

Sleep Apnea in Children and Adolescents with Down Syndrome

Cami Matthews, MD, Associate Professor
Pediatric Pulmonology and Sleep Medicine
Department of Pediatrics
March 16, 2024

Objectives

- Review the factors that predispose people with Down syndrome to obstructive sleep apnea
- Discuss the impact of untreated obstructive sleep apnea on health
- Explain how evaluation of obstructive sleep apnea can occur
- Identify some treatment options for obstructive sleep apnea

What is Sleep Apnea?

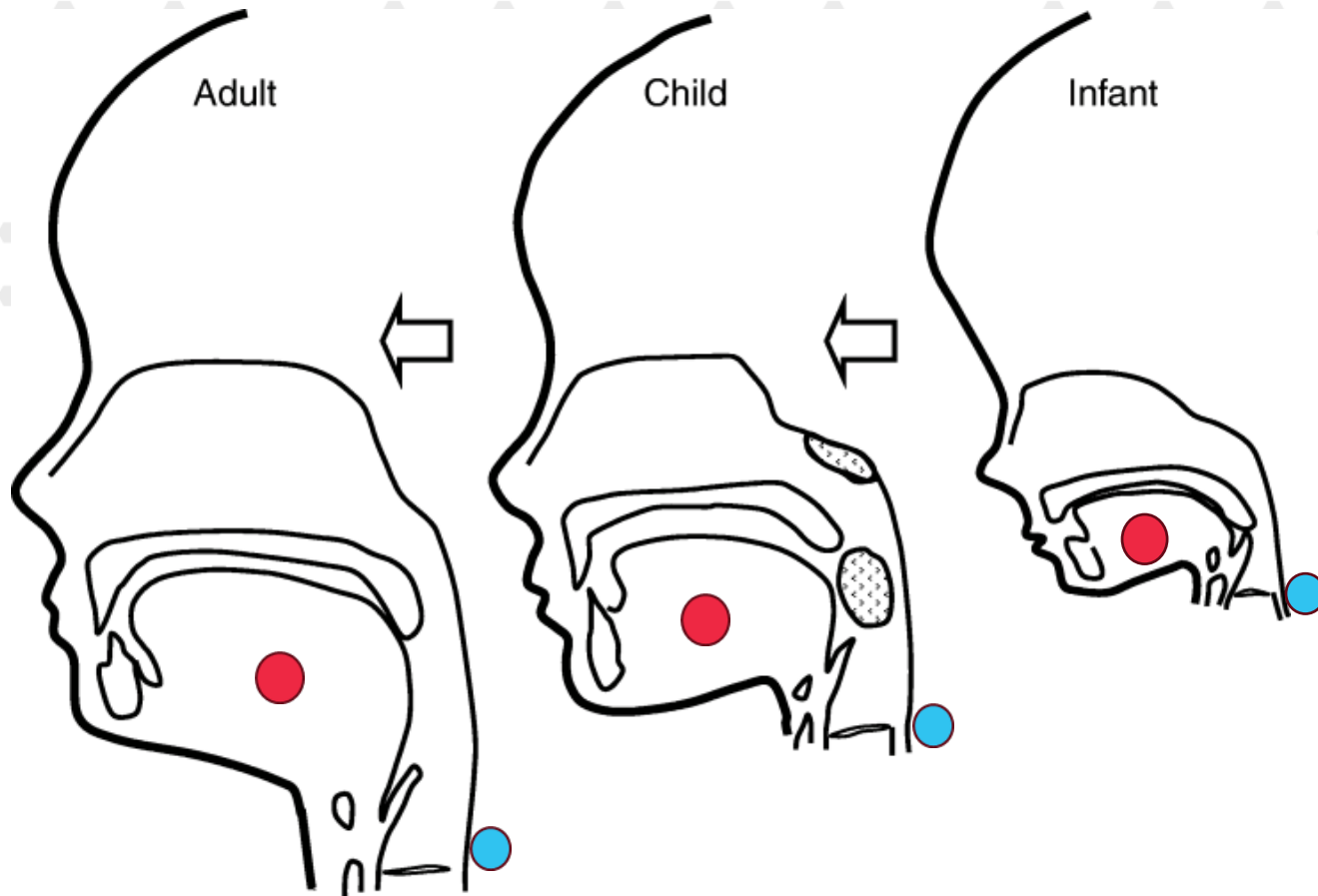
- A change in breathing when sleeping – pause or partially blocked breathing
 - >10 seconds in Adults
 - >2 respiratory cycles in children
- Obstructive Sleep Apnea
 - Breathing is blocked by an “obstruction” of the upper airway while the chest and abdominal muscles keep attempting to breathe
- “Central” Sleep Apnea
 - Brain does not signal the chest and abdomen to breathe
- Hypopnea
 - Reduction in Breathing by 50% that is accompanied by a decrease in oxygen

Why would children with Down Syndrome be at risk for obstructive sleep apnea?

- Smaller midfaces
- Smaller jaw and smaller hard palate/ roof of mouth
 - “relatively” large tongues relative to the size of their mouth
- Decreased pharyngeal muscle tone (Schott, 2004)
 - The pharynx (throat) is made of a collection of muscles
 - The tone of the pharynx maintains its shape
- Frequent nasal and sinus congestion
 - Smaller nasal passageways
 - Immunologic deficiencies

Why would children with Down Syndrome be at risk for obstructive sleep apnea?

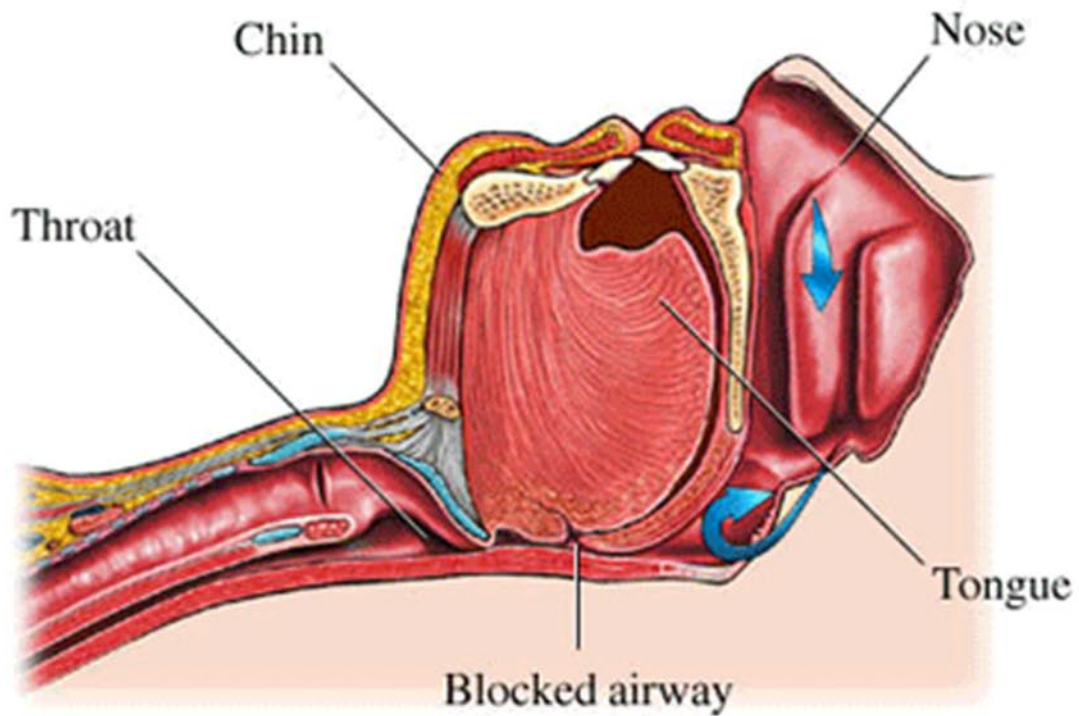
- Dysphagia, reflux
- Other airway anomalies
- Lower muscle tone / hypotonia
- Different ages have different risks as well



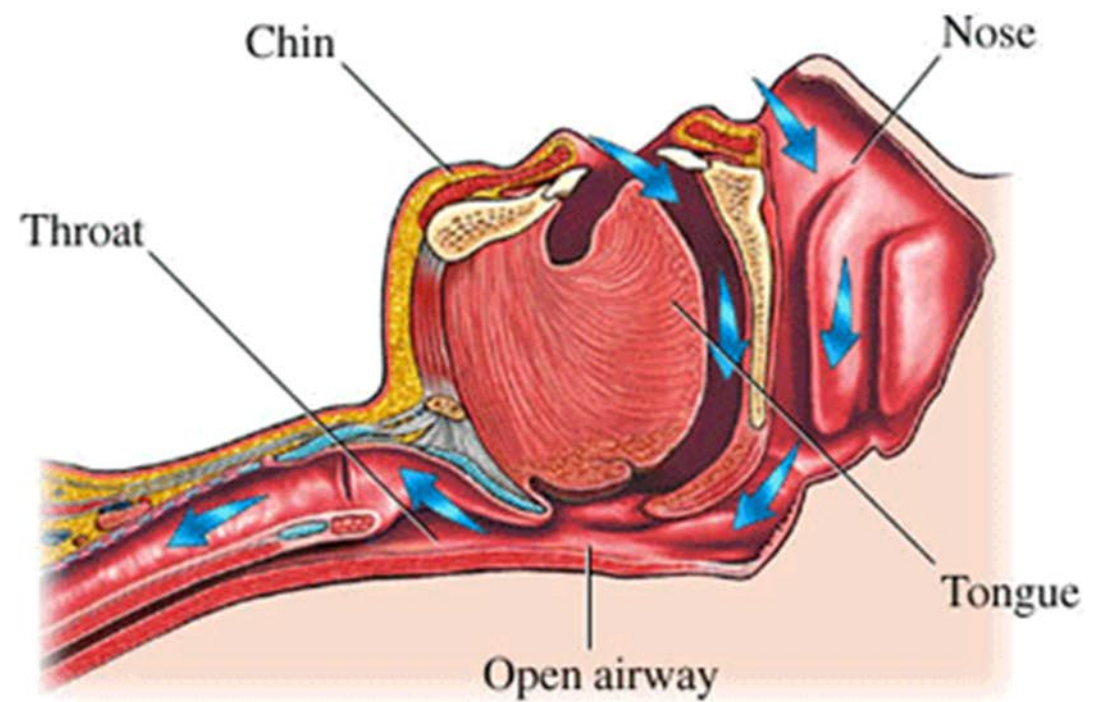
Developmental changes in craniofacial structures from infancy to adulthood are illustrated.

Contributing factors:

- Maxillo-mandibular growth (mid face)
- Laryngeal descent (location of the vocal cords)
- Changes in size of adenoids and tonsils



Blocked airway



Open airway

Why would children with Down Syndrome be at risk for central apnea?

- Repeated episodes of obstructive sleep apnea can precipitate episodes of central apnea
- Children with Down Syndrome have a decreased neuronal sympathetic response (O'Driscoll, 2012)
 - They do not increase their heart rate and wake up as well as other children who have obstructive sleep apnea
 - This could prolong the decrease in oxygen levels with sleep apnea

What's the impact of sleep apnea on health of children with Down syndrome?

- Increased incidence of Pulmonary hypertension (Loughlin, 1981)
- Decreased Verbal IQ scores and cognitive flexibility in DS children with sleep apnea. (Breslin, 2014)
- Impaired executive function in children with DS and sleep apnea. (Chen, 2013)
- Increased incidence of depression in adolescents with DS and sleep apnea. (Capone, 2013)
- Hypertension, sleepiness / irritability, weight challenges

How common is sleep apnea in children with Down Syndrome?

- Studies have shown anywhere between 60-100% of children with Down Syndrome having Sleep Apnea!
- Nearly 80% of children with Down Syndrome have evidence of sleep apnea by 4 years of age. (Schott, 2006)
- Obstructive sleep apnea can be found in up to 50% of asymptomatic patients

What are the symptoms of Sleep Apnea?

- Snoring/Heavy breathing
 - 54% of DS children with no reported symptoms demonstrated sleep apnea on a sleep study. (Schott, 2006)
- Restless sleep/frequent awakenings
- Daytime sleepiness/excessive napping
- Sleeping sitting up
- Sleeping with neck extended
- Sleeping bent forward at the waist in sitting position
- Irritability
- Poor attention
- Poor concentration

Evaluation for Sleep Apnea

- “Sleep study” – diagnostic polysomnogram
 - What is it?
 - Monitors heart rate, oxygen level, carbon dioxide level, videotaping, EEG (brain waves), position, breathing effort, air flow
- Where does it happen?
 - Overnight in a sleep center
 - Ideally, a place that routinely works with children
 - Parent or caregiver stays overnight too



Evaluation for Sleep Apnea

- When?
 - Before the age of 4
 - Anytime...
- What if my child can't tolerate it?
 - Meeting with a sleep specialist before to discuss desensitization
- What are other options? (Stores, 2014)
 - Videotaping at home
 - Overnight pulse oximetry in home
 - Clinical history



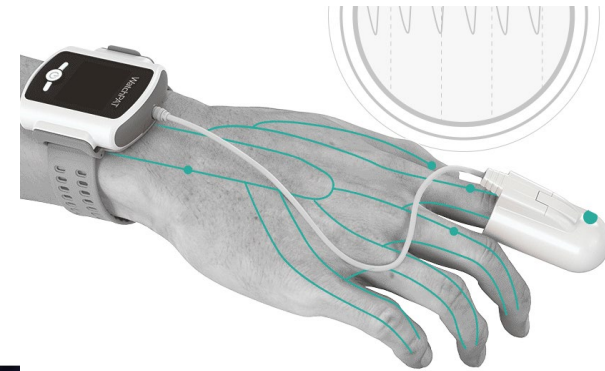
Evaluation for Sleep Apnea

- What about a Home Sleep study?
 - Challenges – keeping the equipment on, doesn't detect mild obstructive sleep apnea
 - Examples – Compass device versus Watch Pat
 - Compass Device – has a nasal monitor and pulse oximeter that comes off easily
 - Watch Pat – only FDA approved for 12 and older and 65 pounds
 - To qualify for CPAP need to do a “sleep study”
 - An overnight pulse oximeter does not qualify for CPAP

Compass



Watch Pat

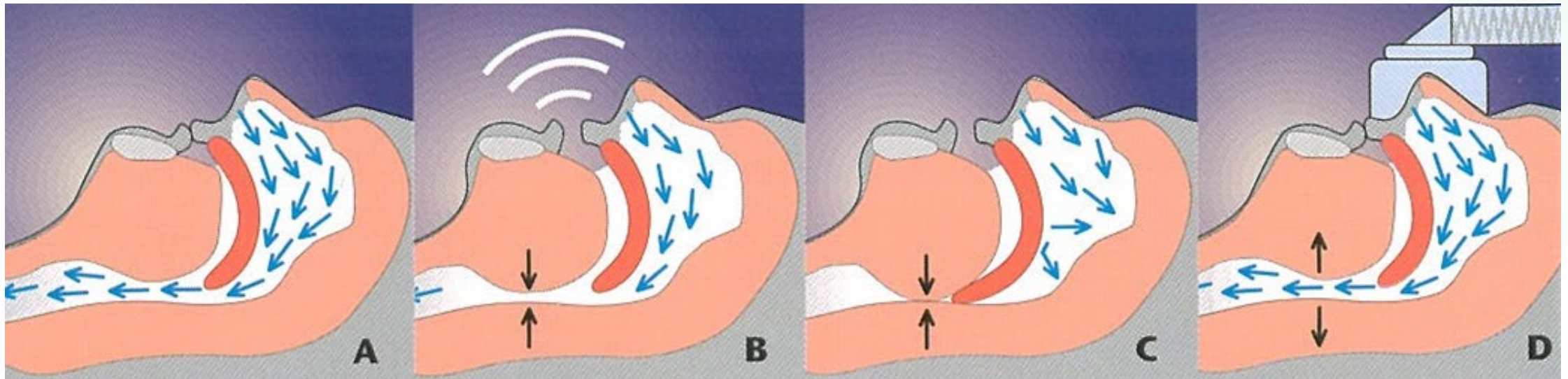


Treatment for Sleep Apnea

- Surgery
 - Adenotonsillectomy – removal of tonsils and adenoids
 - Curative in about 50-70% of cases in children with Down syndrome (Shete, 2010)
 - Lingual tonsillectomy – removal of lingual tonsils at the base of tongue
 - Other options...
- Medications
 - GERD / heart burn / trouble swallowing
 - Allergic rhinitis
 - Asthma
- Orthodontics – rapid maxillary expansion
- Weight management
- Reassessment is important

CPAP – continuous positive airway pressure

- How does it work?
- If you or your child start on CPAP, is it “forever”?



Normal
breathing

Snoring

Obstructive sleep
apnea

CPAP



Like Father Like Son



Process of getting used to CPAP

- Everyone is unique (Chen, 2013; DiFeo, 2012)
- Explain “why” to use it – health and mood benefits
- Explain “how” to use it
- Help it to feel comfortable
 - Practice even during the day
 - Getting the right fit
 - Falling asleep
 - Staying asleep
- Incentives / Rewards

CPAP Tips for Kids

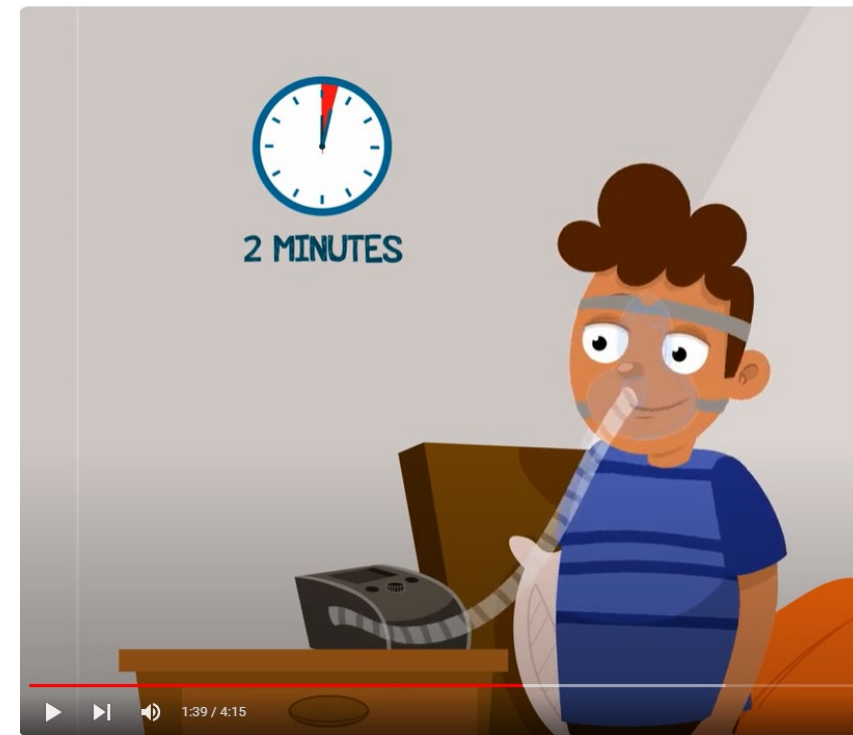
AASIM American Academy of
SLEEP MEDICINE™

Play (k)

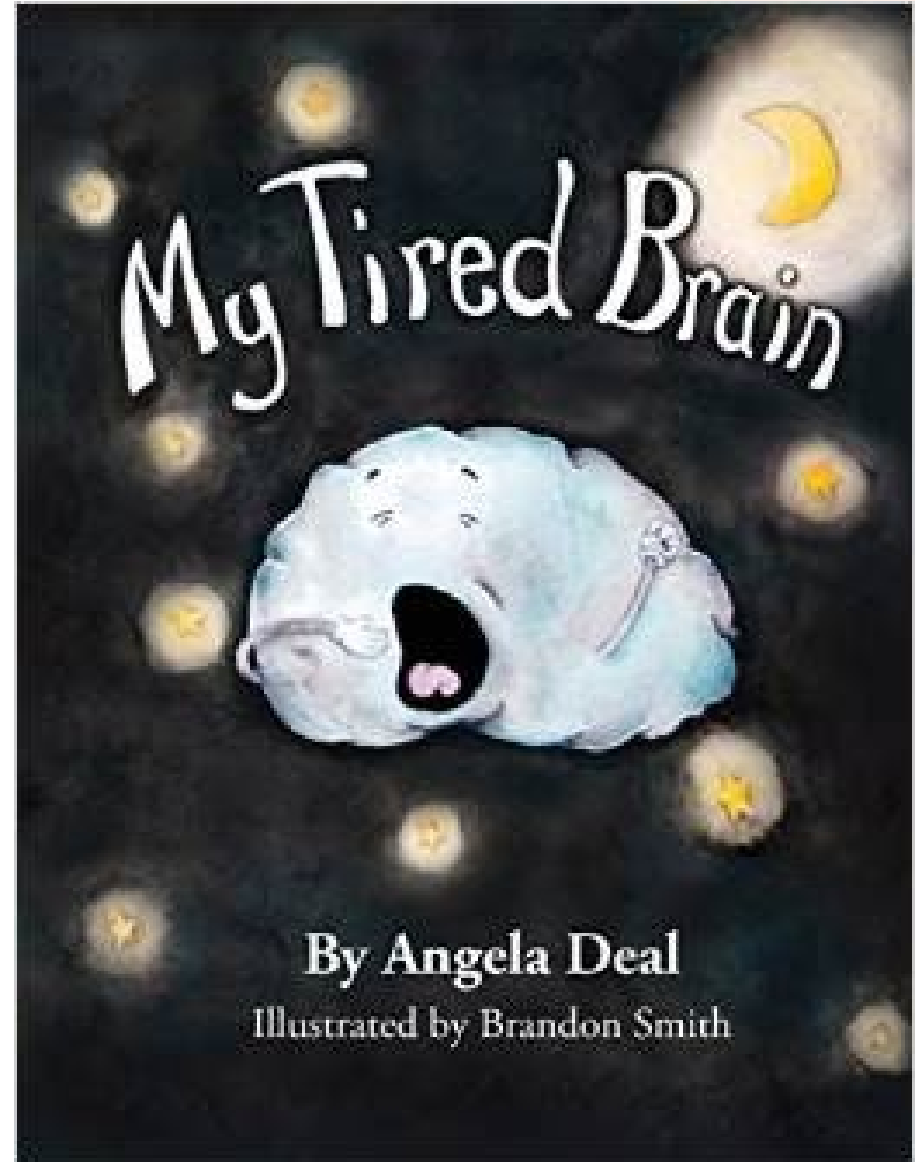
0:01 / 4:15



CPAP Tips for Kids



CPAP Tips for Kids



Summary

- Sleep apnea is very common in infants, children and teens with Down syndrome
- Sleep apnea affects the heart, lungs, brain of people which then affects IQ, mood, attention
- Many factors effect sleep apnea and thus, different treatment options exist
- Talk to your doctor or your child's doctor about your concerns for sleep apnea and how to get tested and treated

Questions?