



Snoring and Sleep Apnea

What is it and how do I stop?

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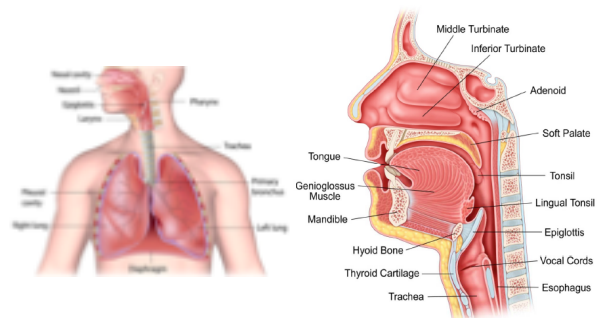
Breathing in Sleep

- How air flows: the anatomy of the nose and throat
- Discuss symptoms related to snoring
- Discuss what happens when breathing during sleep is altered
- Steps for evaluation of snoring and sleep apnea
- Treatment for sleep apnea and snoring

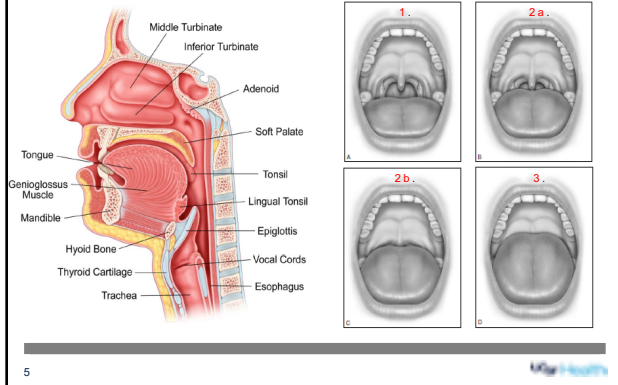
Snoring

- Chronic habitual snoring
 - 20% women, 40% men
 - Most common symptom of sleep apnea (35% of those who snore have obstructive sleep apnea)
- Snoring risk factors
 - Age, sex, obesity, ETOH or sedative use, smoking, nasal obstruction, asthma, lung disease.

Breathing in Sleep



Upper Airway



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Collapsing Pipe

- Upper Airway – Throat
- Lined by muscles you use to swallow and talk
- Muscles of the throat relax during sleep



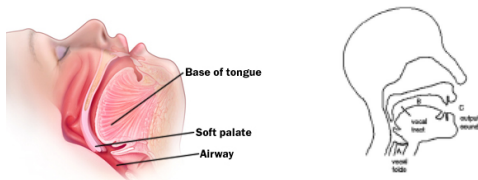
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http://www.mhpe.com.au/web/library/enginfo/textbooks_dtd_only/DAN/buckling/mechanisms/mechanisms.html

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Snoring - Acoustics

- Snoring = noise generated when air flows through a narrowed upper airway
- Sound source: flutter or vibration of soft tissues, can be from multiple sites

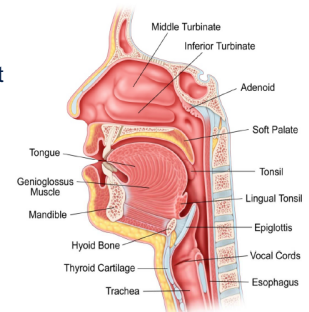


Pevernagie et al. Sleep Med Rev. 2010.

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Fiberoptic Exam

- Done in the office
- Numbing spray
- Look at the nose and throat



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Awake Upper Airway Exam

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Pipe Collapse



10 <https://www.youtube.com/watch?v=rwrbfL3il>

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Sleep Endoscopy: Patterns of collapse

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Effects of primary snoring



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Social Impact

- Bed partner
 - Impaired sleep quality
 - Relationship disharmony
- Second-hand snoring
 - Once treated, **bed-partner QOL** increased, sleepiness, and depression scores improved (Parish & Lyng, Chest 2003)



More Snoring Relates to Worse Sleepiness

- Sleep Heart Health Cohort Study
- 6000 self-reported snoring and ESS
- Sleepiness increases with snoring frequency and loudness

TABLE 3
RELATION OF SLEEPINESS TO SNORING FREQUENCY AND RESPIRATORY DISTURBANCE INDEX (RDI)*

Epworth Score by RDI and Snoring Frequency†

RDI	Snoring Frequency (nights/wk)					
	0	<1	1-2	3-5	6-7	All
1-5	6.1 (275)	6.9 (249)	7.3 (241)	8.5 (162)	8.8 (162)	7.3 (1,089)
5- < 10	6.1 (249)	6.9 (249)	7.5 (249)	8.2 (249)	9.2 (249)	7.7 (1,089)

Gottlieb et al. Am J Respir Crit Care Med. 2000.

Louder Snoring Related to Worse Sleepiness

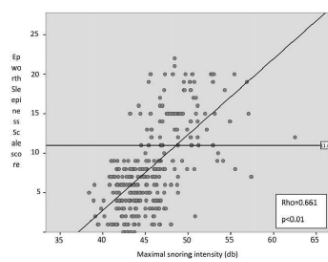


Fig. 2. Correlation between Epworth Sleepiness Scale score and maximal snoring sound (n = 307).

Kalchauer-Dekel, O. Laryngoscope 2016.

Obstructive Sleep Apnea

- Repeated collapse of the upper airway during sleep
- Leads to reduced oxygen delivery to the lungs and body
- Impacts sleep type/depth and quality
- Measured with a sleep study test
 - Number of times airflow is reduced
 - Oxygen level changes
 - Sleep stage
 - Sleep position
 - AHI = Apnea Hypopnea Index

Health Risks of untreated OSA

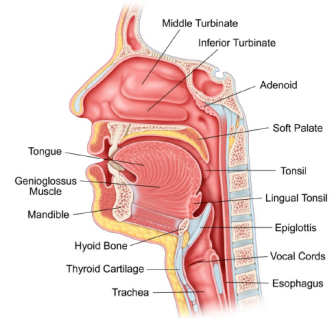
- High blood pressure
- Heart disease
- Stroke
- Obesity
- Motor Vehicle Accidents
- Daytime sleepiness
- Impaired work performance



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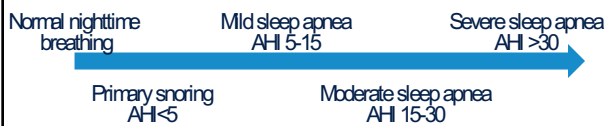
What Happens in Sleep Apnea



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Spectrum: What does snoring mean?



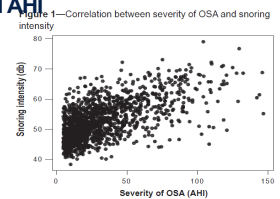
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Is Louder Snoring Associated with Sleep Apnea Severity?

- **1600 Habitual snorers**
 - Sleep Study and objective measures
- **Significant correlation between loudness of snoring and AHI**

- AHI < 5 46dB
- AHI > 50 60dB



Maimon & Hanly. J Clin Sleep Med 2010.

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Evaluation of Snoring

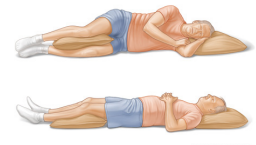
- Screen for OSA
- Sleepiness, daytime symptoms
- Bed partner report
 - Gasping, Pauses in breathing
- Goals of treatment
- Exam
- Treatment options



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Things That Impact Sleep Apnea and Snoring

- Being overweight = more collapse
- Sleep position (back is worse than the side)
- Alcohol/sedative use at nighttime: especially 3-4 hours prior to bedtime
- Acid Reflux



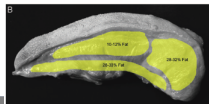
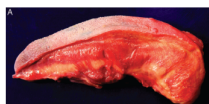
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The Effects of Weight Loss

- BMI = $\frac{\text{mass (kg)}}{(\text{height (m)})^2}$
- Associated with worse outcomes after most surgical procedures
- Tongue fat correlates with BMI (Nashi 2007)
- 10% weight loss ~ up to 47% AHI drop (Johansson 2009)
- 10% weight gain ~ 32% AHI increase (Peppard 2000)

Category	BMI
Very Obese	>35
Obese I	30 - <35
Overweight	25 - <30
Normal	18.5 - <25



Nashi et al. Laryngoscope 2007.

Positive Pressure – Why does it work?

- First line treatment – CPAP (continuous positive airway pressure)
- Applies positive pressure during sleep to prevent collapse
- Different mask interfaces exist



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How to improve CPAP use

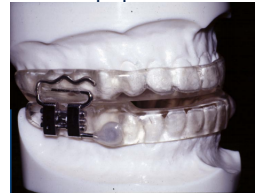
- Getting used to it before sleep
- Improving breathing through the nose
 - Treating allergies and congestion
- Helps determine how symptoms of fatigue will change when the sleep apnea is treated.
- CPAP is adjustable and titratable
- Other Sleep Issues
 - Insomnia
 - Sleep amount

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Oral appliances

- Mouth guard designed to support the jaw and prevent tongue collapse
- Designed by dental providers
- Sleep test done after the guard is made to determine how well it works for sleep apnea



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Exercises for Snoring?

- Snoring and sleep disordered breathing are less common in singers and musicians who played the didgeridoo
- Oropharyngeal exercises done routinely for 3 months (8 mins 3x/day) showed decrease in snoring by 50%

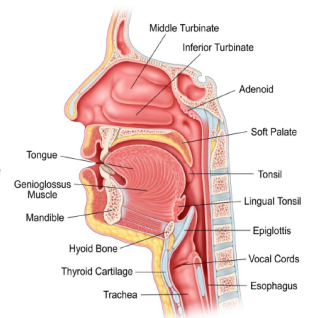


Ito et al. Chest 2015.

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Surgery for OSA

- Directed at the sites of obstruction
 - More space
 - Prevent collapse
 - Support muscle tone loss



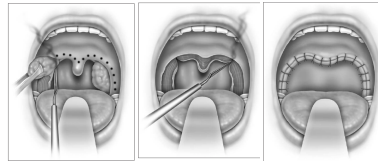
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Types/Classes of Surgery

- When non-invasive measures fail
- Goals: Reduce collapse that happens during sleep
- Create space
- Support tissues
- Improve muscle tone

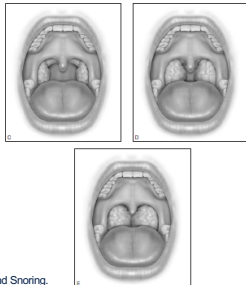
Soft Tissue Surgery

- Tonsil and palate surgery
- Lingual tonsil surgery
- Base of tongue surgery
- Epiglottitis surgery



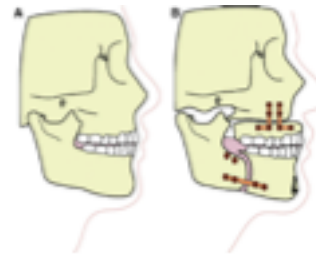
Snoring and OSA in Kids

- Most commonly due to enlarged tonsils and adenoids
- Tonsil and adenoid tissue shrink in size as we age



Bone/Jaw Surgery

- Maxillomandibular Advancement

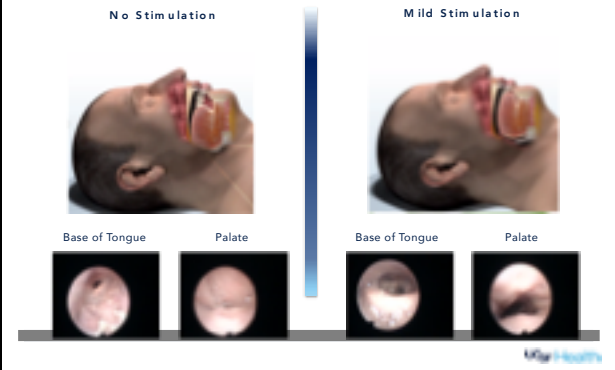


Hypoglossal Nerve Stimulation

- FDA approved first device – Inspire II 4/2014
- Fully implanted system with sleep remote
- Unilateral (right) Hypoglossal Nerve stimulation
- Improves neuromuscular tone during sleep



Nerve Stimulation Therapy



Goals of Treatment

- Reduce symptoms: daytime fatigue, snoring
- Improve quality of life
- Minimize health risks: mortality, cardiac, motor vehicle accidents
- Treatment starts with positive pressure trial
- Treatment is individualized
 - Snoring and sleep apnea severity
 - Health factors
 - Patient choice

Conclusions

- Not all snoring is the same.
- Things to try:
 - Weight reduction
 - Positional sleep (side-sleeping with positioner)
 - Watch alcohol use prior to bedtime
 - Manage acid reflux
- If there are signs of sleep apnea: get tested!
- Sleep apnea treatment starts with positive pressure, & other options exist if that doesn't work.