pdate in Internal edicine 2026

urday, May 2 • 8 a.m. – 4 p.m.

outhwestern Medical Center, T. Boone Pickens Medical Education & Conference Cent

odates in Sleep Medicine

e Tran, MD

stant Professor

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Medical C

sclosures

None

bjectives

- Review OSA diagnosis and Discuss New OSA Treatment Options
- Review New CSA Guidelines with New Treatment Options
- Review Updated RLS Guidelines with New Treatment Options

bstructive Sleep Apnea

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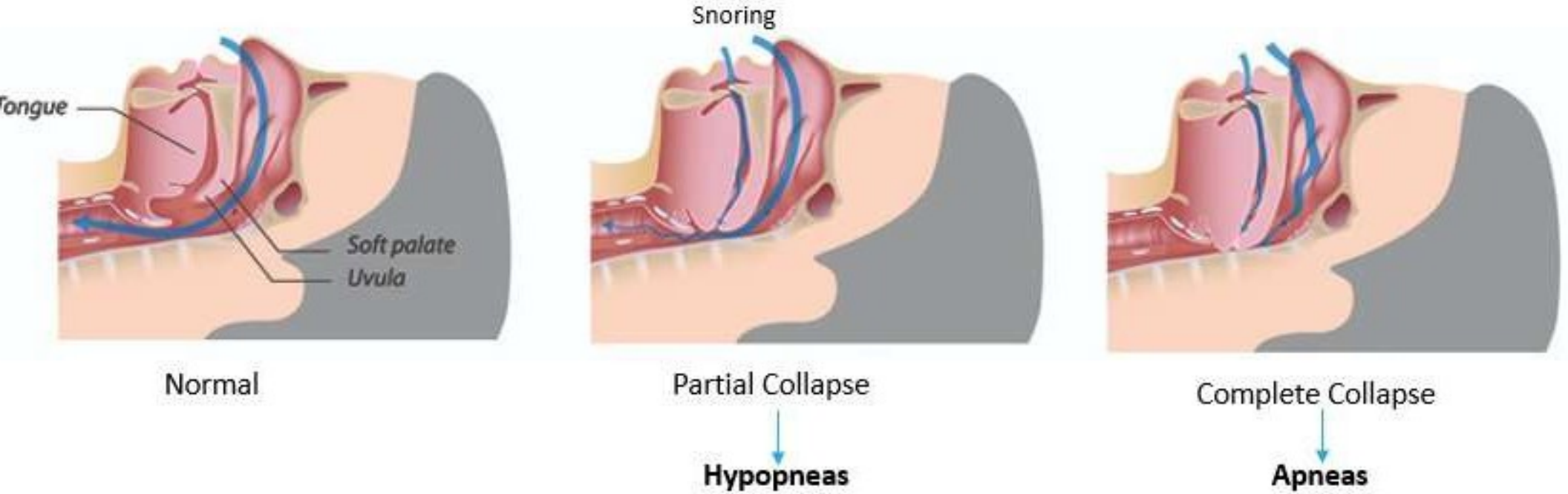
bstructive Sleep Apnea



inical Presentation

Typical symptoms

- Snoring
- Witnessed apneas
- Excessive daytime sleepiness
- Nocturnal gasping/choking
- Morning headaches
- Nocturia
- Poor focus/concentration

- Atypical symptoms are more common in women
  - Nonrestorative sleep
  - Fatigue (not sleepiness)
  - Insomnia
  - Mood complaints

pworth Sleepiness Scale

How likely are you to doze off in the following situations?	No Chance	Slight Chance	Moderate Chance	High Chance
Sitting and reading	○ 0	○ 1	○ 2	○ 3
Watching television	○ 0	○ 1	○ 2	○ 3
Sitting inactive, in a public space	○ 0	○ 1	○ 2	○ 3
Lying down to rest in the afternoon when circumstances permit	○ 0	○ 1	○ 2	○ 3
Sitting and talking to someone	○ 0	○ 1	○ 2	○ 3
Sitting quietly after a lunch without alcohol	○ 0	○ 1	○ 2	○ 3
As a passenger in a car for an hour without a break	○ 0	○ 1	○ 2	○ 3
In a car, while stopped for a few minutes in traffic	○ 0	○ 1	○ 2	○ 3
			TOTAL SCORE:	

Score of ≥10 = sleepy

Johns MW. The Epworth Sleepiness Scal

sk Factors

- Age >50yrs
- Male > female (until postmenopausal)
- Facial anatomy
- Large neck circumference
- Obesity

TOP-BANG Risk Stratification

OP-Bang Questionnaire

se answer the following questions by checking "yes" or "no" for each one

ing (Do you snore loudly?)

dness (Do you often feel tired, fatigued, or sleepy during the daytime?)

erved Apnea (Has anyone observed that you stop breathing, or choke or gasp during your sleep?)

Blood **P**ressure (Do you have or are you being treated for high blood pressure?)

(Is your body mass index more than 35 kg per m^2?)

(Are you older than 50 years?)

k Circumference (Is your neck circumference greater than 40 cm [15.75 inches]?)

der (Are you male?)

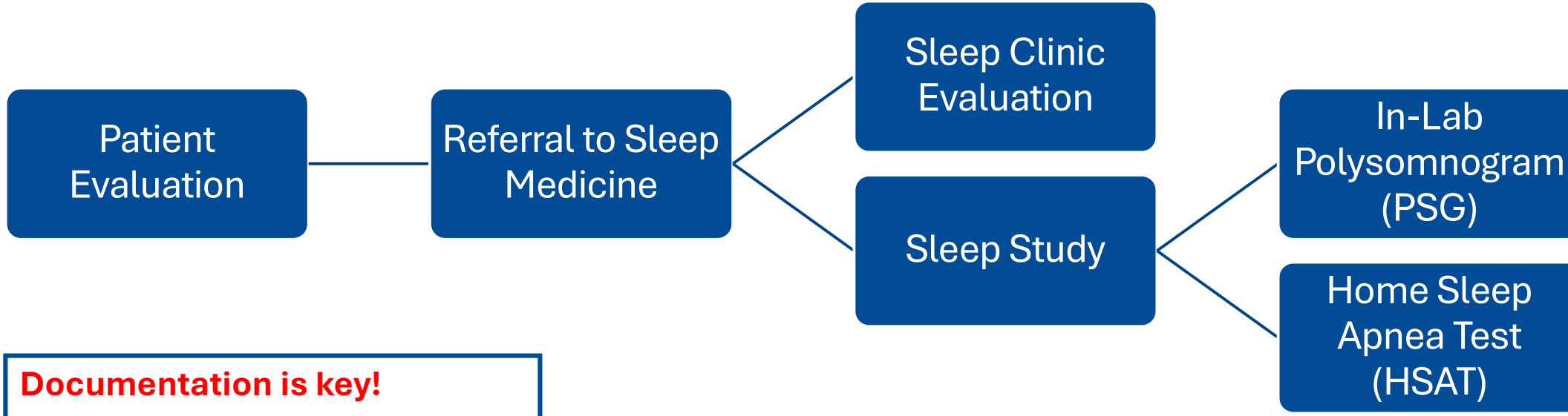
e 1 point for each positive response.

ng interpretation: 0 to 2 = low risk, 3 or 4 = intermediate risk, ≥ 5 = high risk.

Score of ≥3 has >
sensitivity to de
moderate to sever

Chung F et al. STOP questionnaire. Anesthesiology. 2

eferral Process

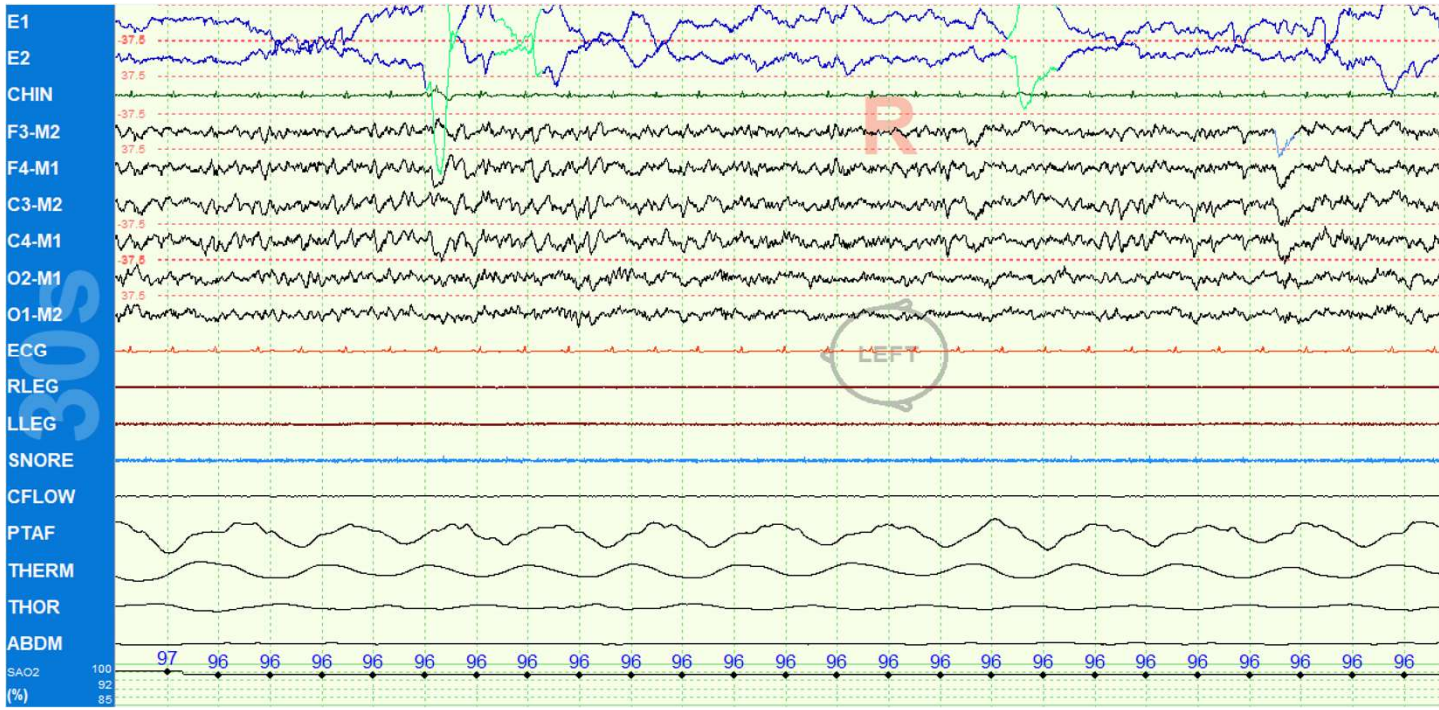


Documentation is key!

- **Symptoms (+ESS)**
- **Risk factors (+STOPBANG)**
- **Comorbidities (O2 use?)**
- **Reason for referral**

olysomnogram (PSG)

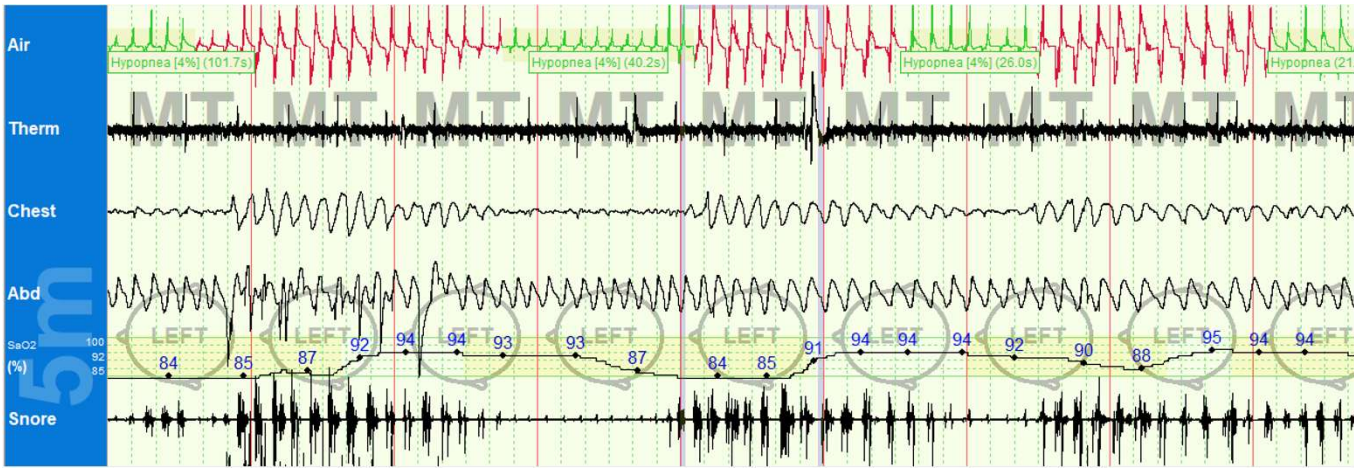
- Limited EEG
- Single lead EKG
- Limb leads
- Respiratory channels
- Oximetry
- Effort belts
- +/- CO2 monitoring



ome Sleep Apnea Test (HSAT)

Avoid in patients with the following significant comorbidities

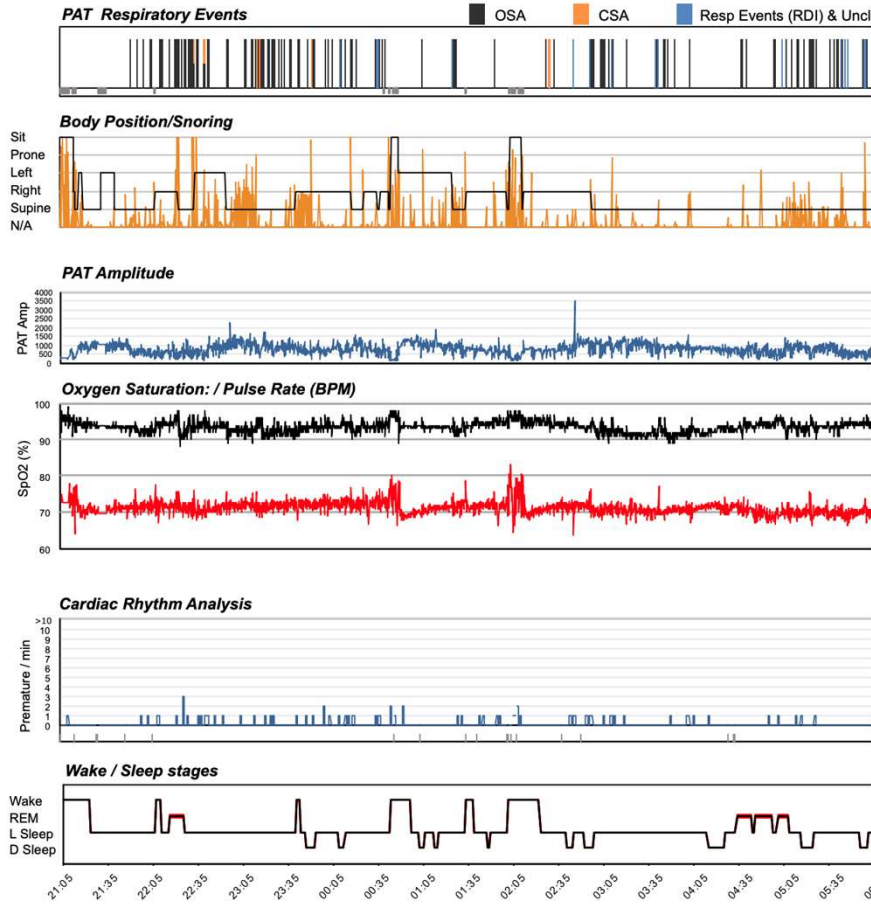
- Severe COPD
- Home O2 use
- Severe CHF
- Hypoventilation
- Central sleep apnea



SAT with Peripheral Arterial Tonometry (PAT)

PAT can estimate sleep time and different sleep stages

Other monitors include actigraphy, body position sensor and oximetry



agnosing OSA: Apnea-Hypopnea Index (AHI)

$$\text{AHI} = \frac{\text{(total \# of apneas and hypopneas)}}{\text{(total } \mathbf{SLEEP} \text{ time in hours)}}$$

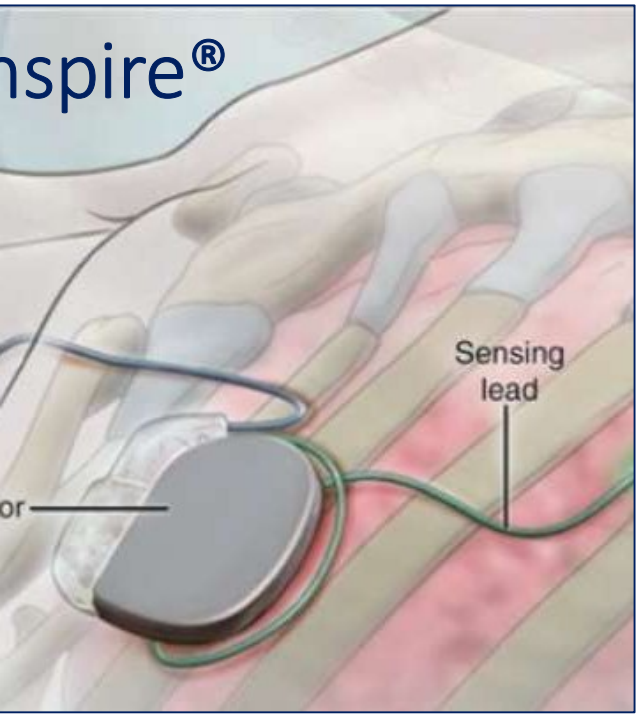
AHI	Severity
<5	No OSA
5-14	Mild OSA
15-29	Moderate OSA
≥30	Severe OSA

eatment Options for OSA

- Continuous Positive Airway Pressure (CPAP)
- Mandibular Advancement Device (MAD)
- Hypoglossal Nerve Stimulator (HGNS)
- Other Surgical Options
- ntraoral Neuromuscular Stimulation (NMES)
- Weight Loss Therapy
- New Medications?

ypoglossal Nerve Stimulation (HGNS) Therapy

ilateral Stimulation



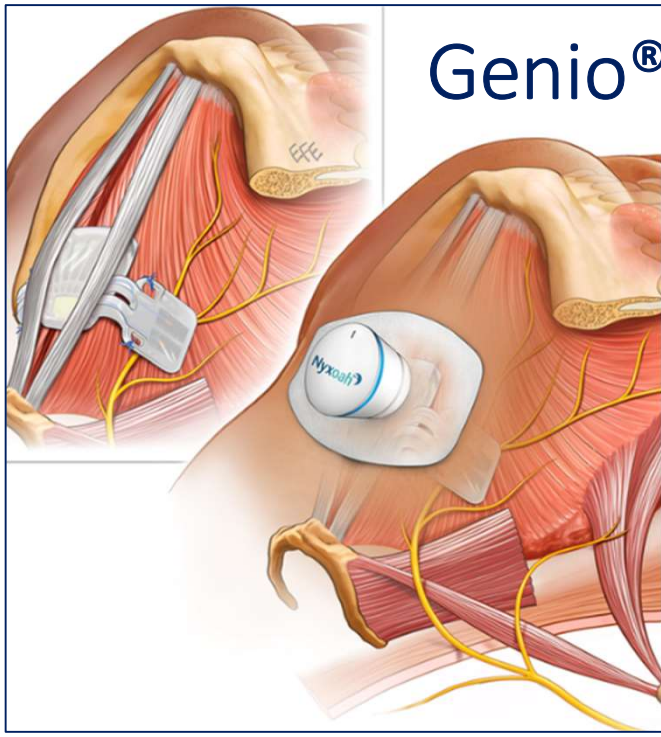
ric collapse is a contraindication

Same Qualifying Criteria

- AHI 15 – 65*
- Centra apneas <25%
- BMI <32*
- Failed CPAP

*based on insurance

Bilateral Stimulati



Concentric collapse is **NOT** contrain

ypoglossal Nerve Stimulation (HGNS) Therapy

Unilateral Stimulation

- FDA approved since 2014
- nternal battery exchanged every 11 years
- Remote operated
- More focus on tongue protrusion

Bilateral Stimulation

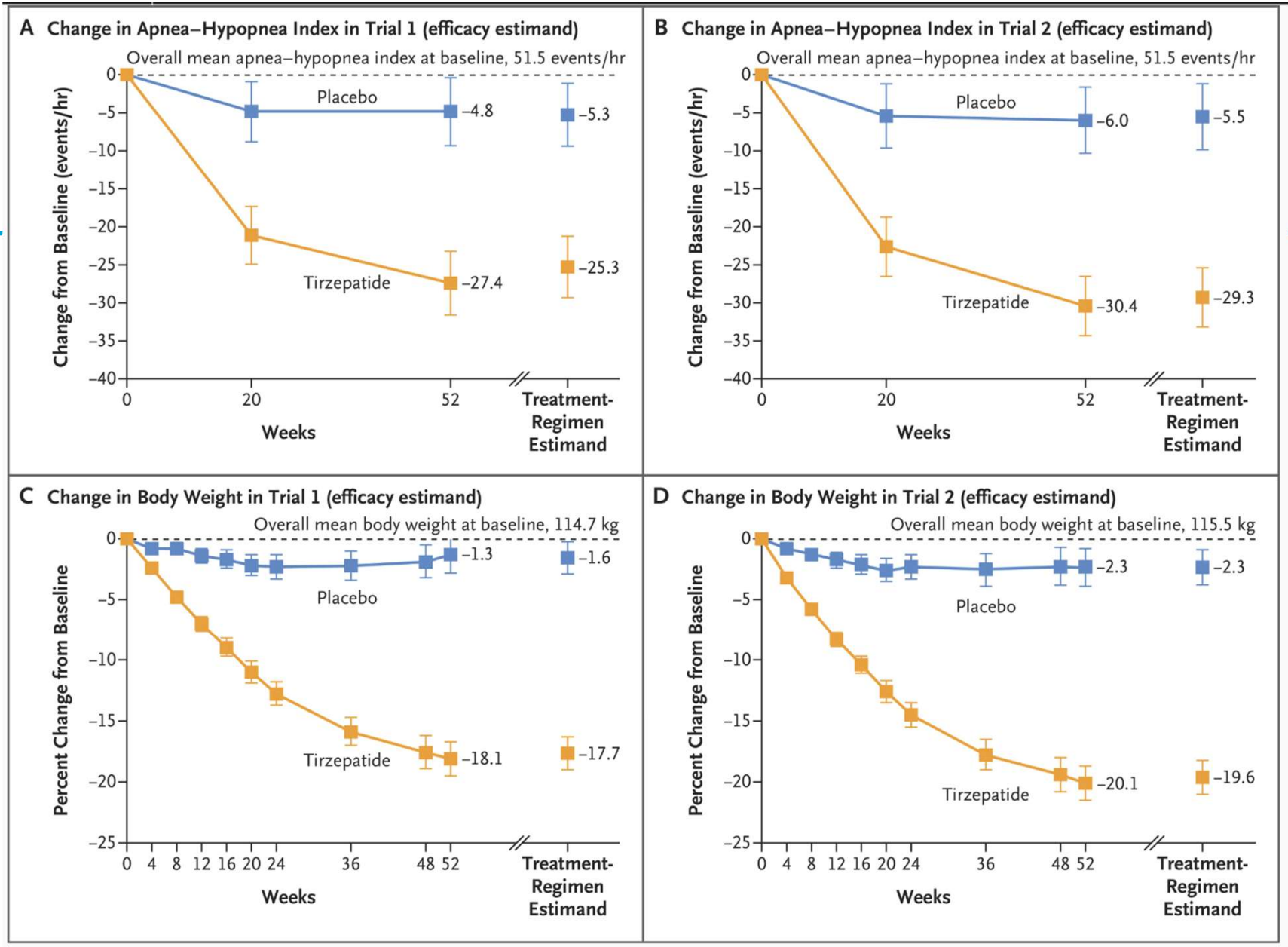
- FDA approved since 2025, b available in Europe since 20
- External battery
- Phone app operated
- More focus on base of tongu depression

rzepatide (Zepbound)

First FDA-approved medication for the treatment of moderate-to-
severe OSA (AHI ≥15) in adults with obesity (BMI ≥30)

SURMOUNT-OSA Trial

- Decrease AHI by ~50%
- Decrease in body weight by ~18%


A Change in Apnea–Hypopnea Index in Trial 1 (efficacy estimand)
Overall mean apnea–hypopnea index at baseline, 51.5 events/hr
Change from Baseline (events/hr)
Placebo
−4.8
−5.3
Tirzepatide
−27.4
−25.3
Weeks
Treatment-Regimen Estimand
B Change in Apnea–Hypopnea Index in Trial 2 (efficacy estimand)
Overall mean apnea–hypopnea index at baseline, 51.5 events/hr
Change from Baseline (events/hr)
Placebo
−6.0
−5.5
Tirzepatide
−30.4
−29.3
Weeks
Treatment-Regimen Estimand
C Change in Body Weight in Trial 1 (efficacy estimand)
Overall mean body weight at baseline, 114.7 kg
Percent Change from Baseline
Placebo
−1.3
−1.6
Tirzepatide
−18.1
−17.7
Weeks
Treatment-Regimen Estimand
D Change in Body Weight in Trial 2 (efficacy estimand)
Overall mean body weight at baseline, 115.5 kg
Percent Change from Baseline
Placebo
−2.3
−2.3
Tirzepatide
−20.1
−19.6
Weeks
Treatment-Regimen Estimand

Malholtra e

rzepatide (Zepbound)

- FDA approved since Dec 2024, but insurance coverage may still be difficult
- Out of pocket expense may run $300-$500
- Sleep study within the past year
- How does coverage look after weight loss?
- Oral GLP-1 meds are not indicated for treatment of OSA

rst Oral Medication for OSA?

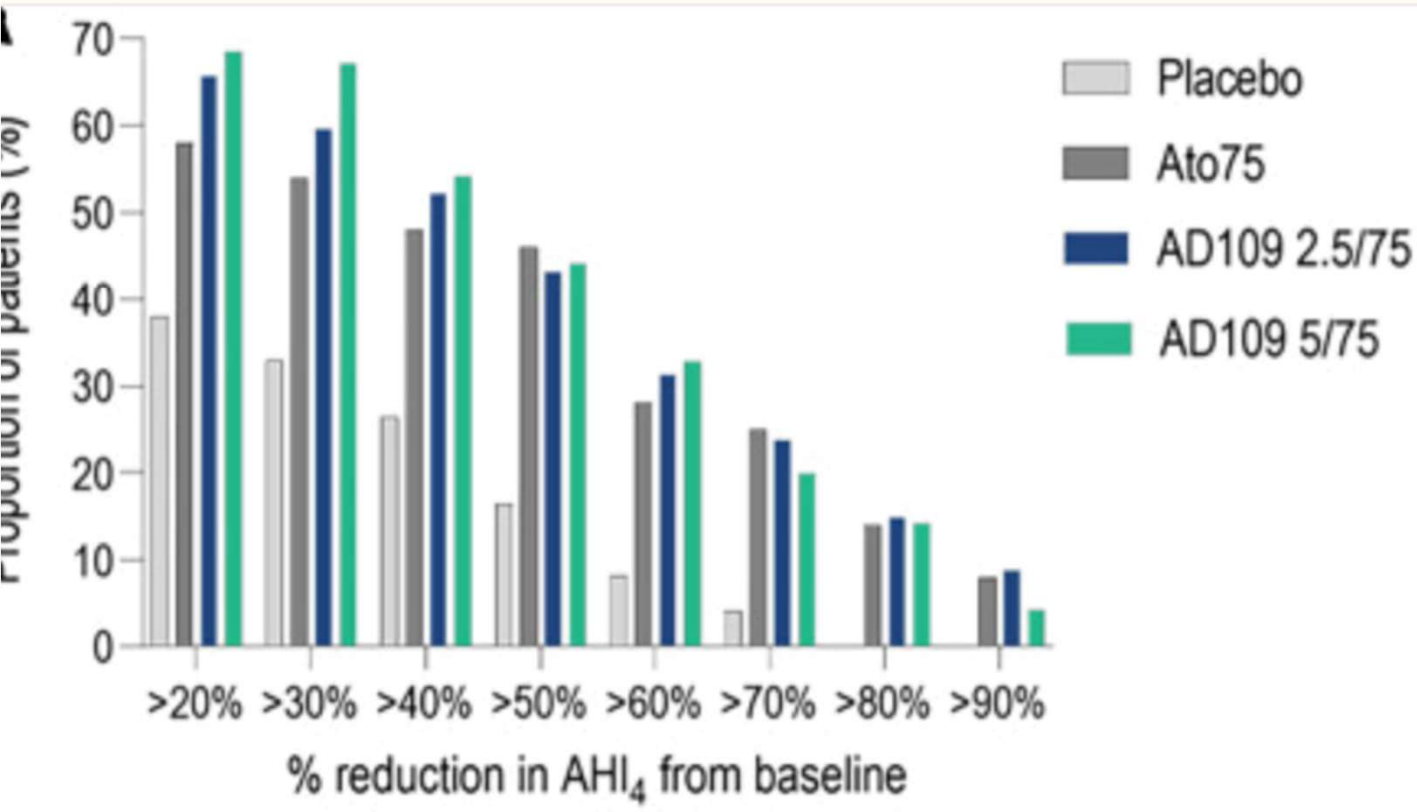
Combination pill of Aroxybutynin and Atomoxetine (AD109)

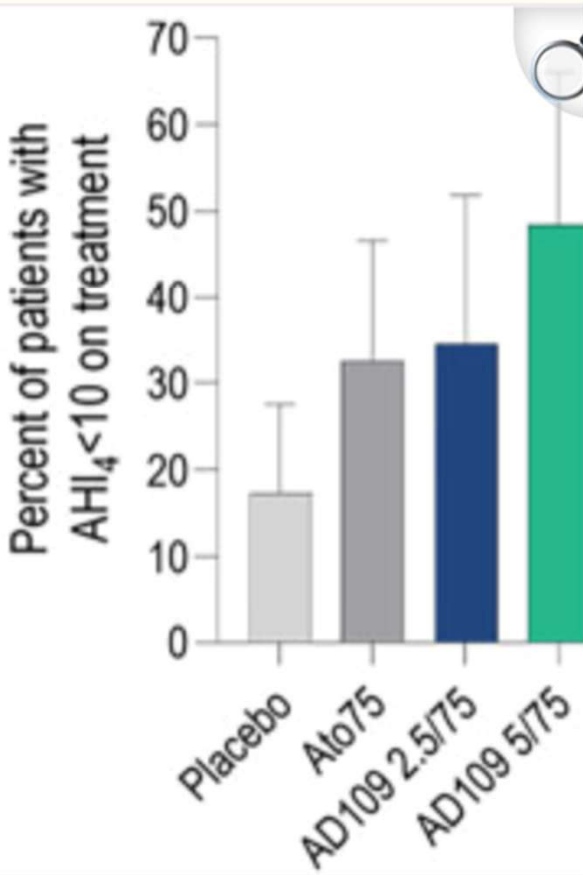
- Increase activity of upper airway dilator muscles

MARIPOSA trial

- Reduction in AHI by 45% in mild-moderate OSA
- Mean HR slightly increased
- Most common side effects – dry mouth, insomnia, urinary hesitancy

ARIPOSA Trial Results





traoral Neuromuscular Electrical Stimulator (NMES)

- FDA authorized since 2021
- Mild OSA (AHI <15) and snoring in adults
- Daytime use – 20min daily for 6 weeks then a couple of times a week for maintenance
- Retrains upper airway and tongue to reduce collapse

entral Sleep Apnea

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entral Sleep Apnea

Absence/reduction in effort with corresponding change in airflow

Not a single disorder, but represents central breathing instability i
various clinical conditions (i.e CHF, OSA, opioids)

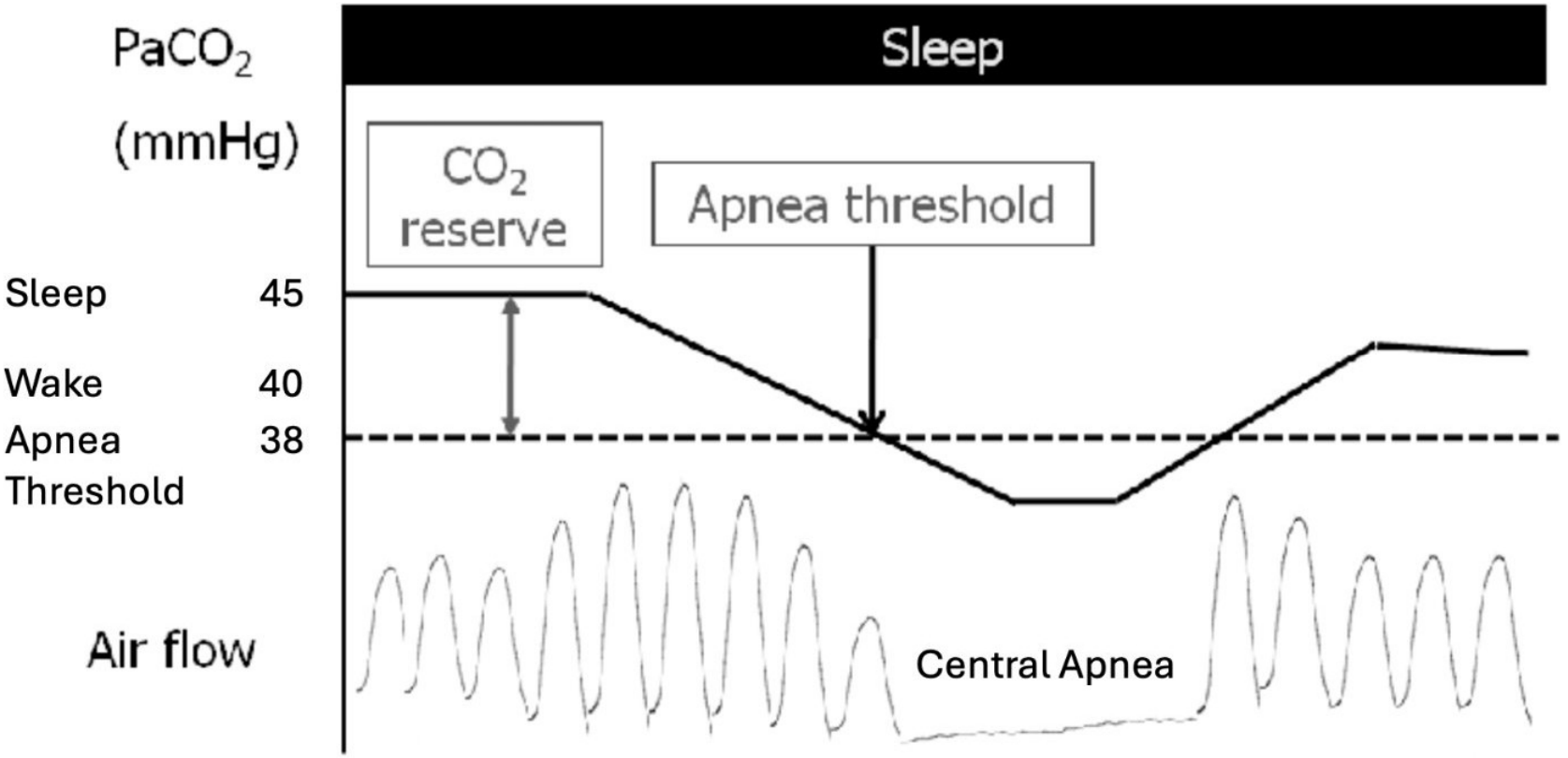
Pathogenesis vary depending on underlying condition, but
majority is a posthyperventilation phenomenon

ffect of Sleep on Ventilatory Control

	WAKEFULNESS	NREM	REM
kefulness Drive	Present	Absent	Absent
emoreceptors/ ntilatory Drive	Intact	Reduced	Reduced more
per Airway sistance	Normal	Increased	Increased/Varia
neic Threshold (AT)	Not present	Present	Not present

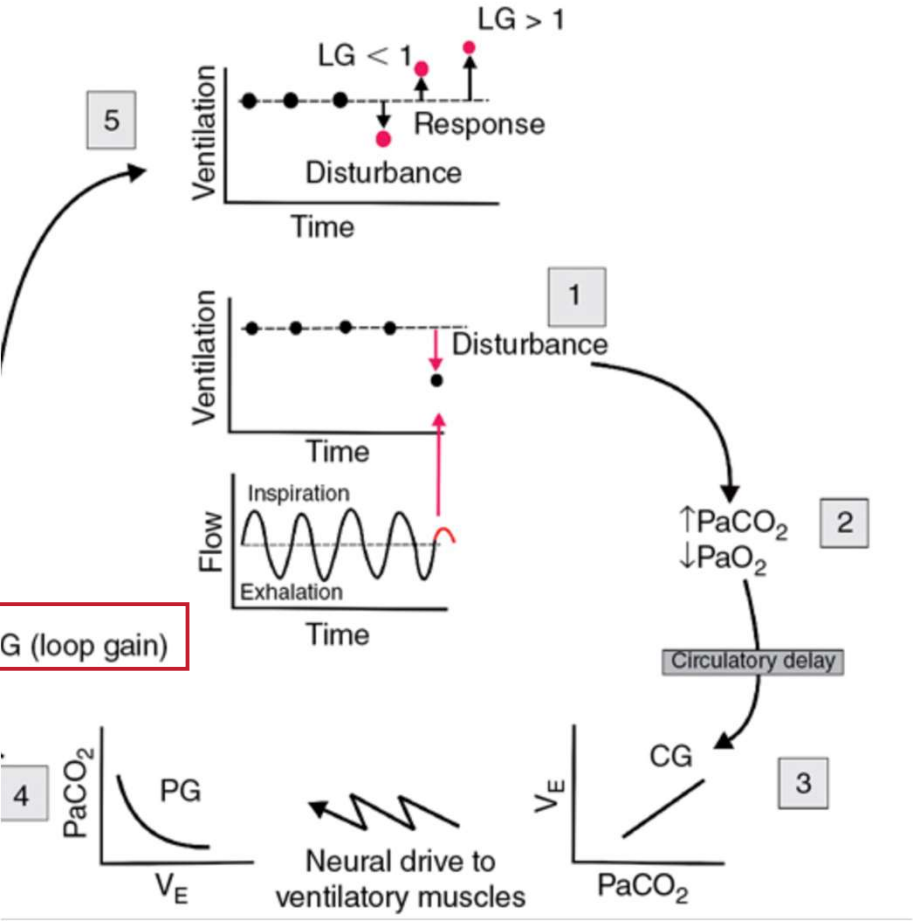
Adapted from Berry, Richard, B. et al. *Fundamentals of Sleep Medicine*. (2nd Editio

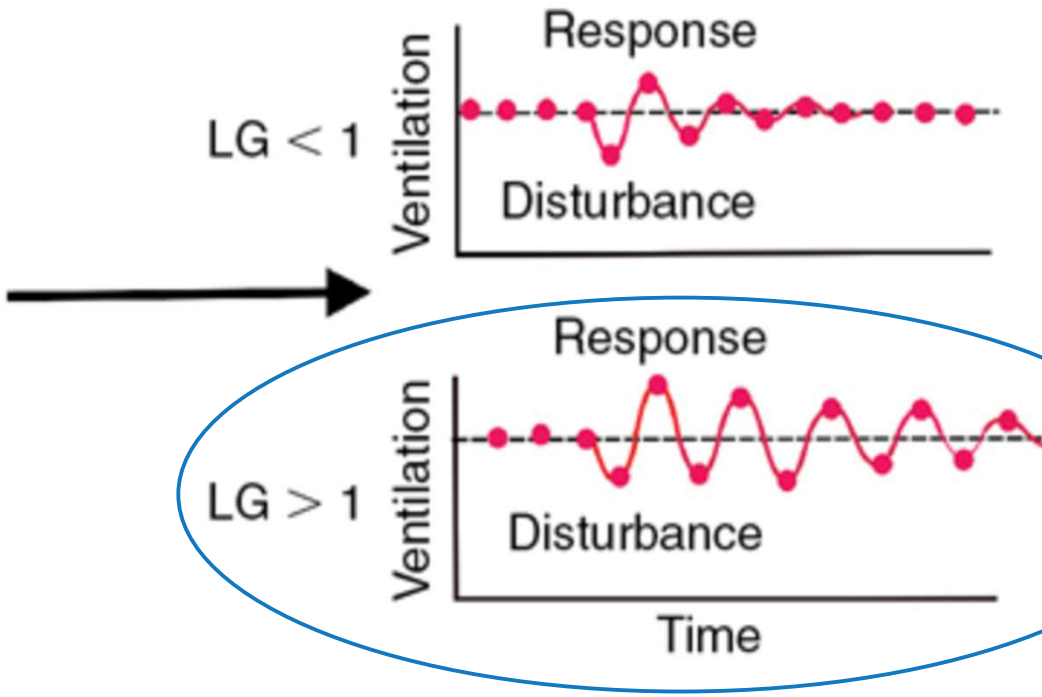
SA Pathophysiology



J Korean Sleep Res

SA Pathophysiology





High Loop Gain = More Instab

Deacon-Diaz N, Malhotra A. Inherent vs. induced loop gain abnormalities in obstructive sleep apnea. Fro

SA Classifications

- Primary (Idiopathic)
- CSA with Cheyne-Stokes respiration (CSR)
  - Typically due to underlying CHF
- CSA due to medication or substance use
- CSA due to medication condition without CSR
- Treatment-Emergent CSA
- CSA due to high altitude

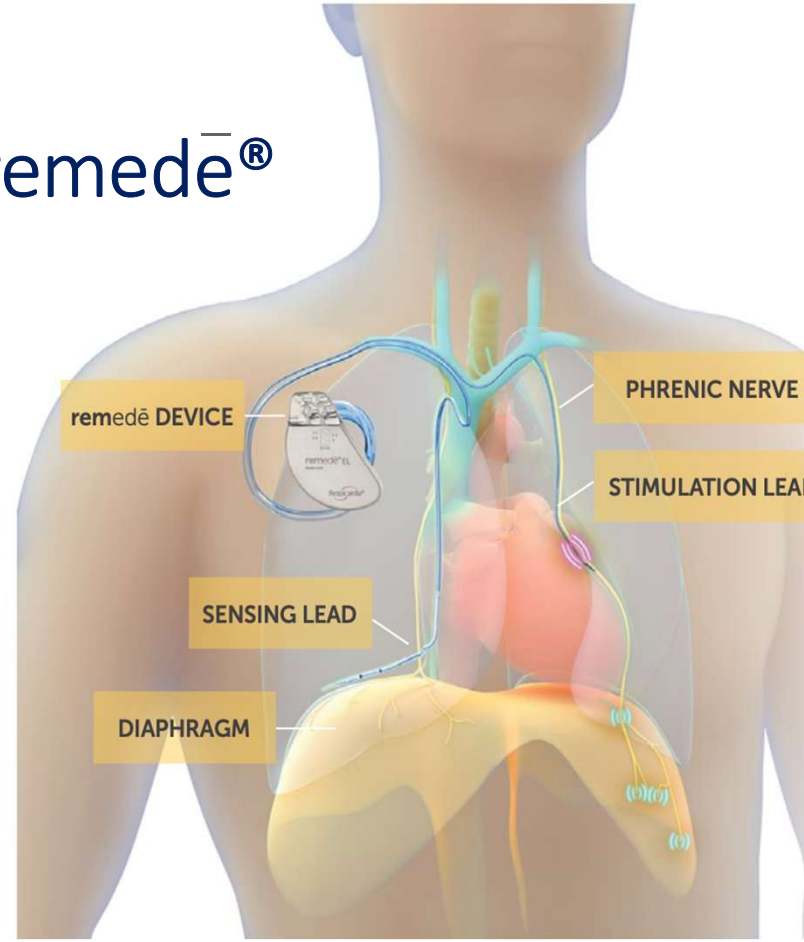
SA Treatment Options

- CPAP
- BiPAP with back up rate
- Adaptive-seroventilation (ASV)
- Low-flow O2
- Acetazolamide
- Transvenous phrenic nerve stimulation (TPNS) - NEW

ransvenous Phrenic Nerve Stimulation

- Moderate to severe CSA
  - Primary CSA
  - CSA due to CHF
- Works automatically and continuously at night
- Pivotal trial in 2016
  - 51% had a 50% reduction in AHI
  - Average reduction of 23.9 events/hr

remedē®



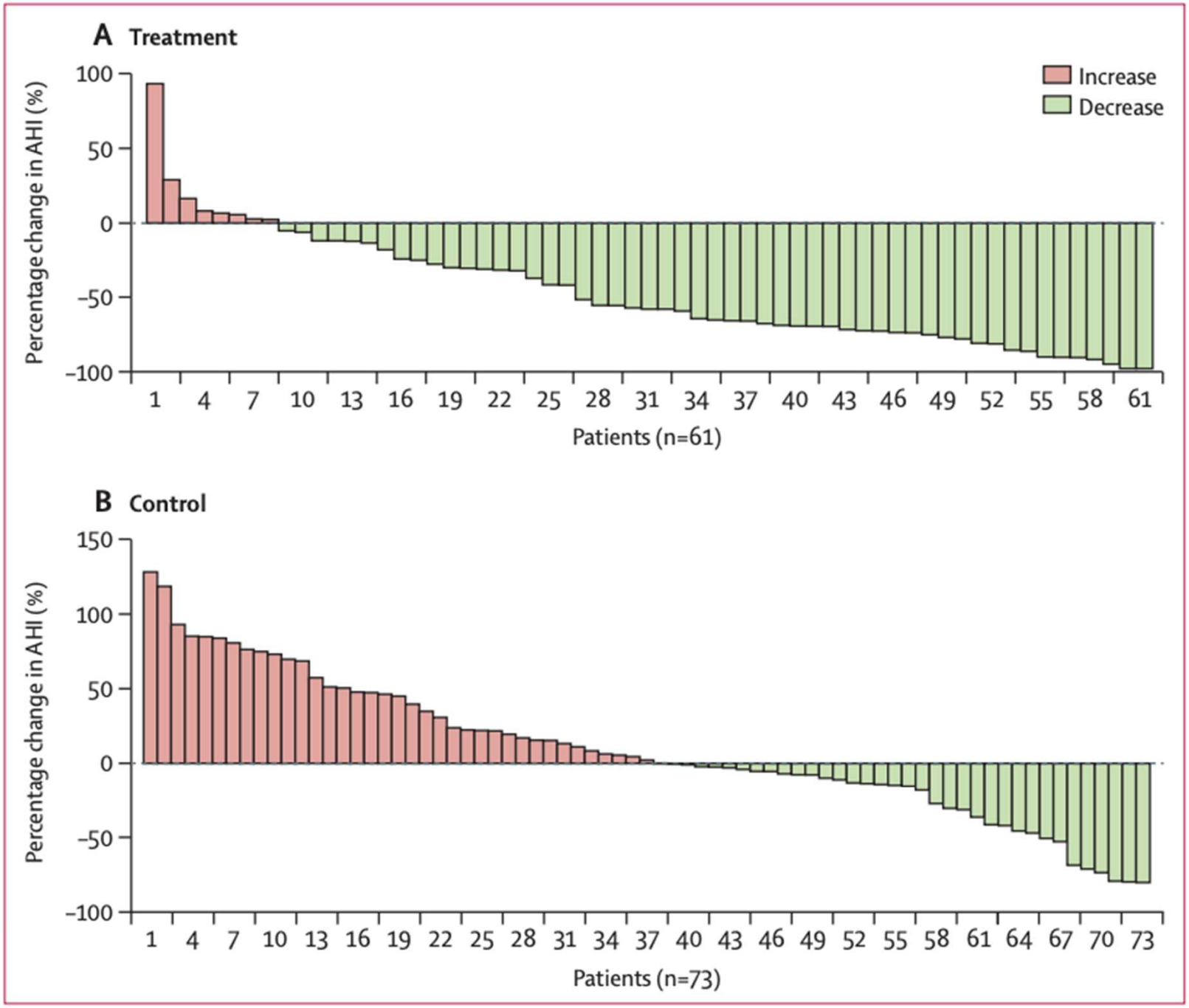


***Figure 2*: Percentage change in AHI at 6 months' follow-up compared with baseline**

Costanza et

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estless Legs Syndrome

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estless Legs Syndrome (RLS) - Clinical Diagnosis

U	Urge to move legs accompanied by or thought to be caused by uncomfortable and unpleasant sensations
R	Rest makes it worse
G	Gets better with movement
E	Evening or nighttime symptoms are worse
D	Differential diagnosis does not explain symptoms

atient Description of RLS

Creepy-crawly	Ants crawling	Jittery	Worms moving
Shock-like feelings	Weird	Unsettled	Throbbing
Grabbing sensation	Itching bones	Crazy legs	Just need to move

ommon Etiologies of RLS

Brain Iron Deficiency (ferritin)

- Pregnancy
- Kidney disease

Medication-Induced

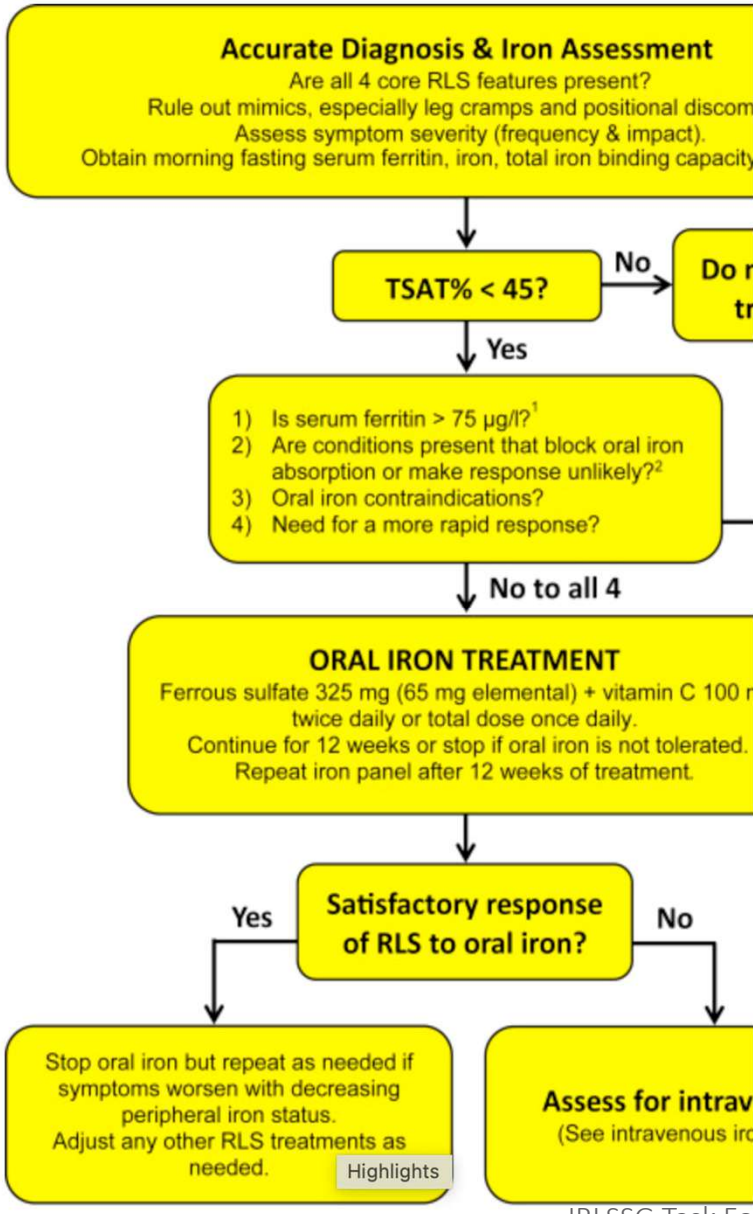
- Antidepressants
- Dopamine antagonists
- Antihistamines (centrally acting H1)
- Caffeine

LS Treatment Options

- Pharmacotherapy
  - Iron supplementation
  - Gabapentinoids
  - Dopaminergics
  - Low-dose opioids
- Non-Pharmacotherapy
  - Peroneal nerve stimulation - NE
  - Behavioral modification

on Supplementation

- Obtain fasting Fe, Ferritin, TIBC, Tsat
- Do not replete for Tsat >45%
- Start ferrous sulfate 325mg + Vitamin C BID or daily as tolerated for ferritin <75 and Tsat <45%
- Consider IV Fe for ferritin <100 and Tsat <45% and/or po intolerant



IRLSSG Task Fo

ABAPENTINOIDS

First line therapy for chronic, persistent RLS

Gabapentin (Neurontin)

- Poorly absorbed above 600mg, space out dosing

Gabapentin Enacarbil (Horizant)

- Only one that is actually FDA-approved

Pregabalin (Lyrica)

Winkelman, et al. Restless Legs Syndrome: A Rev

opaminergics

Ropinirole, pramipexole, rotigotine patch

No longer first line therapy

High risk of AUGMENTATION – incidence of 7-10% per year

- Paradoxical effect with earlier symptom onset, worsening severity, sprea to arms
- Dose-dependent (AVOID going above max dose)
- Difficult to treat

ncreased risk of compulsive behavior in 10-20% of RLS patients

Winkelman, et al. Restless Legs Syndrome: A Rev

ow-Dose Opioids

Methadone 2.5-20mg

Buprenorphine 0.5-6mg

Can be used in refractory RLS

- No improvement or cannot tolerate first line therapy
- Augmented RLS
- Symptoms for >10yrs

Winkelman, et al. Restless Legs Syndrome: A Rev

eroneal Nerve Stimulation

Tonic Motor Activation (TOMAC)

Activates anterior tibialis muscle

For moderate to severe RLS

- Not due to iron deficiency
- Failed at least one pharmacotherapy
- Documentation within the last 6 months

Bogan et al Efficacy and safety of tonic motor activation (TOMAC) for medicati
restless legs syndrome: a randomized clinical tria

ummary

- New neuromodulation treatment options for sleep disorders
  - Bilateral HGNS for OSA
  - Transvenous phrenic nerve for CSA
  - Peroneal nerve stimulation for RLS
- New pharmacological treatment for OSA
  - Tirzepatide
  - Maybe new oral pill?
- RLS treatment
  - Check iron levels on all RLS patients and replete if necessary
  - Start with gabapentin, not dopaminergics