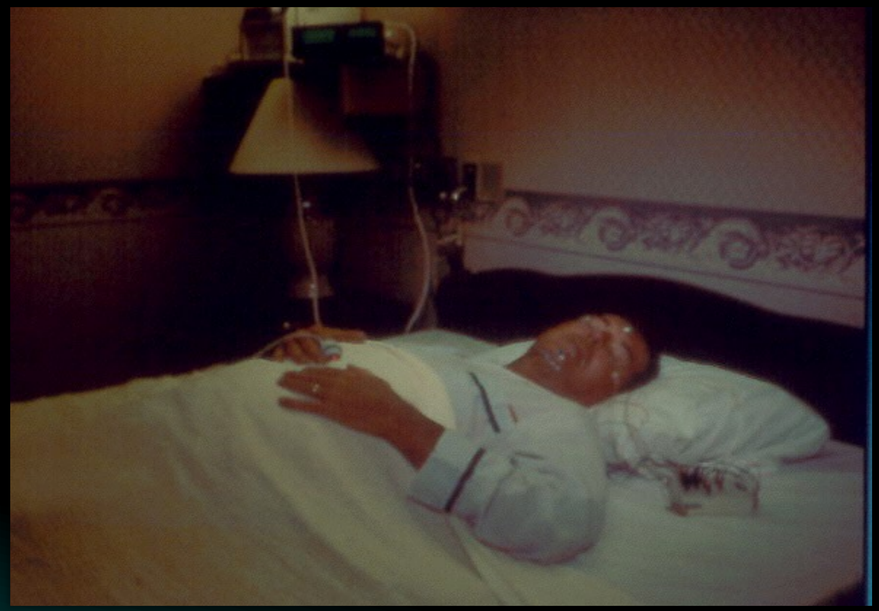

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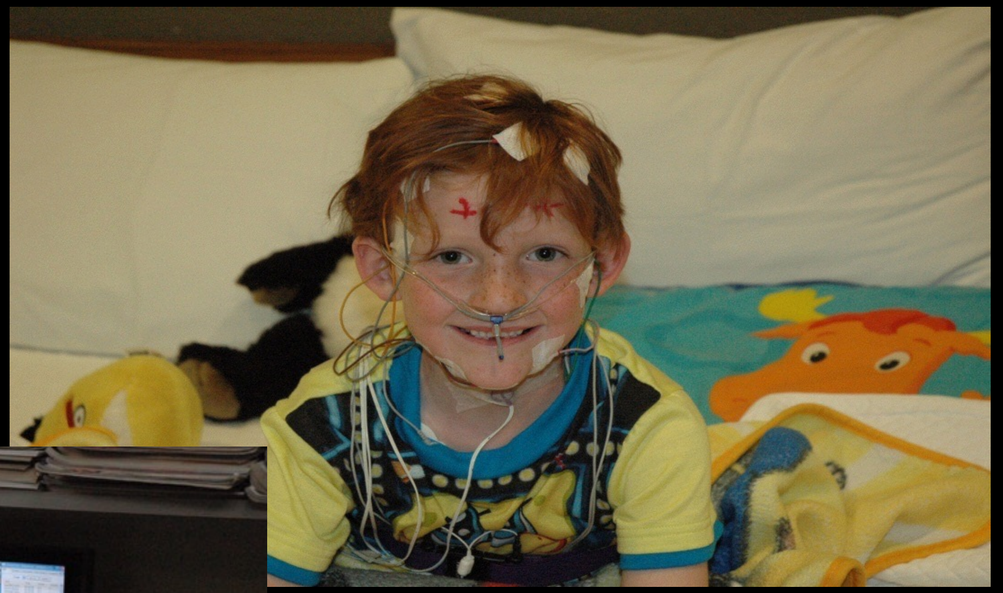

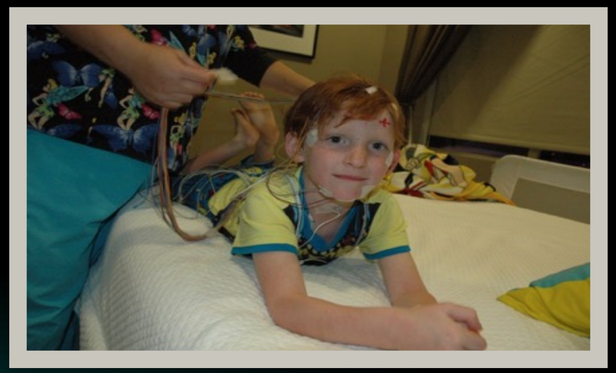

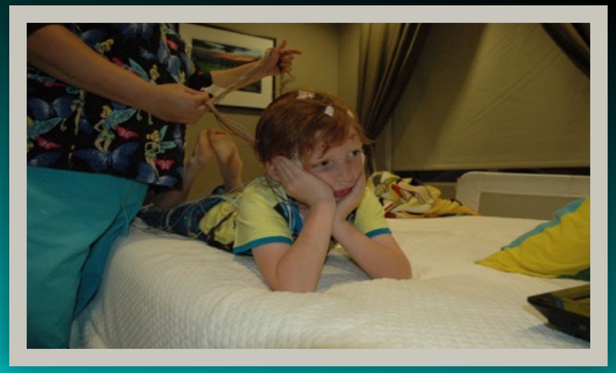

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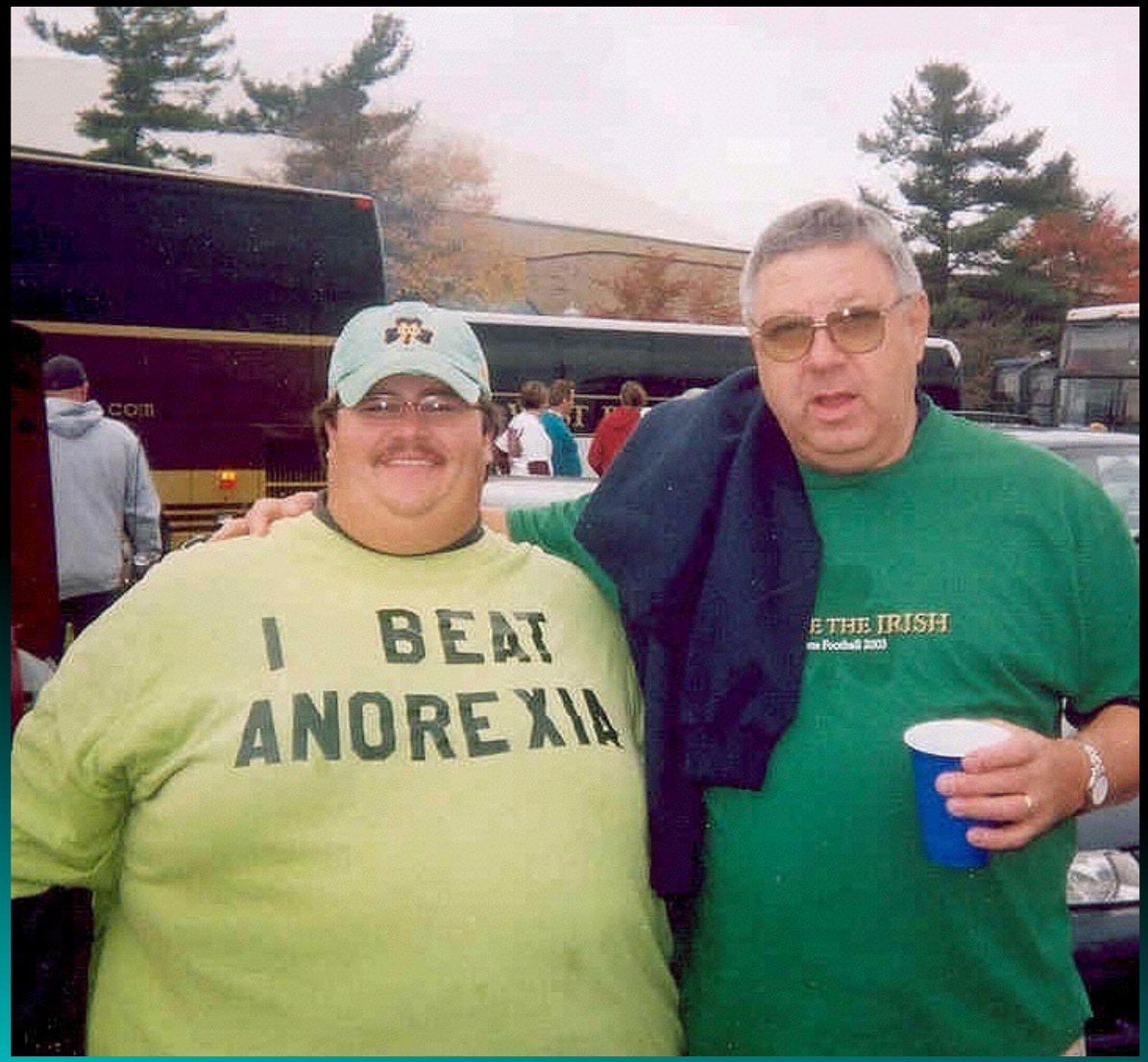
OSA Prevelance



Jamison Spencer

- Obstructive sleep apnea in non-obese patients: age, gender and severity
- Teimur Yeligulashvili, PhD
- Abstract presented at SLEEP 2009

- 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.

- Sleep apnoea is a common occurrence in females
- Karl A. Franklin et. al.
- European Respiratory Journal, August 2012

- 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.

- Sleep apnoea is a common occurrence in females
- Karl A. Franklin et. al.
- European Respiratory Journal, August 2012

- 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.

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.

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Non-Surgical Treatment of OSA

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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

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Oral Appliances for the Management of Snoring and Obstructive Sleep Apnea

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CPAP Treatment

OA Treatment

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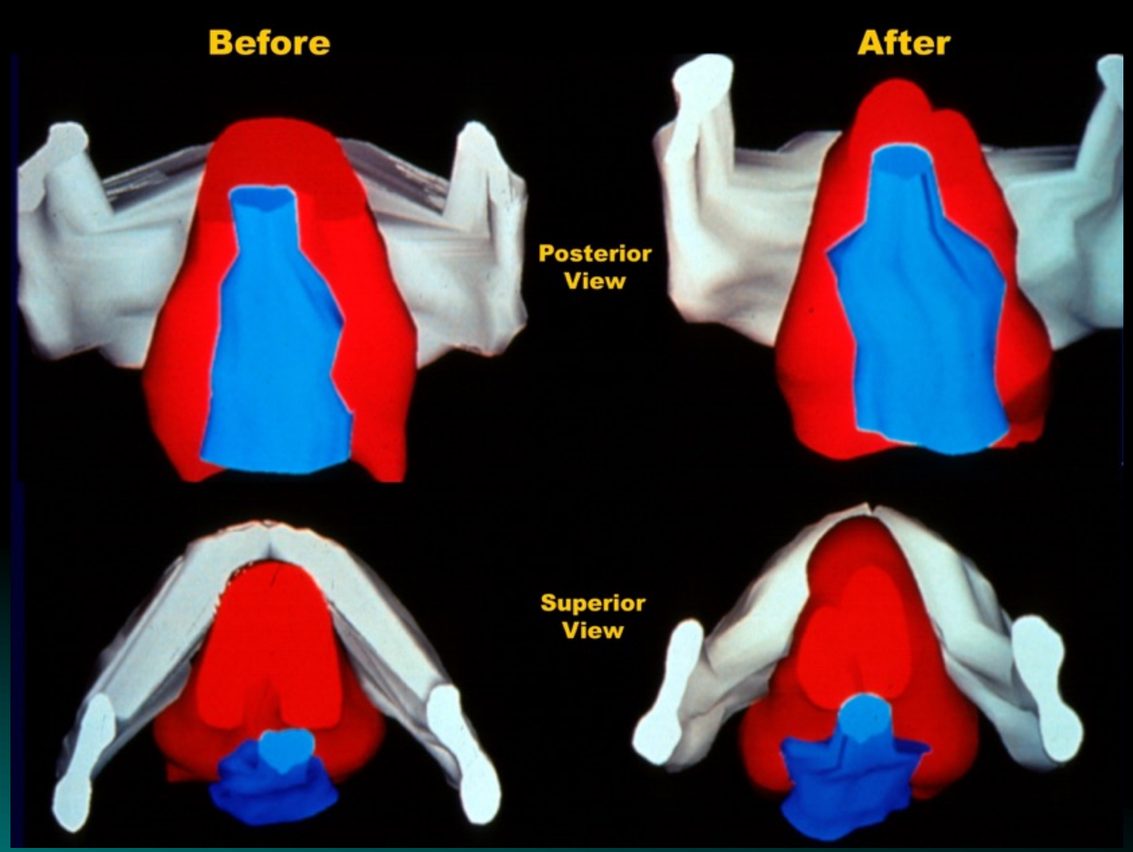

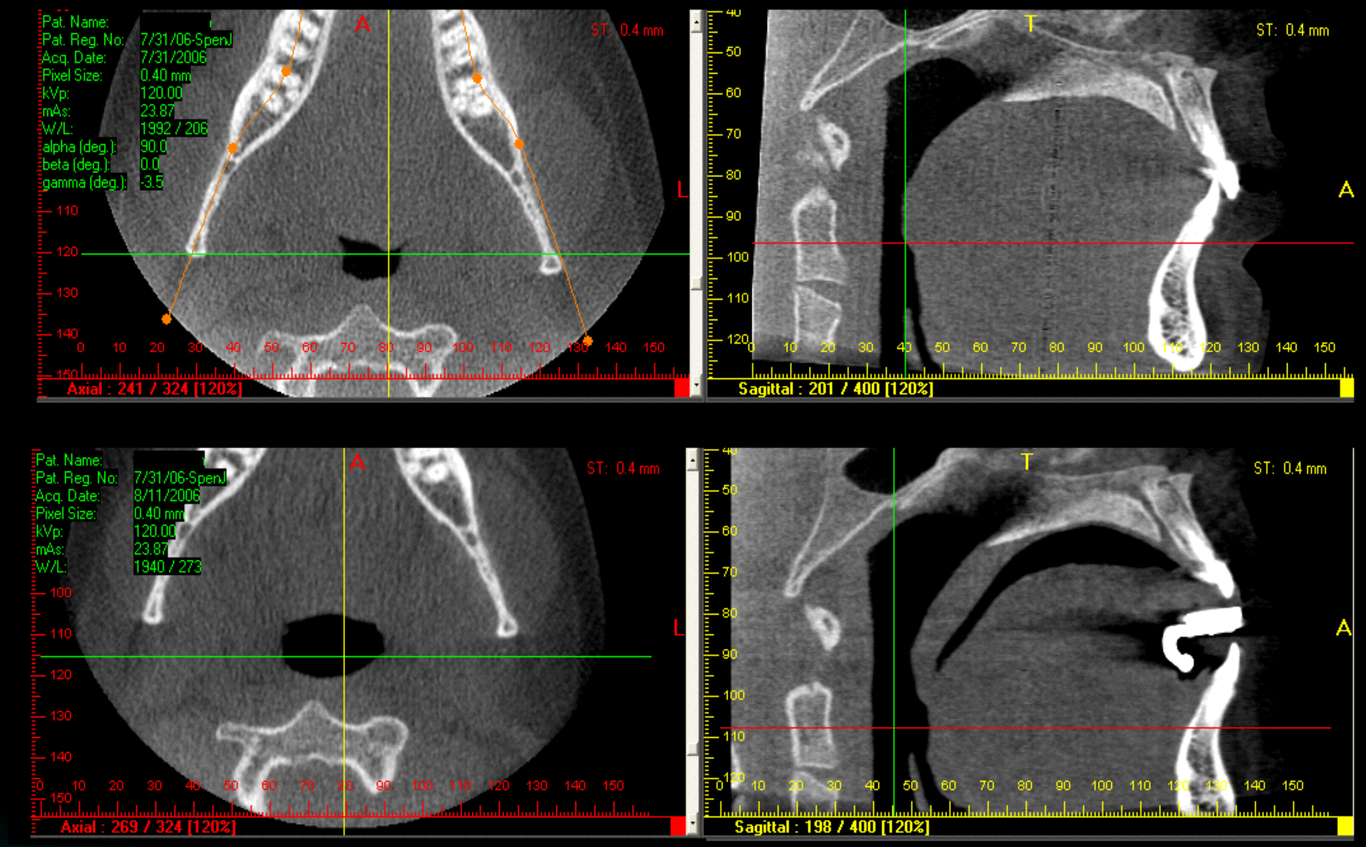

Three Dimensional reconstructions courtesy of Alan A. Lowe, DMD, FRCD (C) , FACD

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

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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

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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

SLEEP 2006;29(2): 240-243.

PRACTICE PARAMETERS

Practice Parameters for the Treatment of Snoring and Obstructive Sleep Apnea with Oral Appliances: An Update for 2005

An American Academy of Sleep Medicine Report

Jamison Spencer

American Academy of Sleep Medicine Clinical Guidelines

- Oral appliances are indicated in:

  "patients with mild to moderate OSA who prefer them to continuous positive airway pressure (CPAP) therapy, or who do not respond to, are not appropriate candidates for, or who fail treatment attempts with CPAP."

SLEEP, Vol. 29, No. 2, 2006

Jamison Spencer

American Academy of Sleep Medicine
Clinical Guidelines

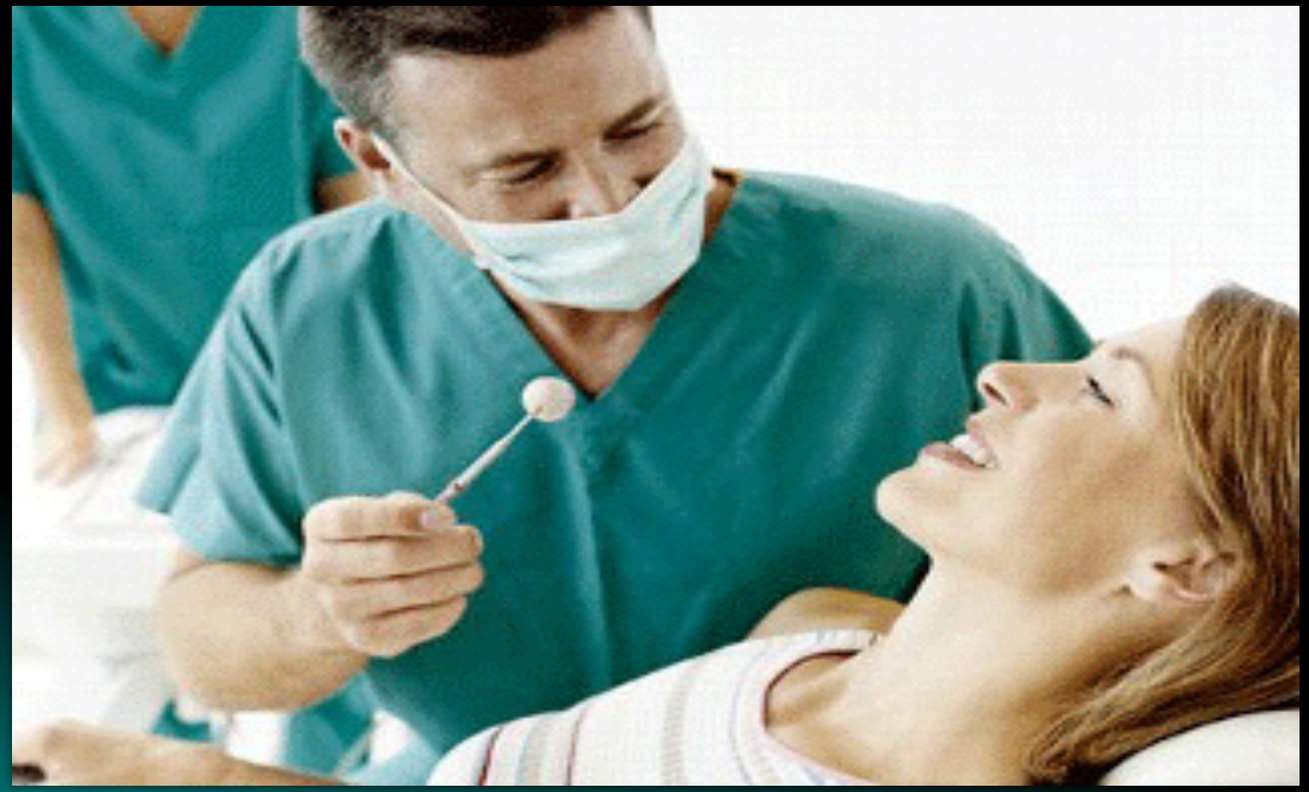
"Until there is higher quality evidence to suggest efficacy, CPAP is indicated whenever possible for patients with severe OSA before considering OAs."

SLEEP, Vol. 29, No. 2, 2006

Other Indications for Oral Appliance Therapy

- As an adjunct to CPAP
  - For use during travel
  - For use when electricity is not readily available (camping/hunting)
- In combination with CPAP to help reduce necessary pressures or to eliminate head gear
- As a predictor of success of “bi-max advancement” surgery

Screening Your Patients



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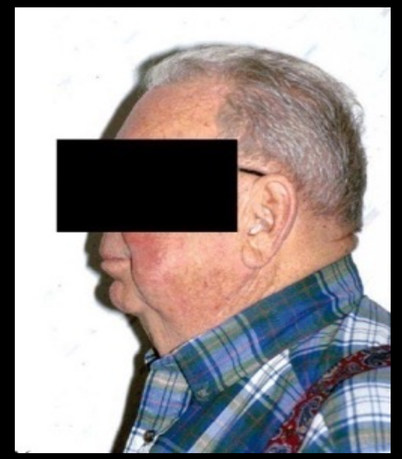
How do we best screen for OSA?

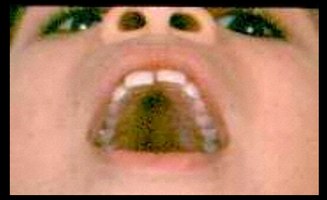
- History
  - Snoring w/ or w/o apnea/gasping
  - Non-restorative sleep
  - Excessive Daytime Sleepiness / Fatigue
- Co morbidities
  - Hypertension
  - GERD
  - Headaches
  - CAD/CHF
  - BRUXISM

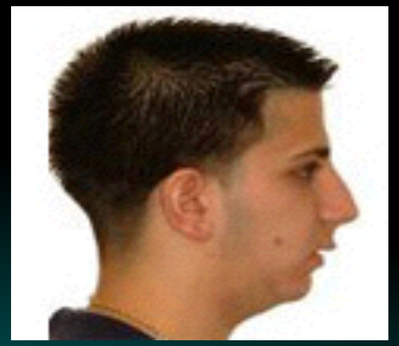
OSA Risk Factors

- BMI>30
- Neck circumference >16in

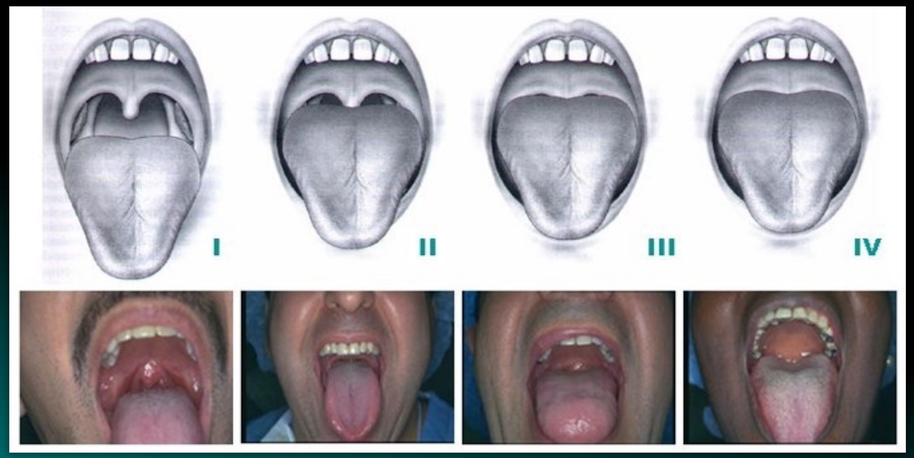


- High arched palate





- Micro/retrognathia
- Mallampati class III / IV airway



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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

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STOP BANG

STOP - BANG

			Yes	No
1.	**S**nore	Do you snore loudly? (Louder than talking or loud enough to be heard behind a closed door?	☐	☐
2.	**T**ired	Do you often feel tired, fatigued or sleepy during daytime?	☐	☐
3.	**O**bstruction	Has anyone observed you stop breathing during your sleep?	☐	☐
4.	**P**ressure	Do you have or are you being treated for high blood pressure?	☐	☐
5.	**B**MI	Is your body mass index greater than 28?	☐	☐
6.	**A**ge	Are you 50 years old or older?	☐	☐
7.	**N**eck	Are you a male with a neck circumference greater than 17 inches, or a female with a neck circumference greater than 16 inches?	☐	☐
8.	**G**ender	Are you a male?	☐	☐

Questionnaires adapted from www.EpworthSleepinessScale.com and Chung F, et. al Anesthesiology 2008; 108(5):812-821.

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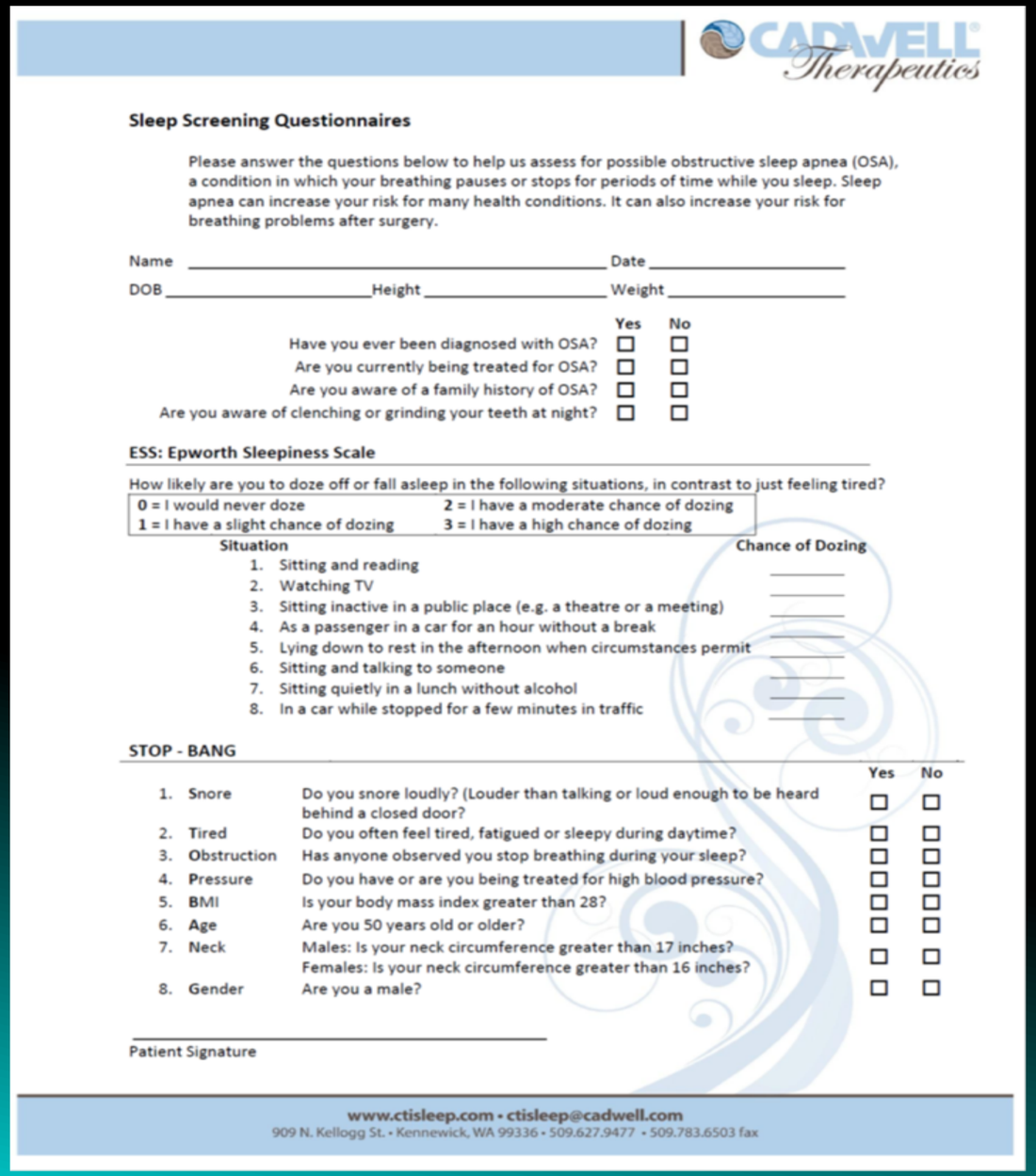

CADWELL Therapeutics

Sleep Screening Questionnaires

Please answer the questions below to help us assess for possible obstructive sleep apnea (OSA), a condition in which your breathing pauses or stops for periods of time while you sleep. Sleep apnea can increase your risk for many health conditions. It can also increase your risk for breathing problems after surgery.

Name _____ Date _____

DOB _____ Height _____ Weight _____

	Yes	No
Have you ever been diagnosed with OSA?	☐	☐
Are you currently being treated for OSA?	☐	☐
Are you aware of a family history of OSA?	☐	☐
Are you aware of clenching or grinding your teeth at night?	☐	☐

ESS: 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	**2** = I have a moderate chance of dozing
1 = I have a slight 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 theatre 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 in a lunch without alcohol	_____
8. In a car while stopped for a few minutes in traffic	_____

STOP - BANG

			Yes	No
1.	Snore	Do you snore loudly? (Louder than talking or loud enough to be heard behind a closed door?	☐	☐
2.	Tired	Do you often feel tired, fatigued or sleepy during daytime?	☐	☐
3.	Obstruction	Has anyone observed you stop breathing during your sleep?	☐	☐
4.	Pressure	Do you have or are you being treated for high blood pressure?	☐	☐
5.	BMI	Is your body mass index greater than 28?	☐	☐
6.	Age	Are you 50 years old or older?	☐	☐
7.	Neck	Males: Is your neck circumference greater than 17 inches? Females: Is your neck circumference greater than 16 inches?	☐	☐
8.	Gender	Are you a male?	☐	☐

_____

Patient Signature

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909 N. Kellogg St. • Kennewick, WA 99336 • 509.627.9477 • 509.783.6503 fax

www.JamisonSpencer.com

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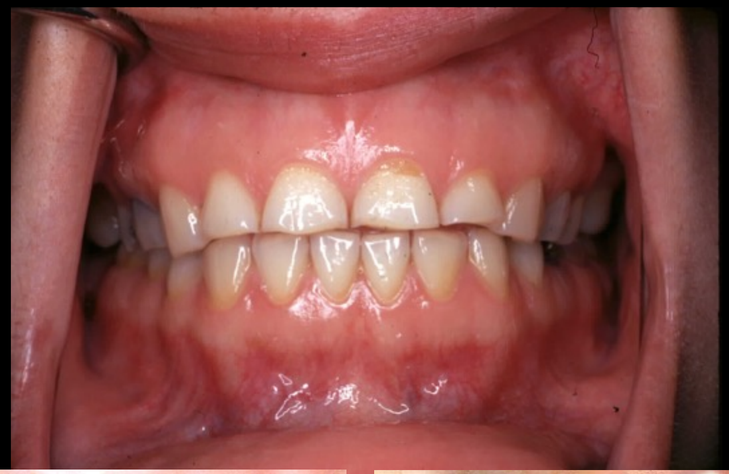

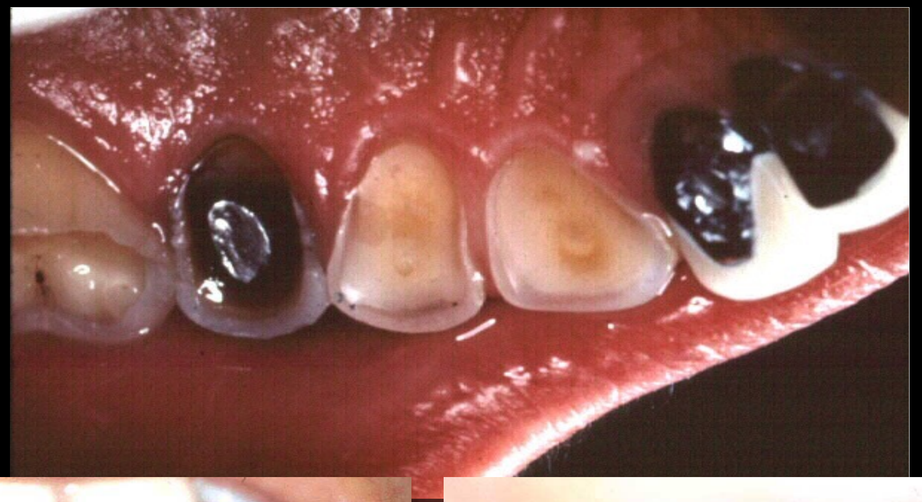

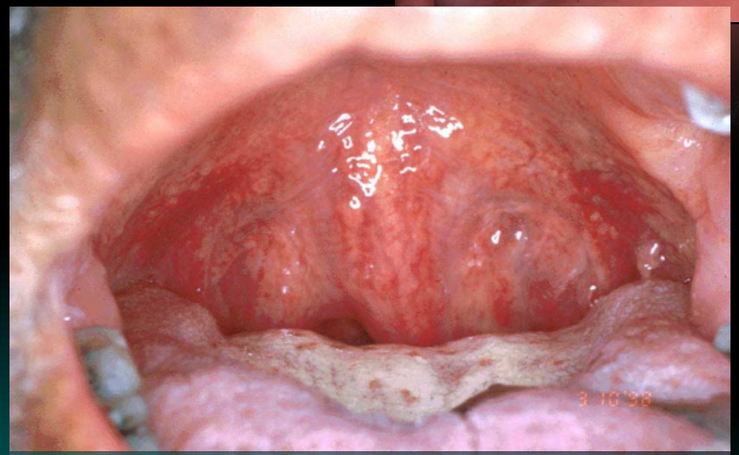

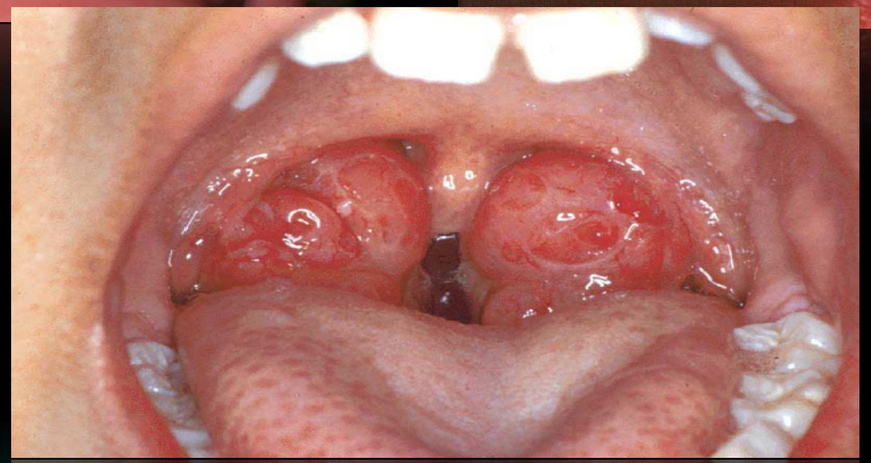

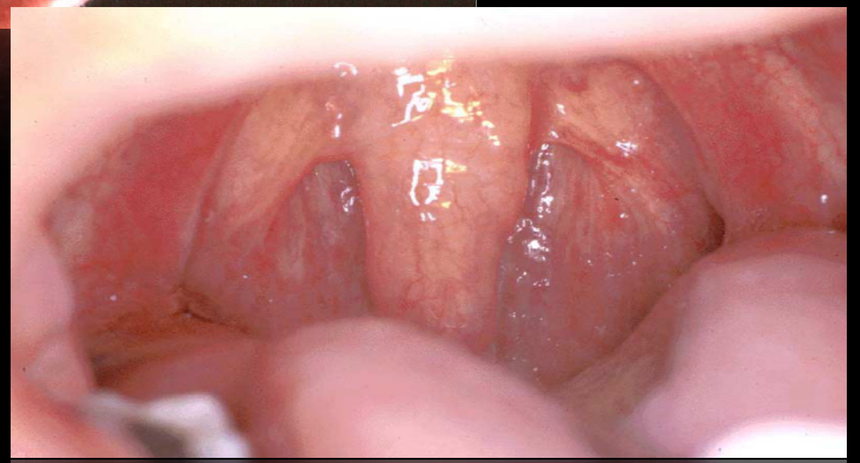

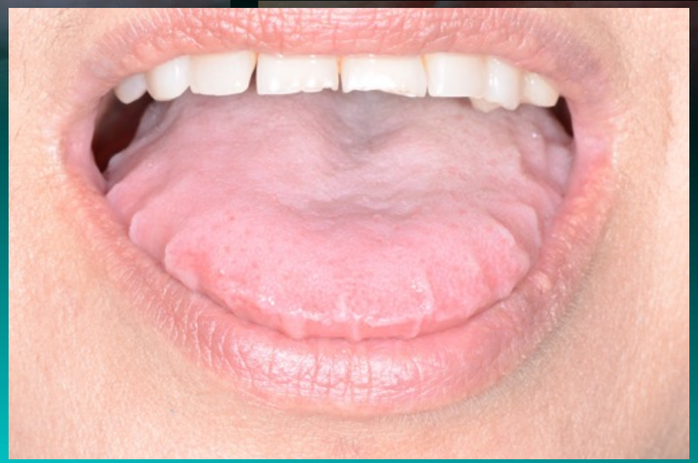

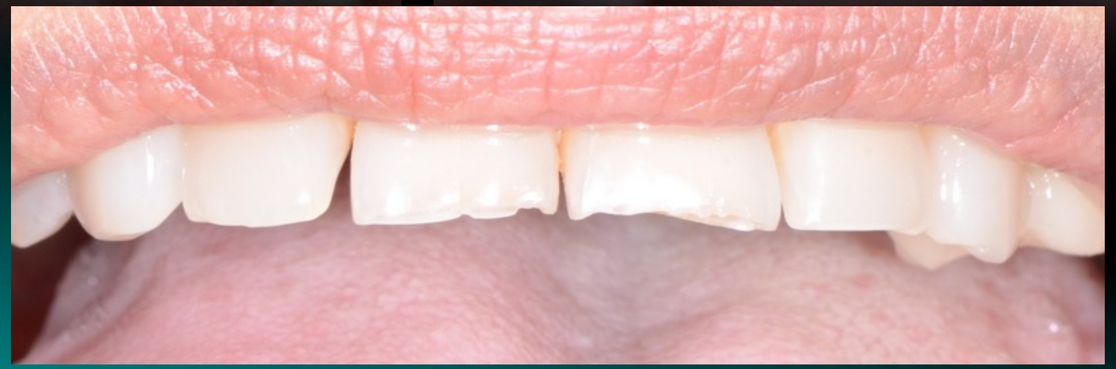

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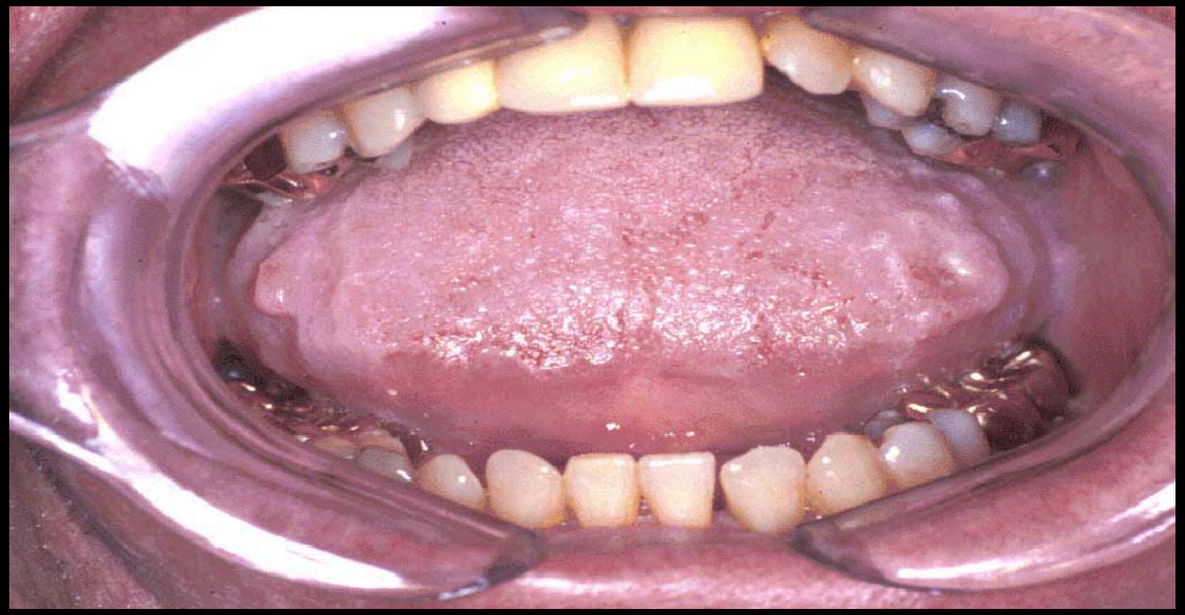

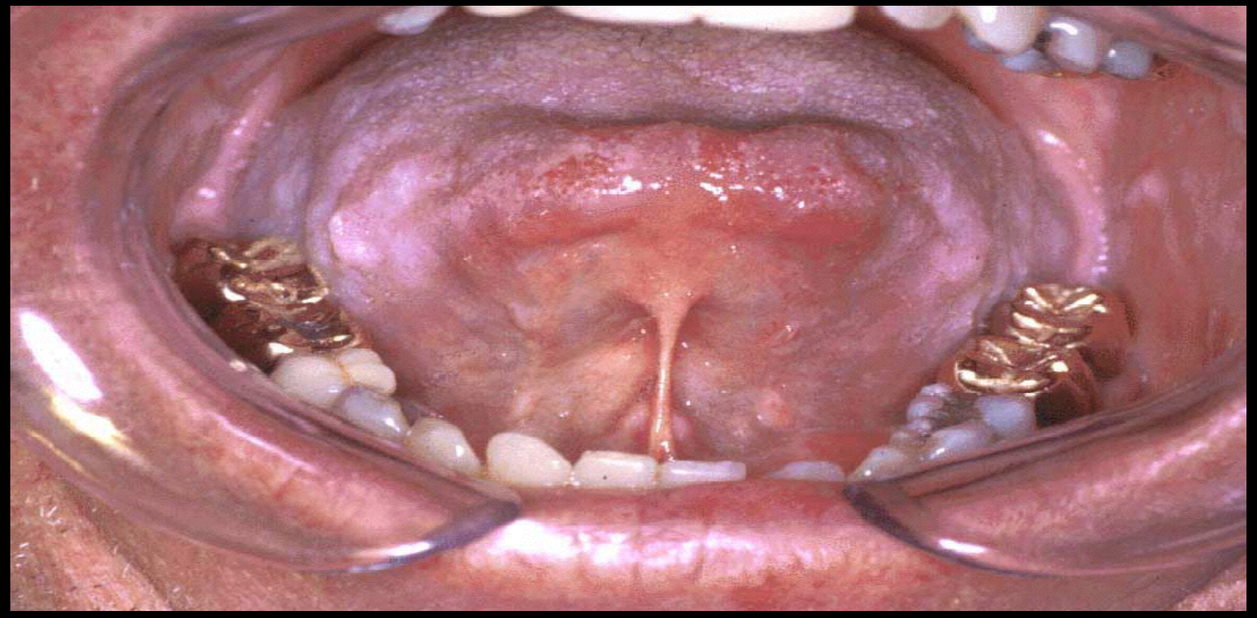

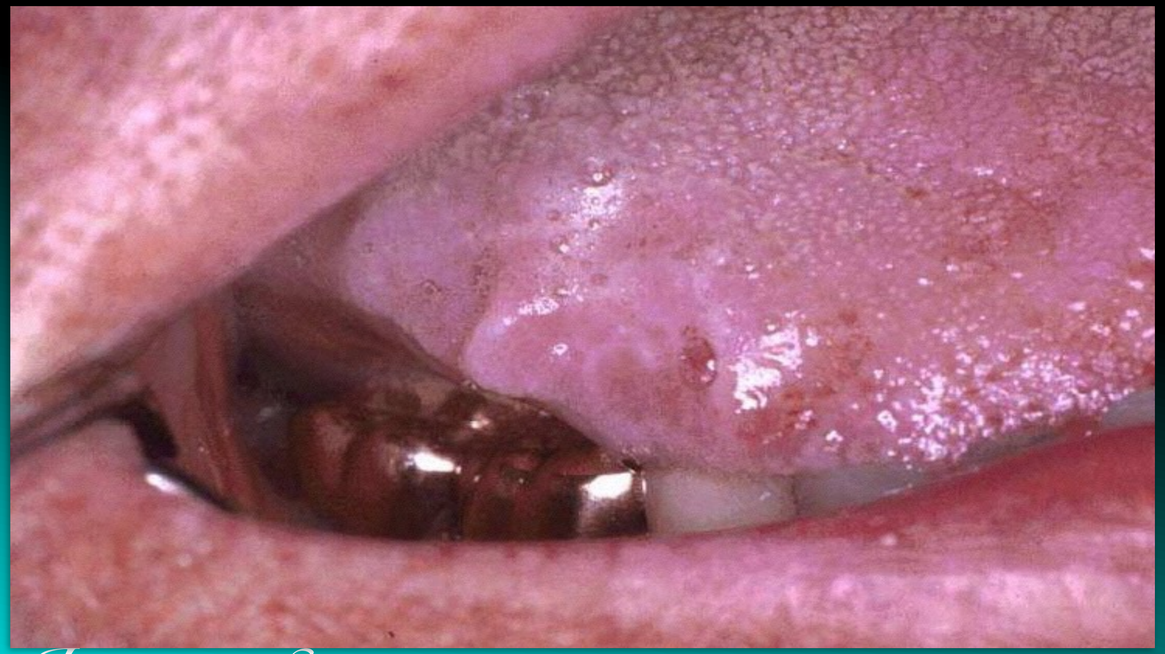

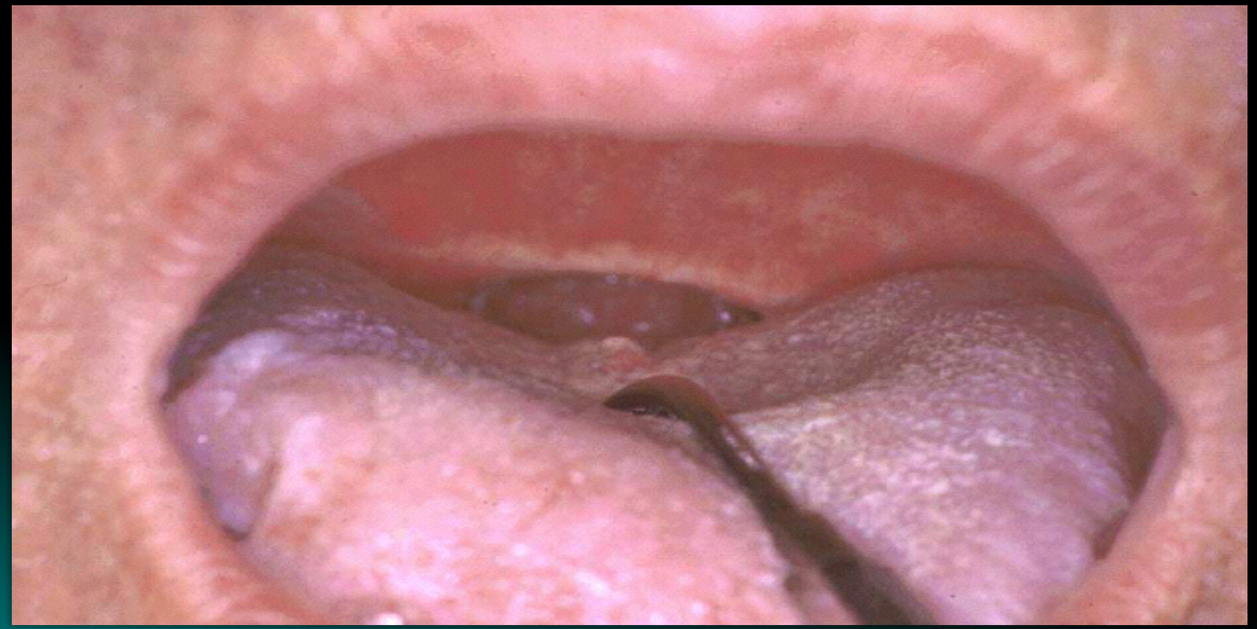

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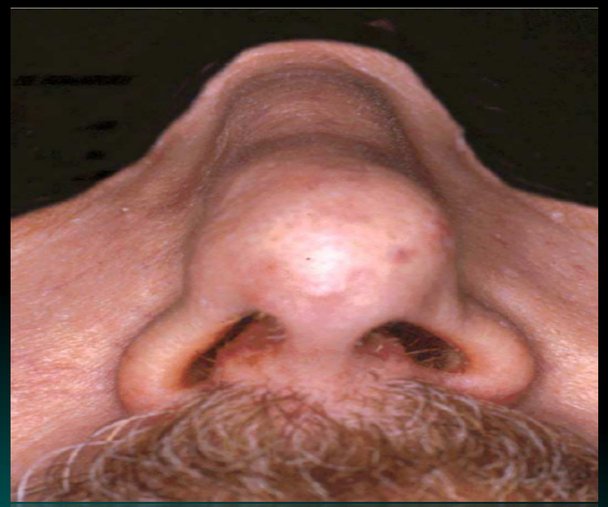

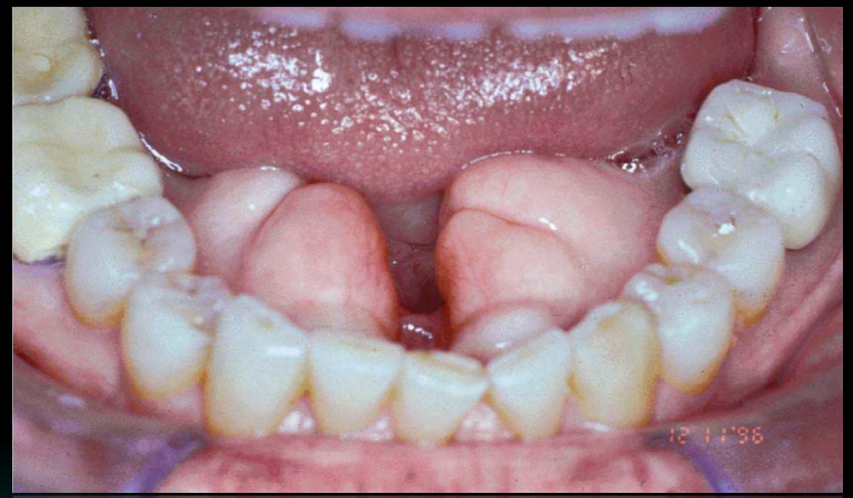

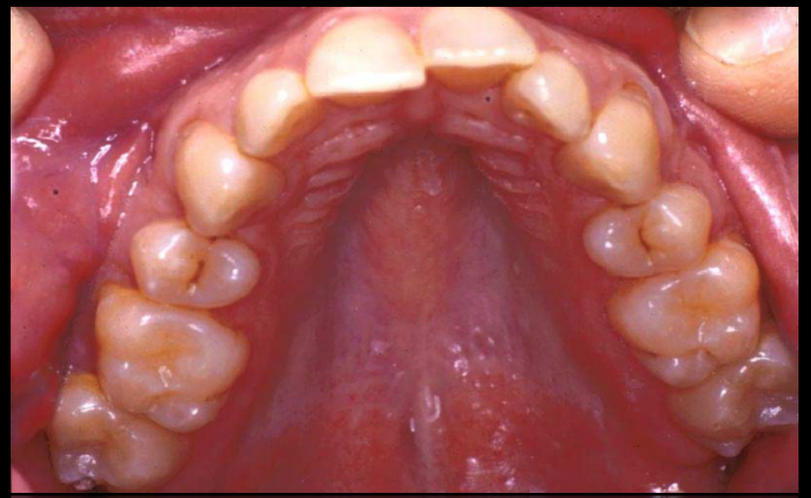

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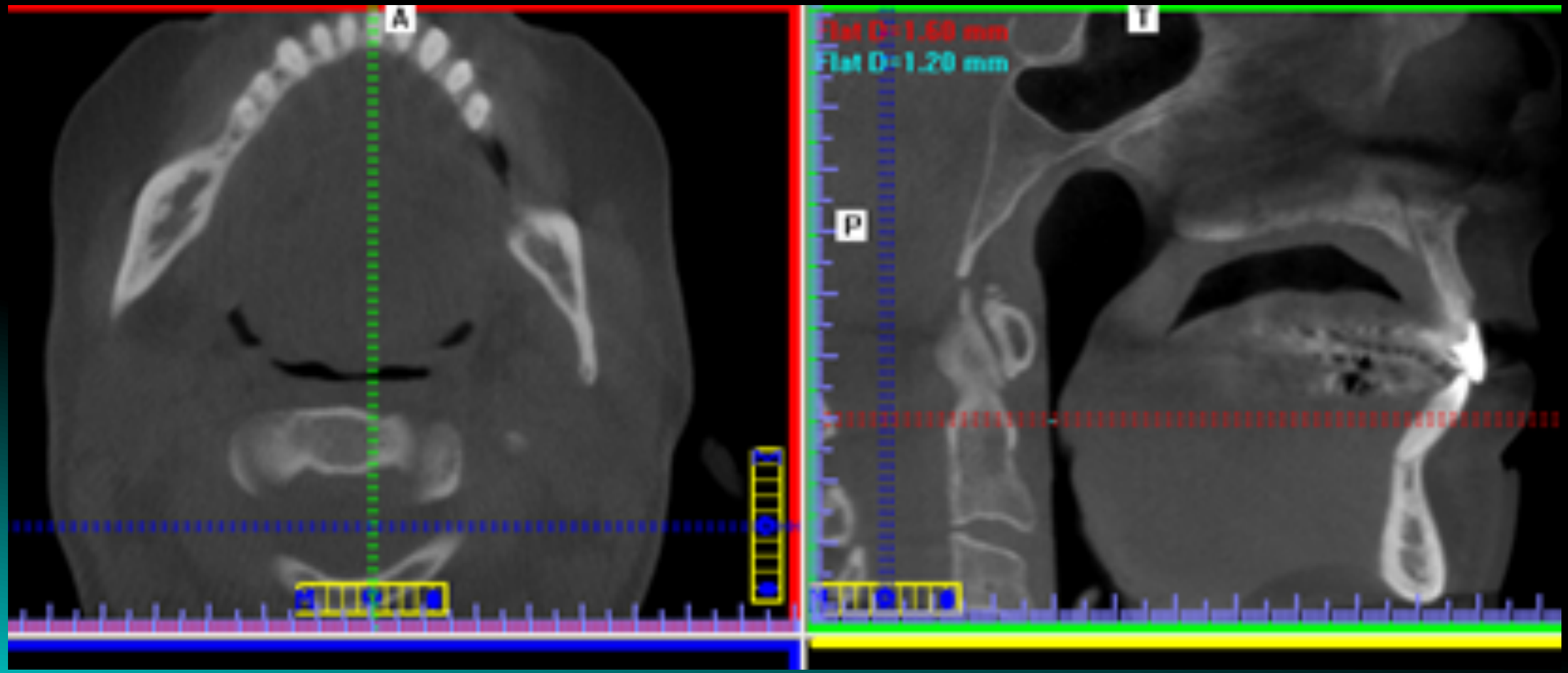
1.2mm Airway!!!



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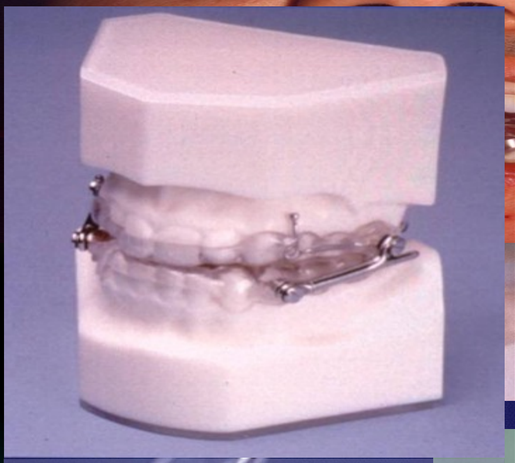
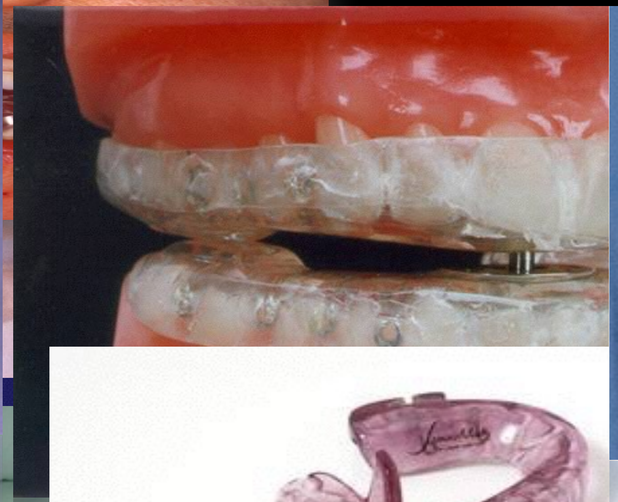
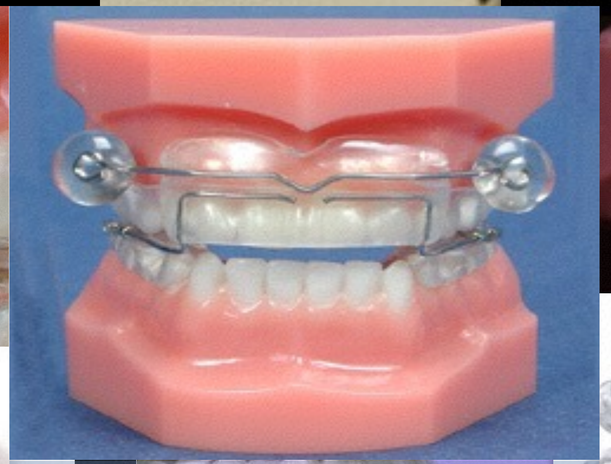
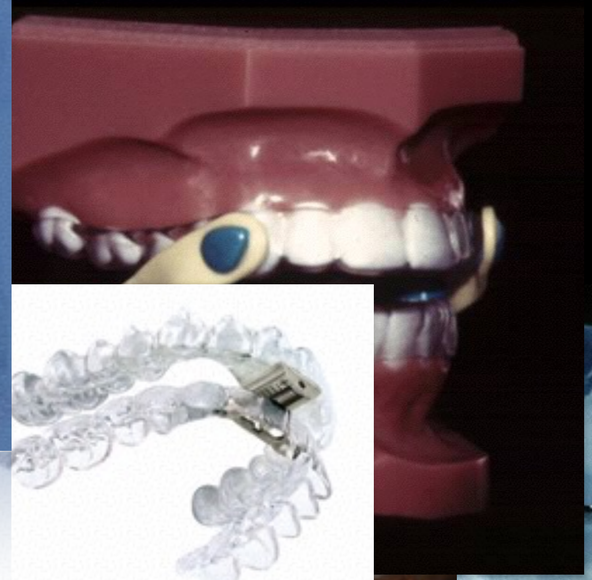
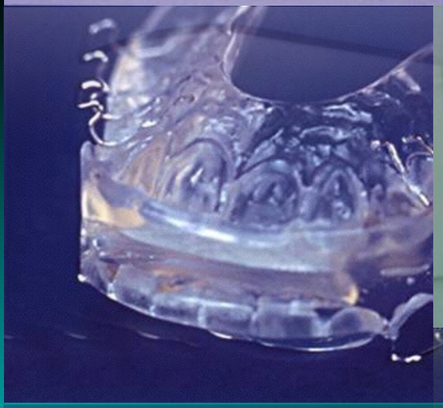
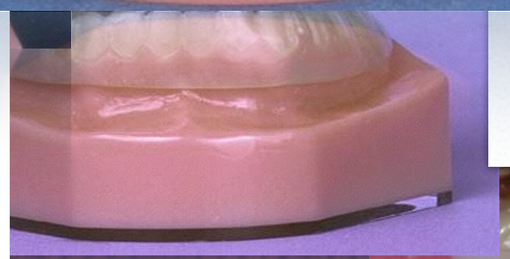
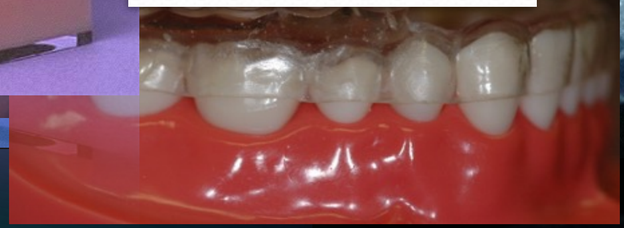
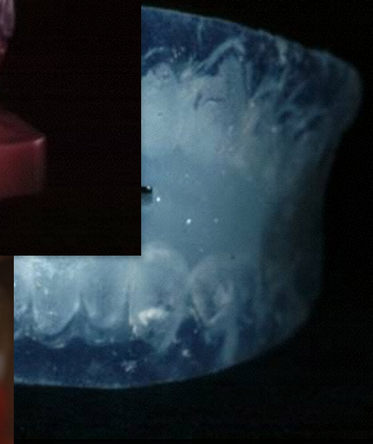
Types of Oral Appliances

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Functional Classification of Oral Appliances

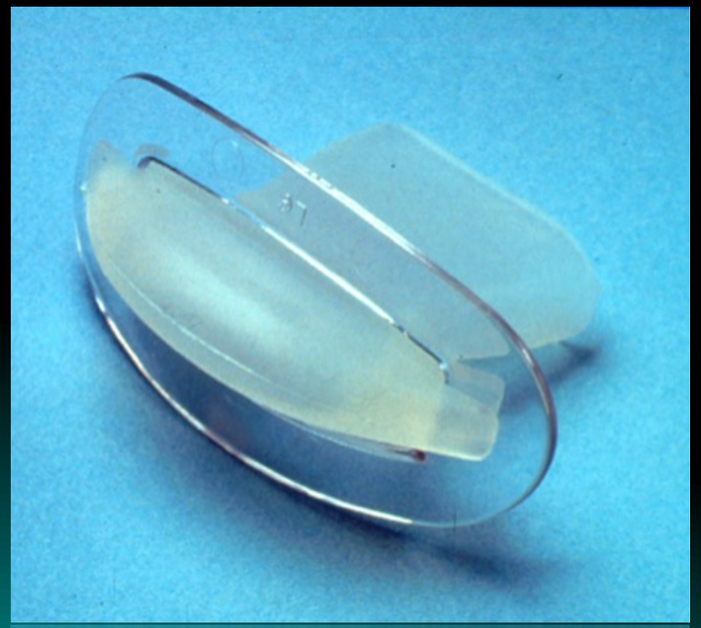
- Tongue Retaining Devices (TRD)
- Mandibular Repositioning Appliances / Mandibular Advancement Devices (MRA or MAD)
- Combination Oral Appliance and CPAP

Tongue Retaining Device (TRD)

Indications for Tongue Retaining Device

- Lack of tooth support or edentulous
- Active TMD symptoms (?)
- Non-apneic snorers or mild OSA
- Patients with Down's Syndrome

Snor X



Custom TRD

Custom TRD w/ Tubes

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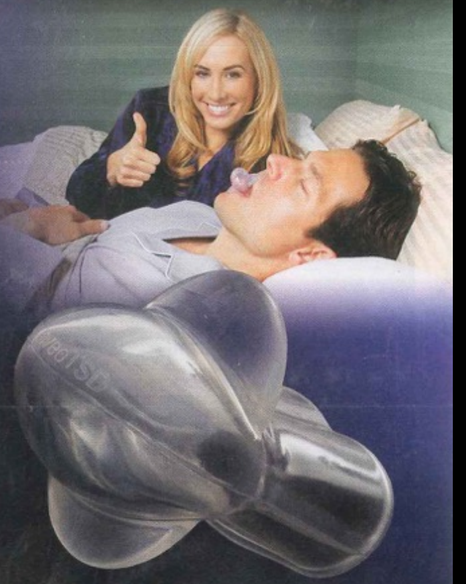
A simple, effective treatment for snoring.

aveoTSD®

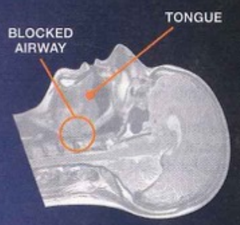


- A brilliantly simple, low-cost treatment for problem snoring.
- aveoTSD suctions onto the tongue, preventing it from falling back into the throat. It is indicated for anyone – even patients with TMJ or who are edentulous.
- Requires no impressions or adjustments. Deliver it on the same day the patient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

$139 each‡

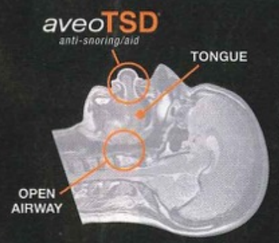
Ask for your free patient education materials

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.*

**Magnetic 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.

800-334-1979

getaveo.com

glidewelldental.com

GLIDEWELL LABORATORIES

"The Standard of Care"

Jamison Spencer

Mandibular Repositioners

- Like most veterinary students, Doreen breezes through chapter 9

Types of Appliances

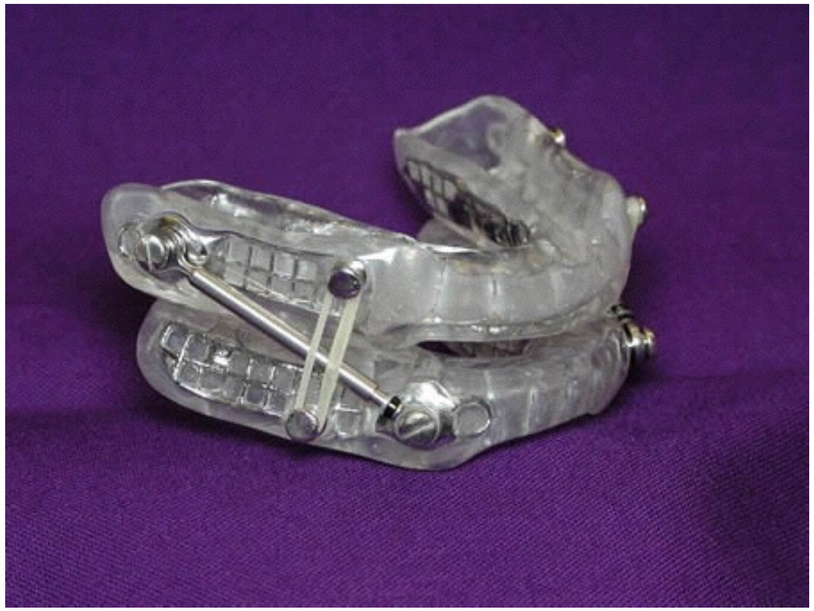
- Anterior point stop (TAP, Silencer, MDSA, etc.)
- Push (Herbst, SUAD, etc.)
- Pull (EMA, Silent Night, etc.)
- Adjustable Mono block (Moses, PM Positioner, Klearway, etc.)
- Interlocking (Somnomed, Dorsal, Respire, etc.)
- Temporary/Trial (Boil and Bites, Silent Sleep, etc.)

Anterior Point Stop

Anterior Point Stop

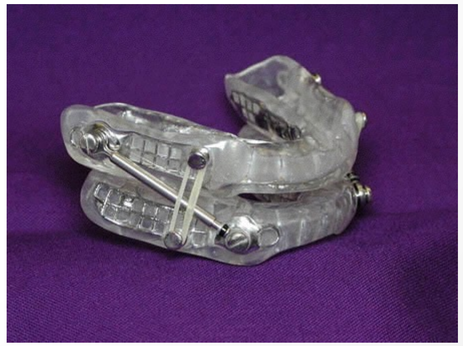
- Not ideal in deep overbite cases due to the need for at least 5mm of anterior vertical space for the hook mechanism.
- May cause discomfort, or worse, in the front teeth due to forces being concentrated there.
- Ask lab to be sure that they use your bite registration, otherwise the hook mechanism may not hook (if the tray material contacts only in the posterior).

Push



Push

- Difficult for people with poor manual dexterity to use.
- May cause discomfort in the lower anterior teeth due to forces being concentrated there.
- Have the lab place posterior stops if they don’t automatically, and use your bite registration so that you have prescribed the initial vertical.
- May need to use elastics and hooks to keep the mouth relatively closed, because the mandible will fall back a little when the mouth opens.

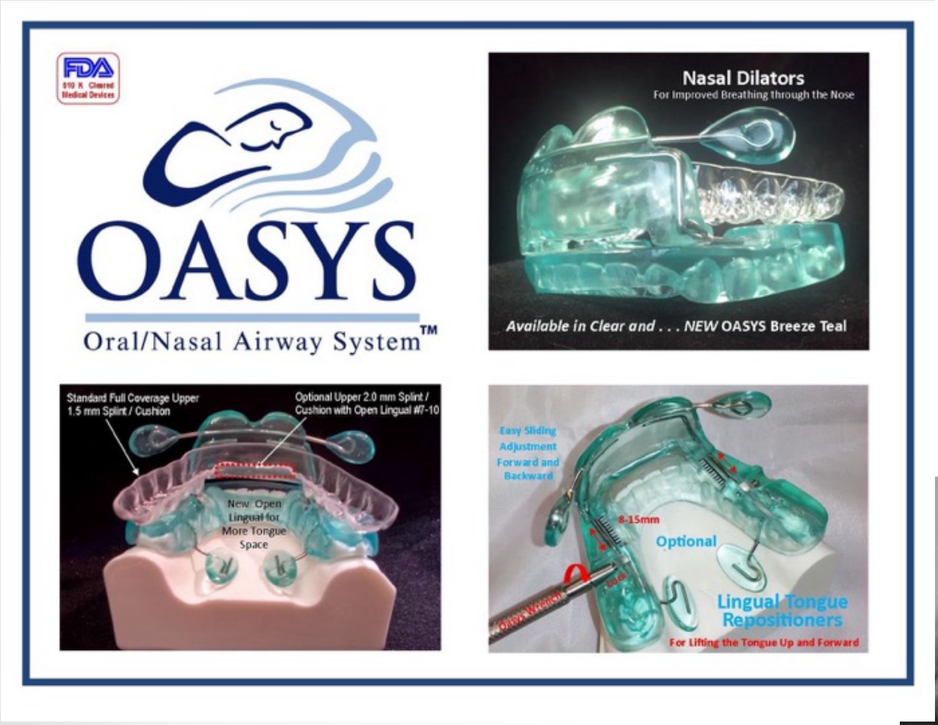


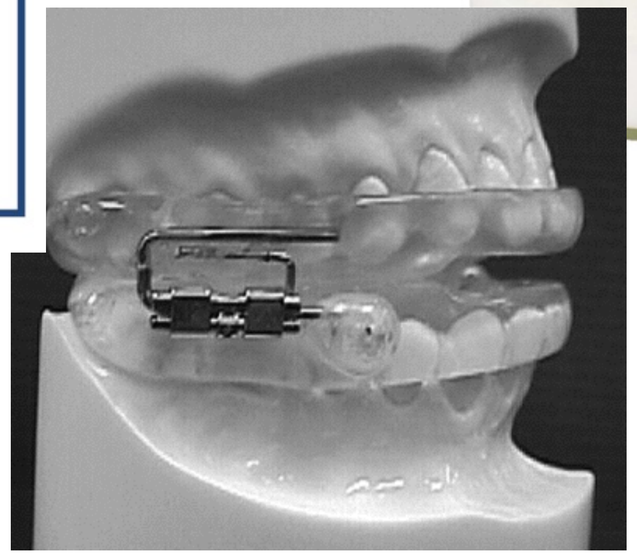
Pull

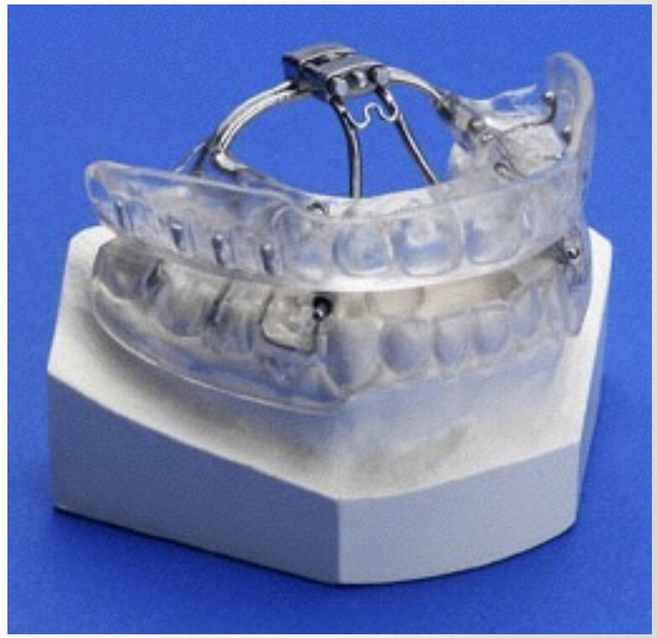
Pull

- May cause discomfort in the upper anterior teeth, due to forces being concentrated there.
- Have the lab place posterior stops if they don’t automatically and have them use your bite registration so that you have prescribed the initial vertical.

Adjustable Mono Block







Adjustable Mono Block

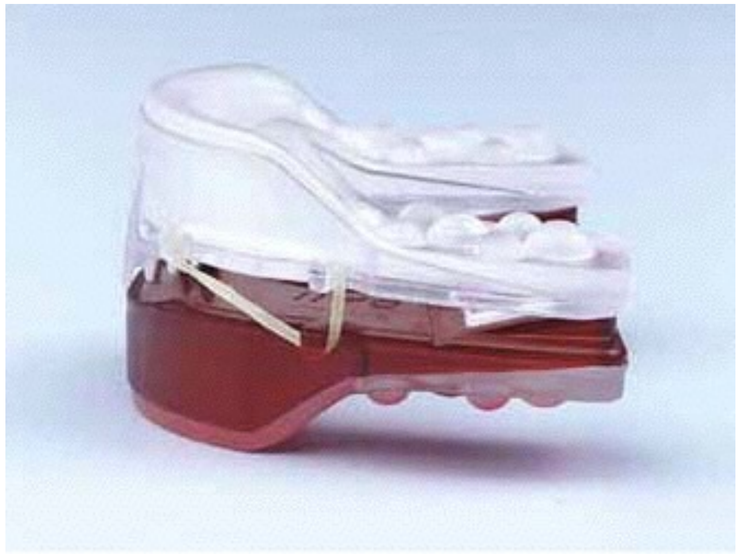
- Biggest issue is extremely limited, or no, ability to move the mandible (in any direction).
- Some people have no problem with this, others can't stand it… good luck figuring out in advance who won't like it (you might try the Silent Sleep, but it's so soft that it's not "apples to apples").
- Little or no ability to adjust vertical, without basically rebuilding the appliance from scratch.
- CRITICAL that the bite registration is PERFECT and that the lab fabricates the appliance EXACTLY in the bite registration position.
- If the initial bite registration position is posterior, and the patient has a steep articular eminence, the bite will want to open as you adjust the appliance forward.
- May have an advantage of having a lot of tongue space (Moses appliance).
- May be a good choice for people with less retentive features as the appliance WILL dislodge when they open, but when they close again it will seat.

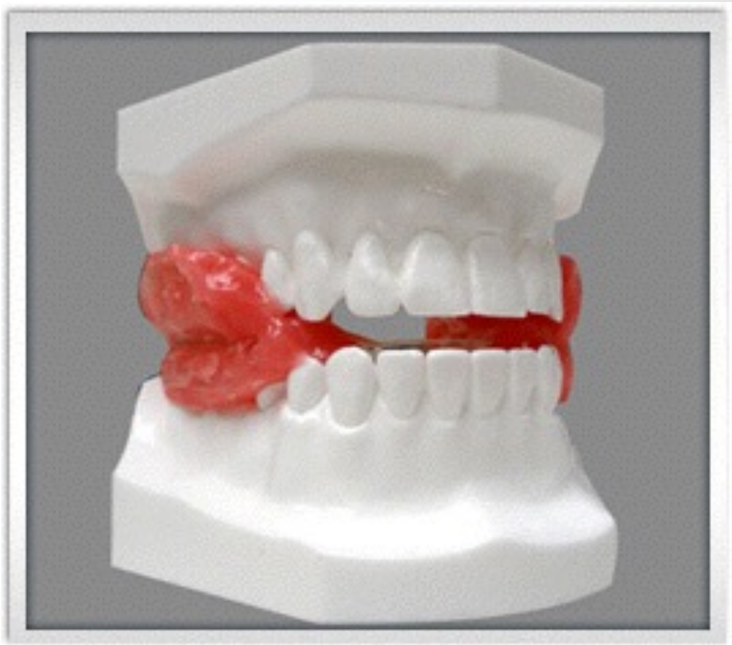
Interlocking

Interlocking

- A good choice for:
  - Patients who “sleep with their mouth open.”
  - Patients with minimal retentive features (because other appliances that are connected together will dislodge).
  - Patients with anterior periodontal issues, as the forces are concentrated in the pre-molars and molars.
- Most do not allow much lateral movement.
- Can adjust the vertical (more vertical…easily; less vertical…with difficulty).
- (Warning) Adding acrylic or grinding off a lot of acrylic does void the warranty on some appliances.
- My #1 choice for fitting over dentures.

Temporary/Trial

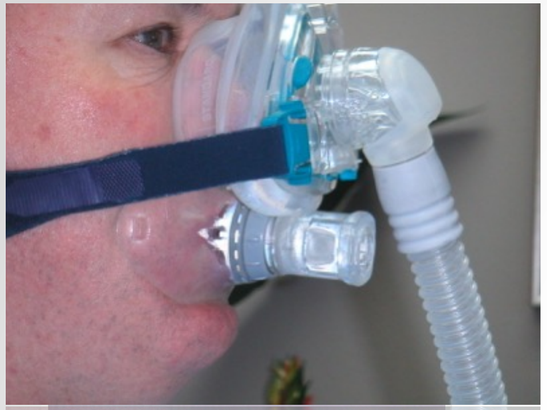


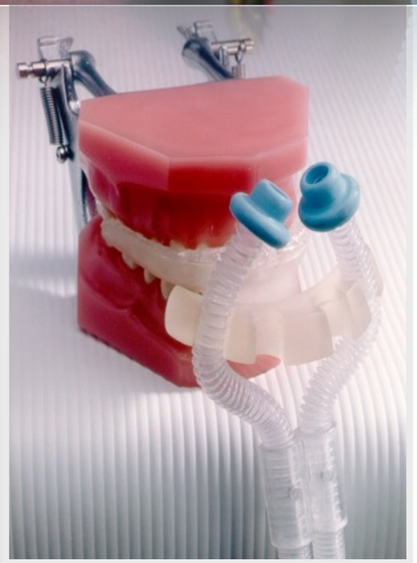


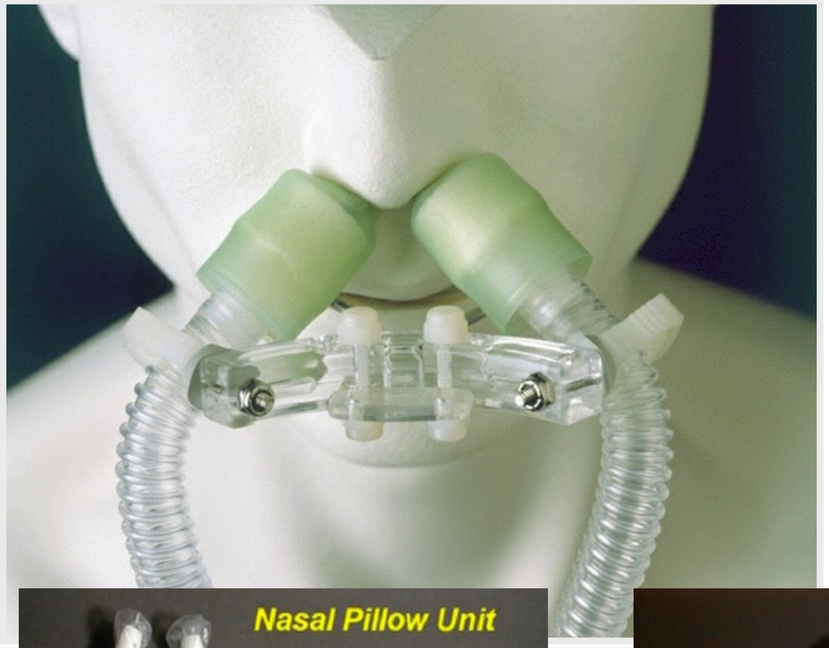
Temporary/Trial

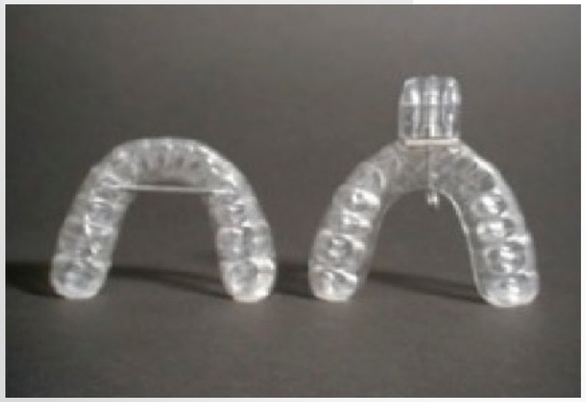
- **Pretty much all boil and bites are terrible**
  - Terrible = difficult/painful to fit, poor retention, bulky, lack of tongue space, poor retention gets worse over time, patient compares to what they see on TV.
  - Boil and bites are difficult, if not impossible, to adjust anything other than protrusion.
- **Temporary/Trial appliance can be useful for:**
  - Treating a patient immediately.
  - Protecting a patient while they wait for a custom appliance OR DURING REPAIR.
  - Fitting someone who needs restorative work prior to fabrication of a custom appliance.
  - As a trial to see if they'll be able to tolerate an appliance or to see if mandibular advancement will help them.
  - Patients in orthodontics (Silent Sleep only).
  - Children (Silent Sleep only with input from an orthodontist).
  - As a spare appliance (for travel).

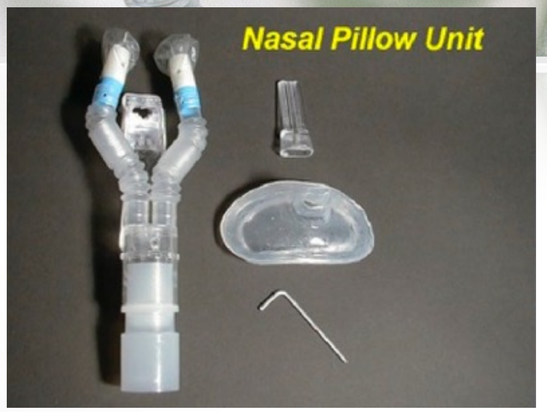
“Combination Therapy”



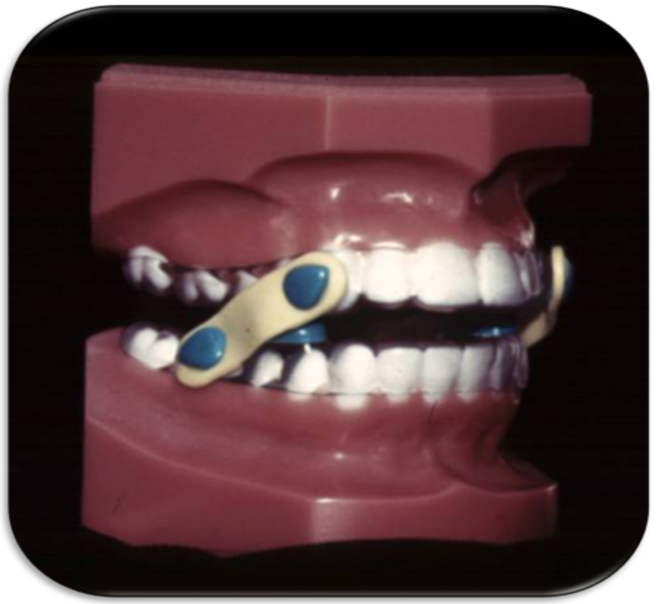








The Best Combination Therapy…



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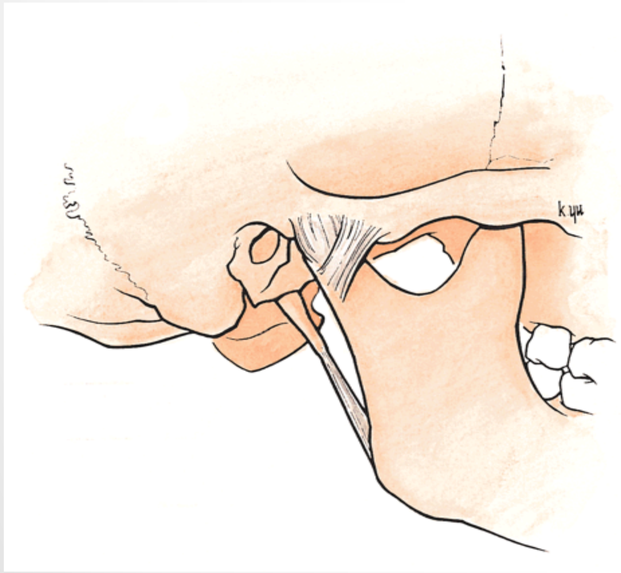
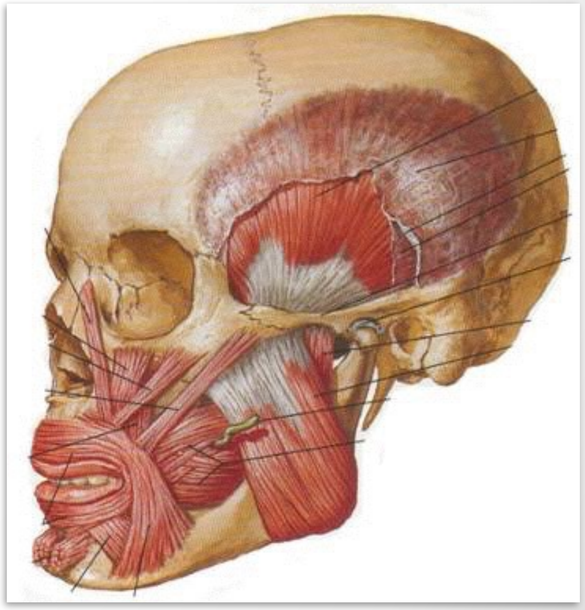
“Jaw Pain”

- 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, reduce the protrusion and/or check to see if the midline is being shifted.

Non-Intuitive Exception to the Rules of Thumb

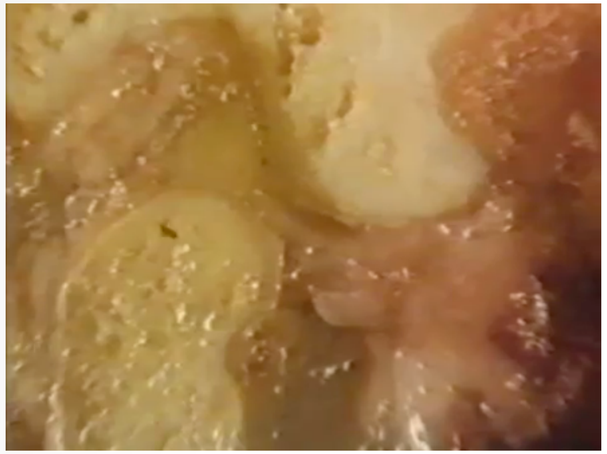
- If the patient's airway is not being kept patent by the oral appliance, they may "fight" the appliance (the brain trying to maintain an airway) and as such may have muscle and/or TMJ pain.
- Ask the patient:
  - Are you still snoring?
  - How do you feel you are sleeping?
- If the patient is still 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.
- 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.

Clinical Thoughts

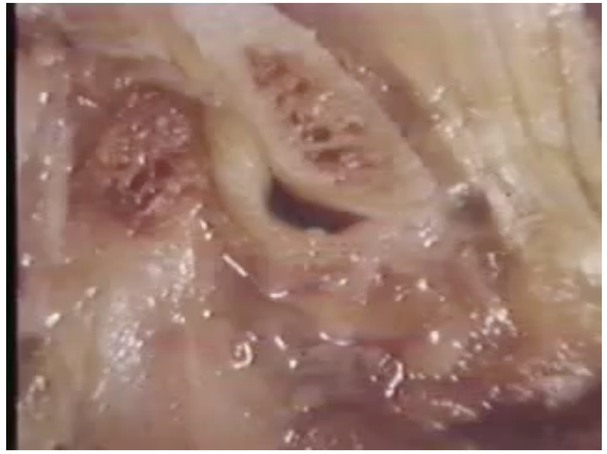
- In many cases you can continue to use the oral appliance while you treat the TMJ/muscle pain.
- Look for potential causes for the TMJ/muscle pain coming from the appliance and make appropriate adjustments.
- Have the patient set their alarm for 2-3 hours after they go to bed, at which time they will check to see if the adjustments to the appliance have helped. If so, they go back to sleep with the appliance in. If not, they take the appliance out.
- In some cases, you will need to have the patient go without the appliance to resolve the TMJ/muscle pain. In some cases, you can go right back to the position you were in when the pain started and it won't return (personal experience).

Predict the Problems
BEFORE
They Occur

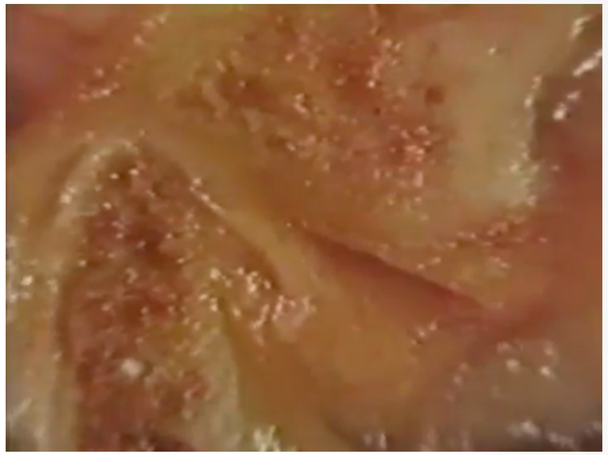
Normal



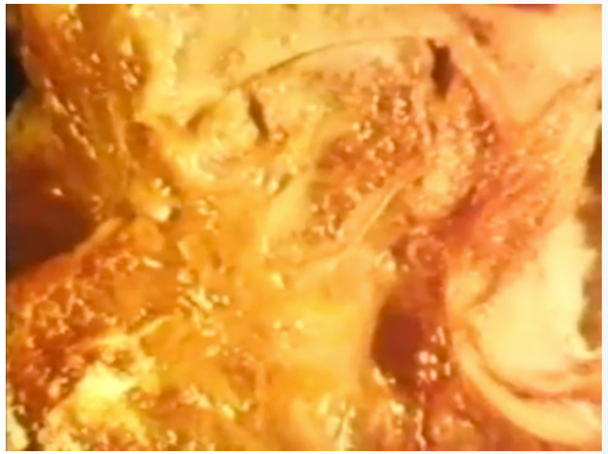
RDD



NRDD



Internal Derangements



DJD

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

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!!

Avoiding Problems

- Choosing the Right Appliance
  - Take into account
    - Parafunctional habits and force (Bruxers vs. Clenchers)
    - Pending restorative dentistry
    - Quality of dental retention
    - Life of the appliance
    - Cost of the appliance

Avoiding Problems

- Patient Instructions for Avoiding Common Side Effects of OAT
  - Tooth Movement
    - “World’s Greatest Flosser”
  - Jaw Position Changes
    - Take out the appliance the last hour of sleep
    - Morning repositioner
    - Check your bite every night when you brush

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
  - LOWER EXPECTATIONS!!

Dealing with Problems

- Tooth Movement
  - **Adjust the appliance**
  - **“Invisalign” effect**
  - **Orthodontic movement**
  - **MAKE SURE YOU HAVE GOOD RECORDS!**

Dealing with Problems

- **Jaw position changes**
  - **Most are minor and insignificant to the patient—don't worry about it**
  - **Many are positive—deal with it**
  - **Some are significant—consider surgery**

- To avoid, diagnose, treat and manage TMD associated with OAT:
  - Educate yourself!
  - Know how to perform a good evaluation
  - Follow up with your patients regularly
  - Practice, practice, practice… and don't give up!

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

Jamison Spencer

In Conclusion

- Obstructive Sleep Apnea is a serious problem, with serious complications and comorbidites
- As dentists we are unique amongst healthcare providers to evaluate the airway of ALL of our patients, adults and children, and screen for possible sleep apnea, refer and provide (or refer for) oral appliance therapy

Good Night

Wouldn't it be nice?

Sleep Tight

Good Night

Good Night

Sleep Tight

Sleep Tight

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

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