

Obstructive sleep apnea and its effects on the Heart!

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Outline

- ◆ Definitions
- ◆ Demographics
- ◆ Pathophysiology
- ◆ Risk factors
- ◆ Symptoms
- ◆ Determining Severity
- ◆ Systemic effects
- ◆ Effects on the Heart



Definitions

- Repetitive cessation (Apnea) or reduction (Hypopnea) of airflow during sleep despite respiratory efforts
- Due to complete (Apnea) or partial (Hypopnea) airway occlusion during sleep



Is this you?

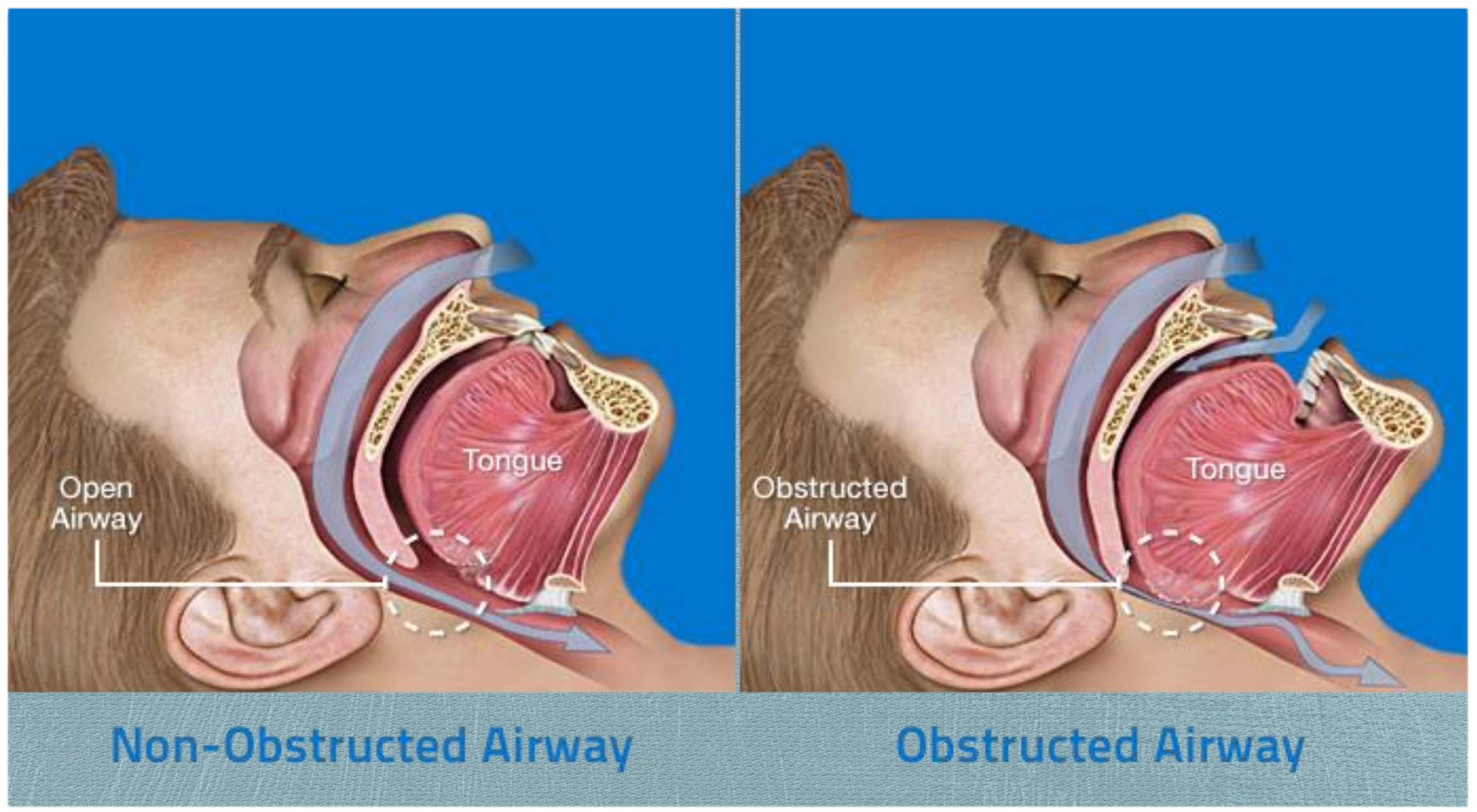
Demographics

- ◆ 24% of adult men and 9% of adult women
- ◆ Gender Males > Females
 - ◆ Prevalence in women increases with menopause



Upper airway is a collapsible cylinder

- ◆ Think of your upper airway as a cylinder..
- ◆ Determinants of air flow
 - ◆ Difference of upstream pressure and downstream pressure
 - ◆ Airway resistance
- ◆ Upper airway patency determined by balance of
 - ◆ Maintain airway opening (dilator muscles)
 - ◆ Promote airway closure (decreased intraluminal pressure and Bernoulli Forces)
 - ◆ Airway size influenced by lung volume that decreases during sleep

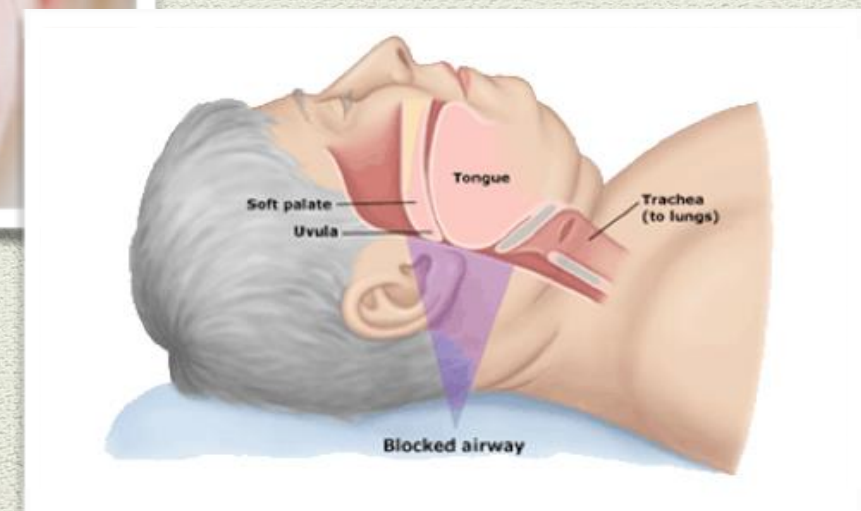


While you are asleep...

Mechanism of Obstruction - Upper airway is a collapsable cylinder

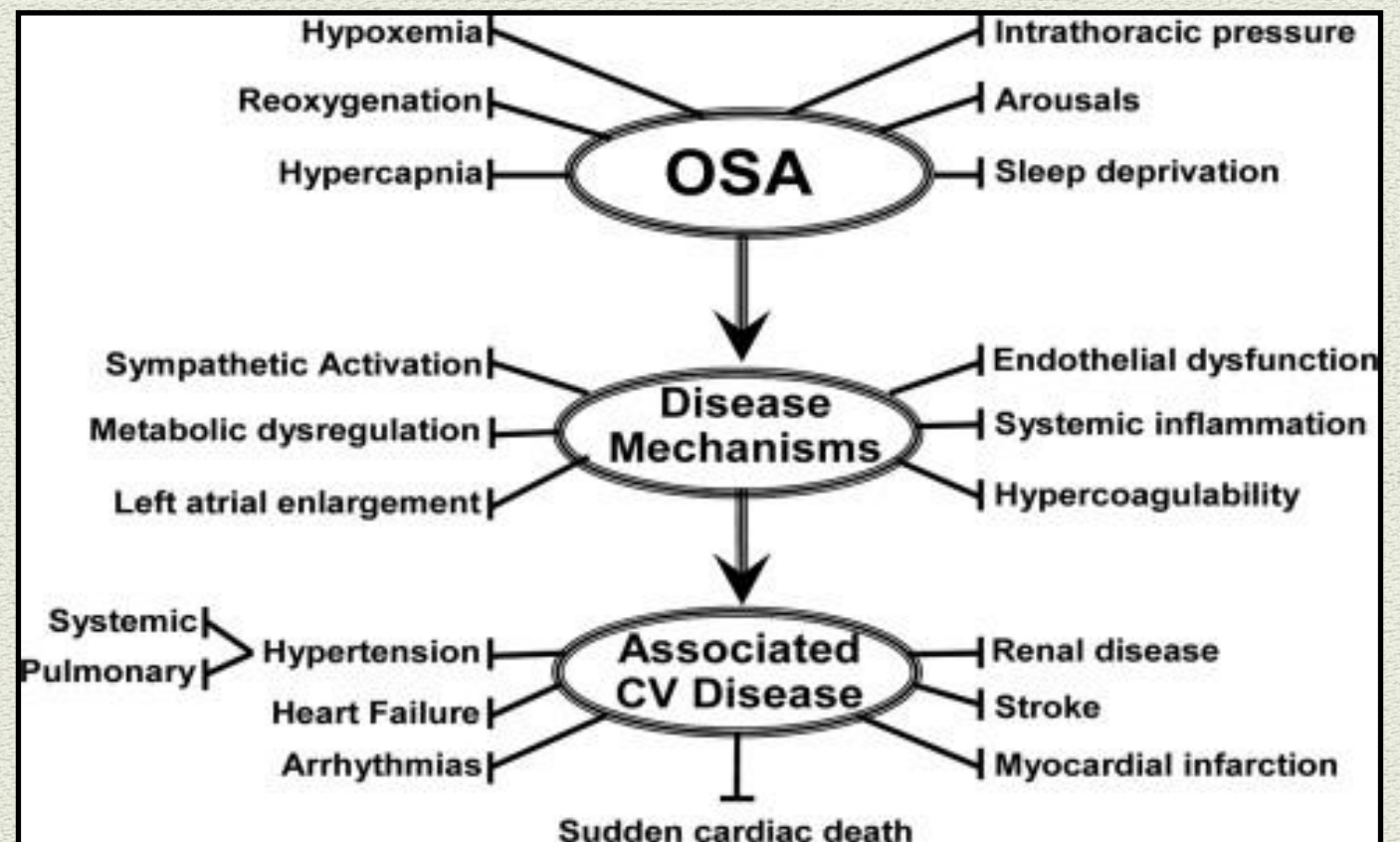
What are some factors that worsen collapse of the upper airway

- ◆ Alcohol
- ◆ Sedatives
- ◆ Obesity
- ◆ Aging



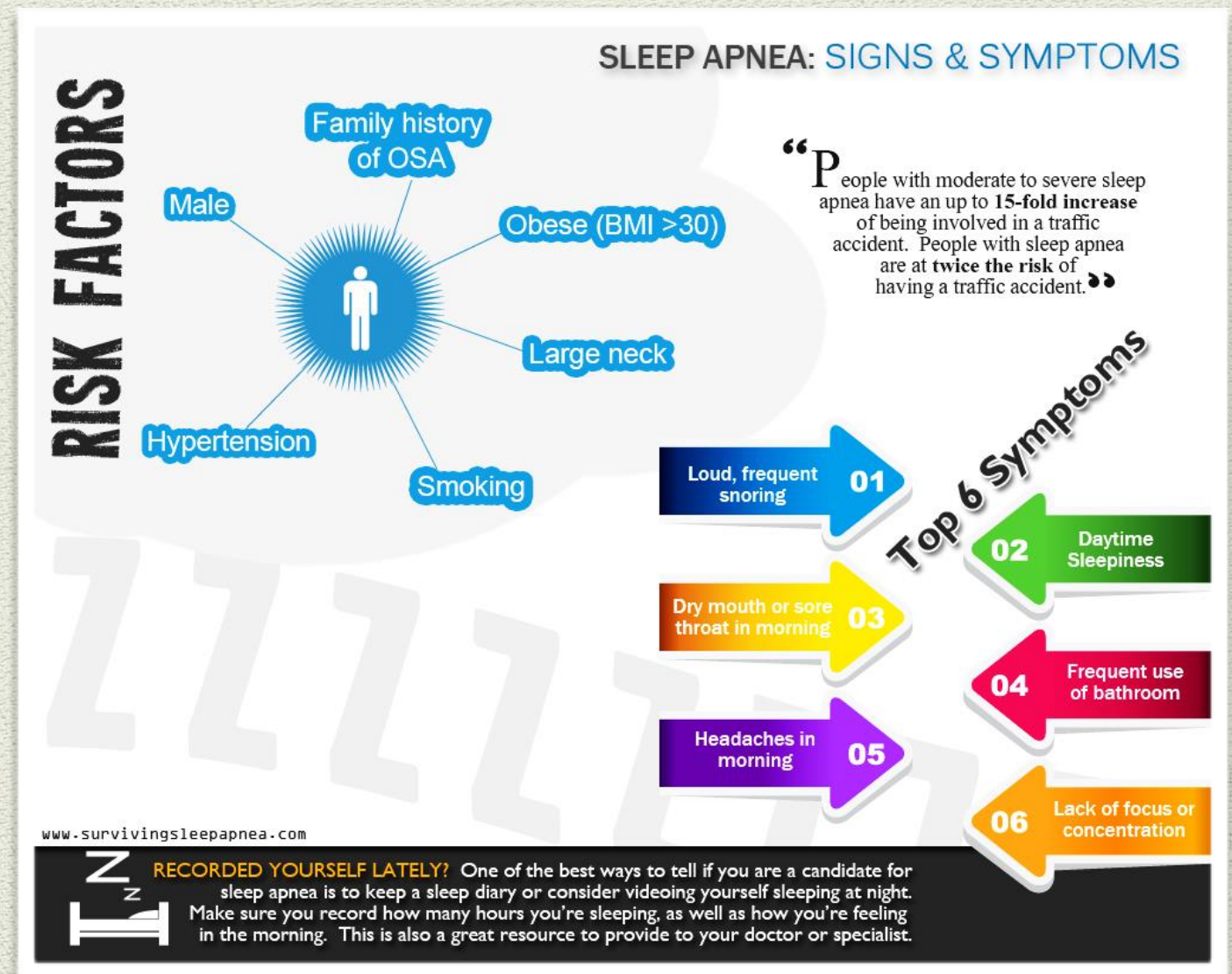
PATHOPHYSIOLOGY

- ♦ Repetitive upper airway obstruction is associated with
- ♦ Snoring (alternating with periods of silence)
- ♦ **Fall in SaO₂**
- ♦ **Arrhythmias**
- ♦ Decrease HR during obstruction
- ♦ Increase HR during apnea termination
- ♦ **Arousal** at apnea termination
- ♦ **Increased Blood pressure** during post apnea period



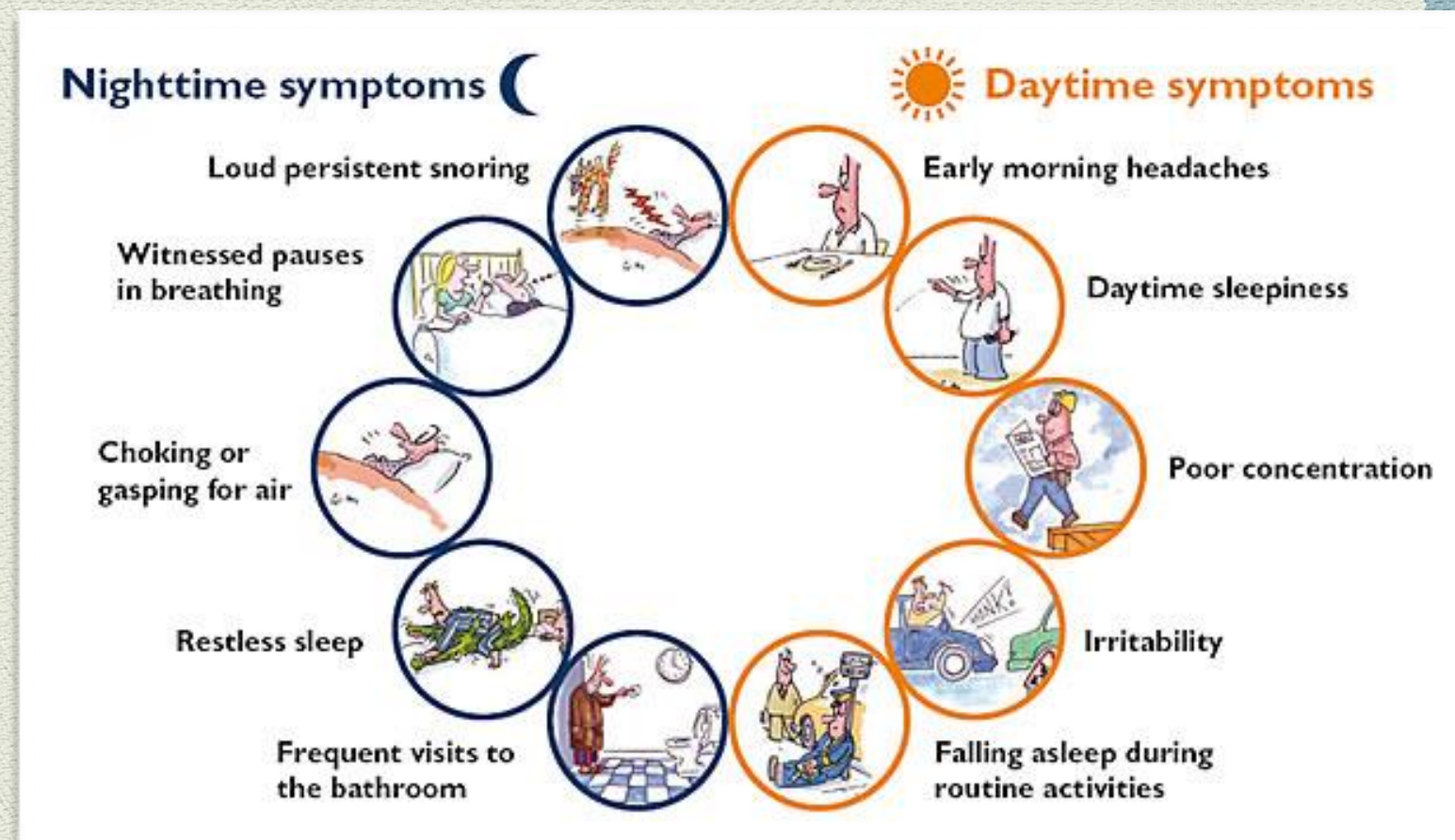
Risk Factors for OSA

- ◆ Family history of OSA
- ◆ Male Gender
- ◆ Menopausal state
- ◆ Aging
- ◆ Race (AA, Mex -A, Asians and Pacific islanders)
- ◆ Excess body weight



Common Clinical Features

- ◆ Daytime sleepiness (most common)
- ◆ Repeated awakenings with gasping or choking
- ◆ Snoring, morning headaches
- ◆ Witnessed apneas
- ◆ Attention deficit
- ◆ Changes in mood
- ◆ Dry mouth/ throat
- ◆ Fatigue, Reflux, Insomnia



What Do You Do if OSA Is Suspected: STOP-BANG

► STOP Questionnaire

- Snoring
- Tiredness
- Observed you stop breathing
- Blood Pressure

► BANG

- BMI >35
- Age >50
- Neck circumference >40 cm (>15.7")
- Gender male

High risk: Yes to ≥ 3 items → Refer for sleep testing

Is your doctor screening you?

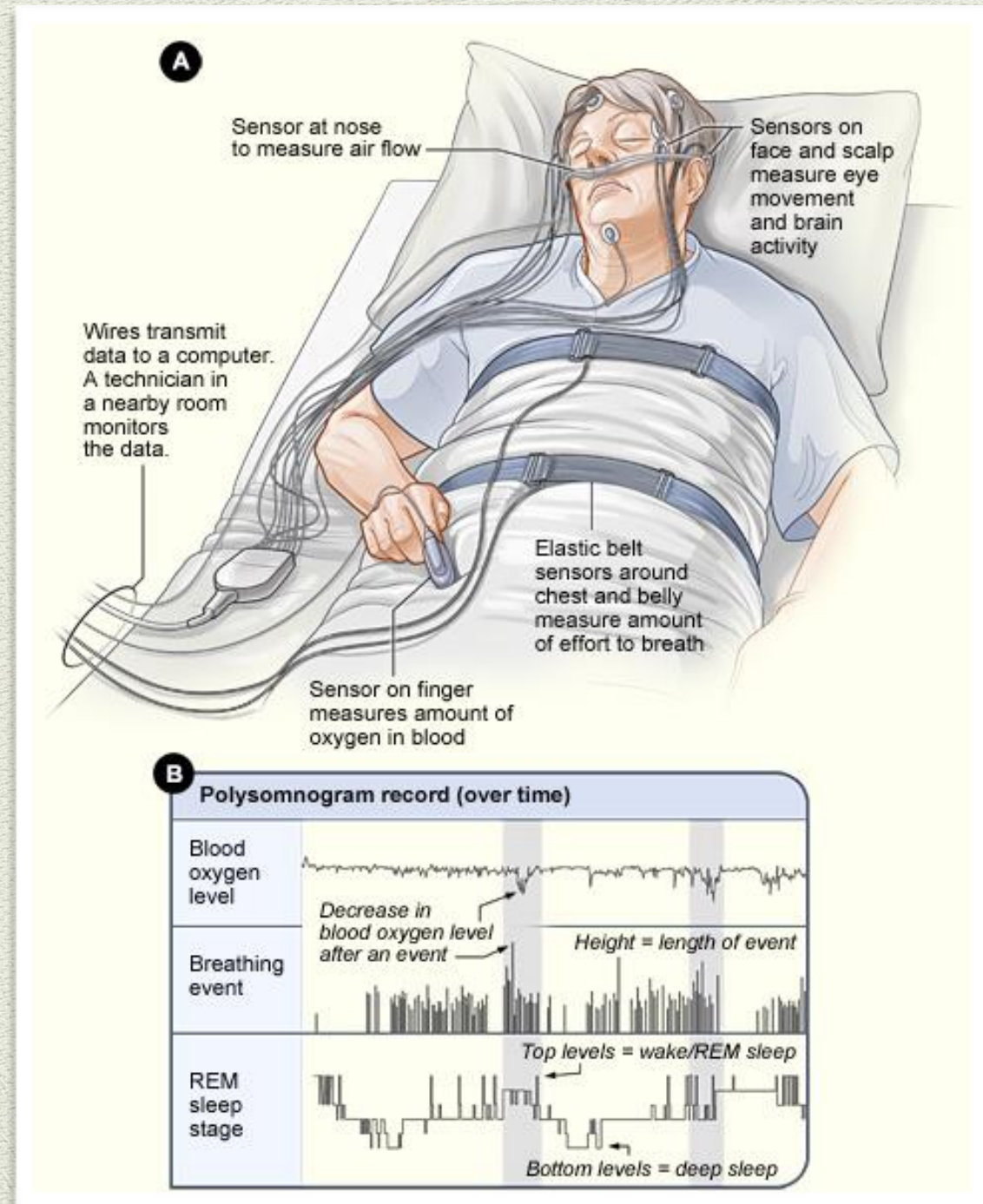
OSA: Severity

- APNEA-HYPOPNEA INDEX (AHI)

- Mild 5-15

- Moderate 15-30

- Severe >30

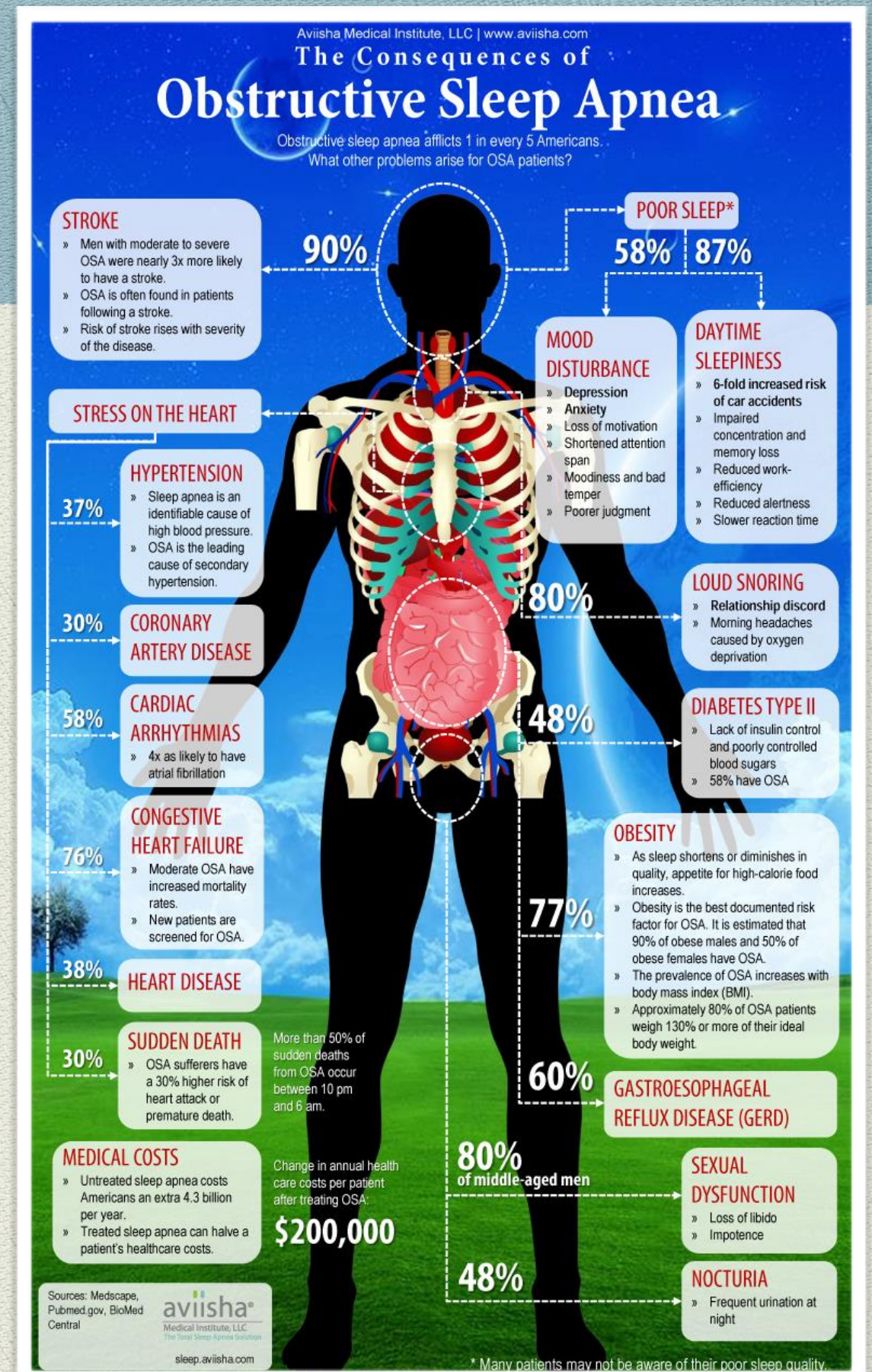


OSA- Severity

- ◆ Other factors that influence the clinical severity of OSA
 - ◆ Degree of daytime sleepiness
 - ◆ Lowest SaO₂
 - ◆ Severity of sleep fragmentation
 - ◆ Nocturnal arrhythmias
 - ◆ Co-morbid cardiovascular or neurological disorders

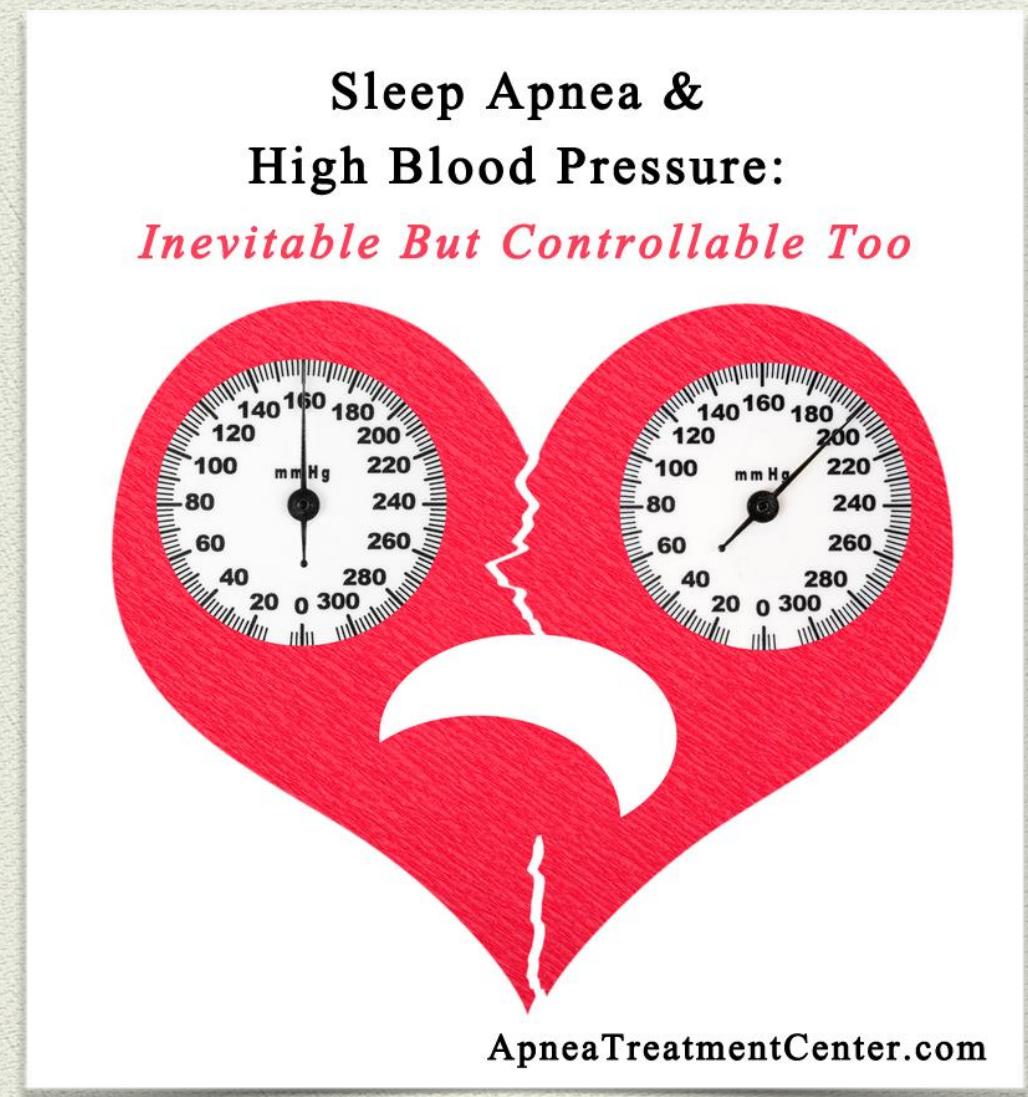
OSA: A Systemic Disorder

- Cardiovascular
- Respiratory
- Renal
- Gastrointestinal
- Endocrine
- Neuro-cognitive
- Immunity



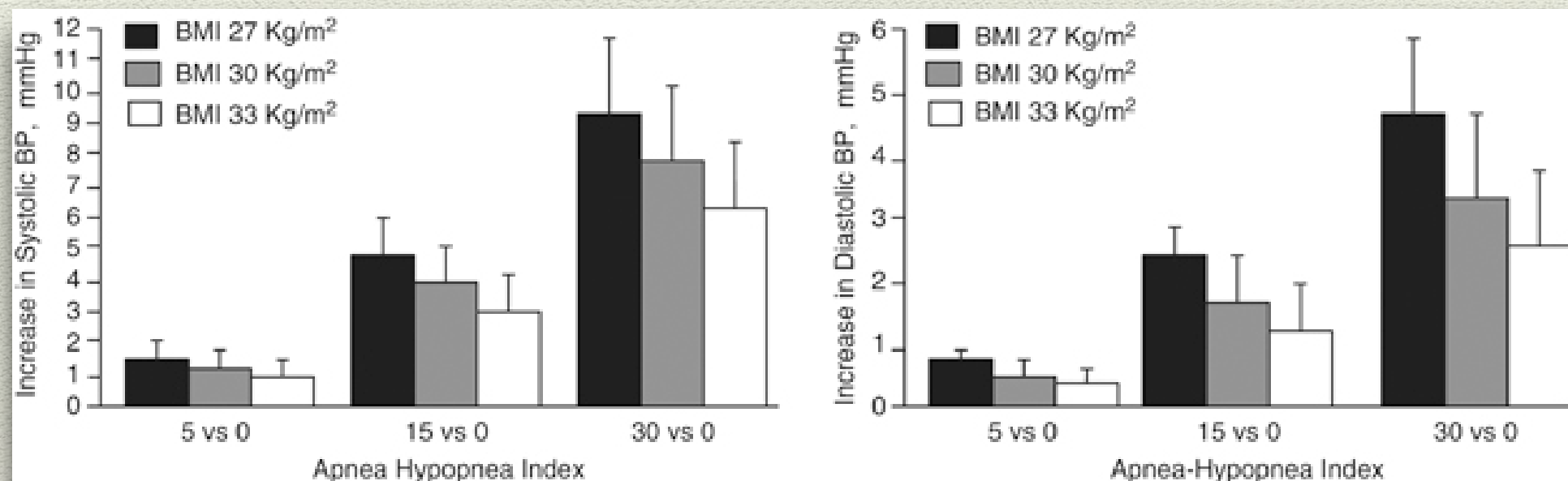
OSA and HTN

- OSA is a risk factor for HTN independent of known confounding factors
- Increase in SBP and DBP
- Loss of nocturnal fall in BP ‘dipping’ phenomenon
- Risk of cardiovascular disease is increased..



OSA and HTN

- ♦ Wisconsin Sleep Cohort Study (709 participants followed over 4 years)
- ♦ The OR for presence of HTN at 4 year follow up
 - ♦ AHI (0-5) - 1.42
 - ♦ AHI (5-15)- 2.03
 - ♦ AHI >15 - 2.89

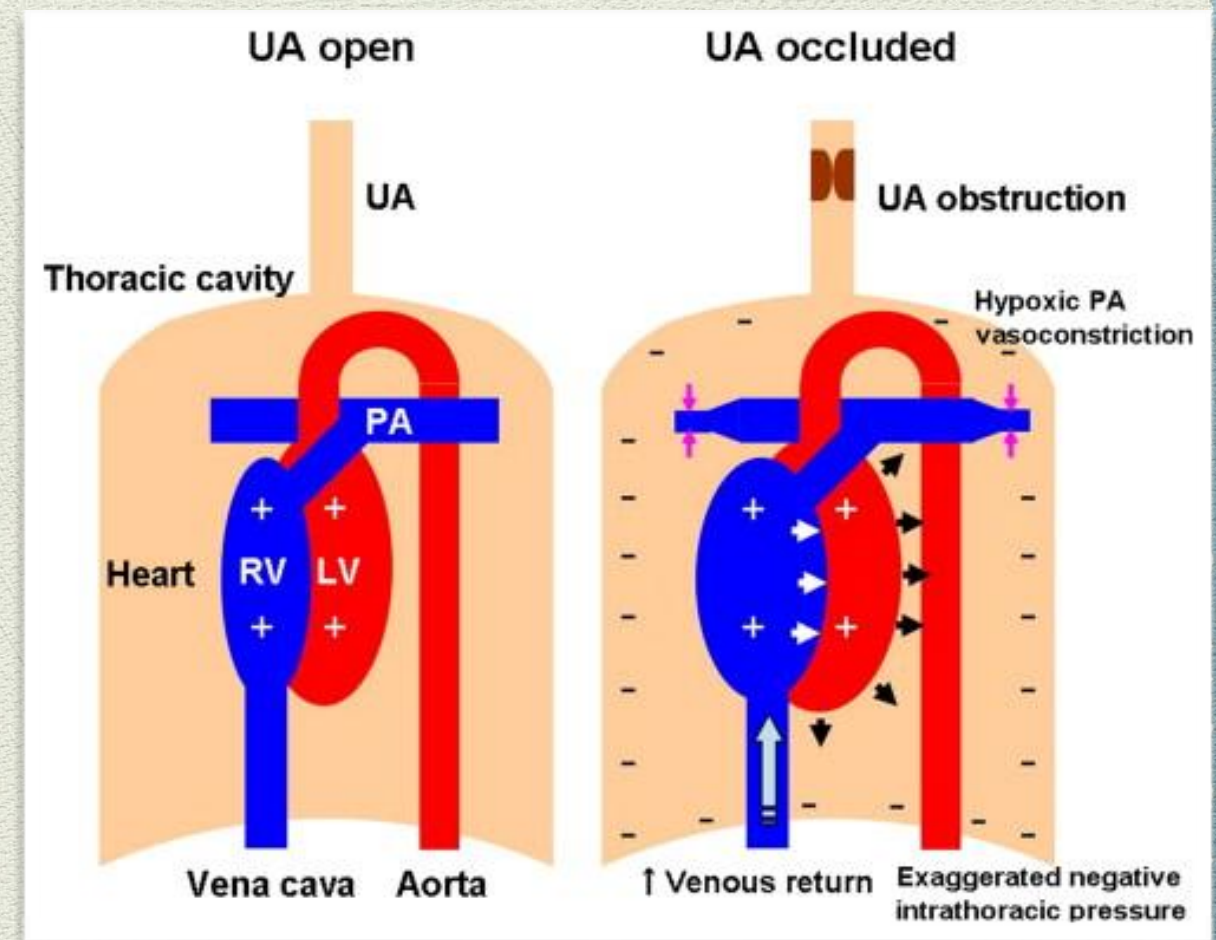


OSA and HTN

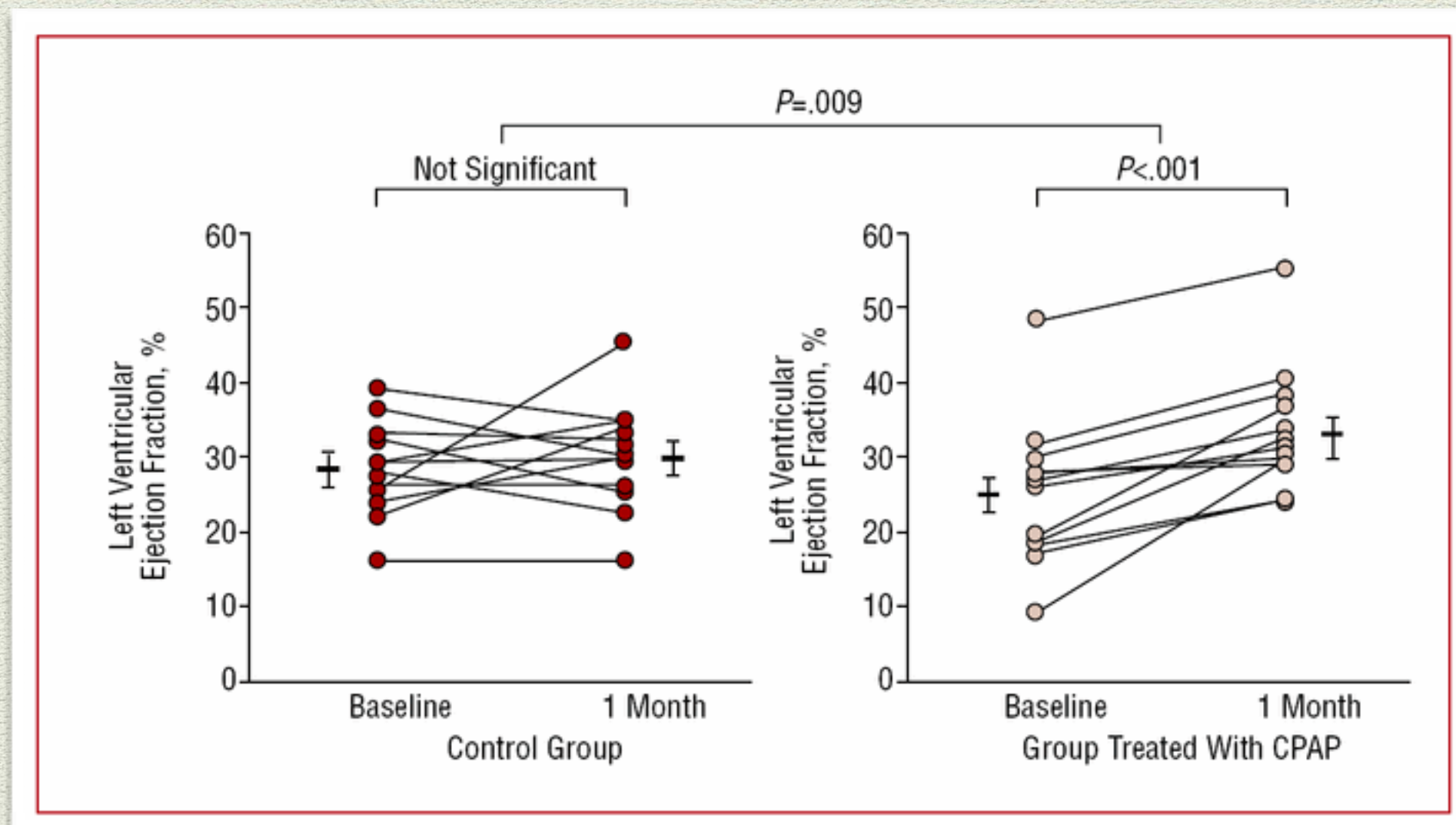
- ◆ Improvement in BP during CPAP therapy in persons with OSA and HTN
- ◆ Meta-analysis of RTC (1980-2006)
 - ◆ 16 trials; 818 subjects
 - ◆ Compared to controls, mean net change with CPAP
 - ◆ SBP 2.46mm Hg
 - ◆ DBP 1.83mm Hg
 - ◆ MAP 2.2mm Hg

OSA and Heart Failure

- ◆ 1/ 3rd of patients with heart failure will have OSA
- ◆ LV systolic dysfunction is an independent risk factor for OSA
- ◆ OSA may contribute to worsening LV dysfunction
- ◆ Higher mortality with untreated OSA
- ◆ 24% vs 12% (J Am Coll Card 2007)



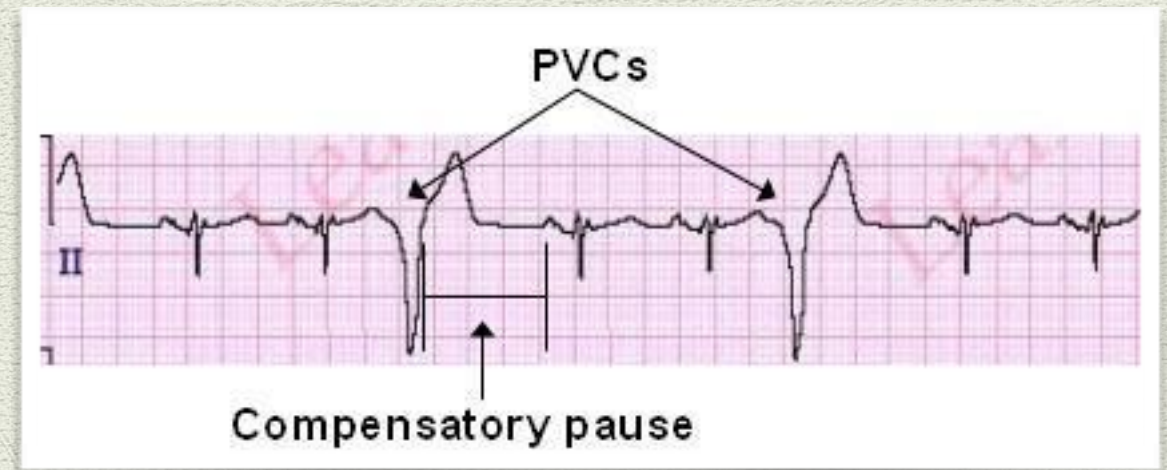
Effect of treating OSA in CHF



- CPAP therapy improved Left Ventricular ejection fraction in persons with acute heart failure and OSA

OSA and Arrhythmias

- ♦ Ventricular arrhythmias
 - ♦ Frequency of PVCs during sleep decreased by 58% with CPAP
- ♦ Atrial fibrillation
 - ♦ Decreased recurrence after cardioversion with CPAP (82% vs 42%)



OSA and Ischemic Heart Disease

- ◆ Increased risk in middle aged adults with OSA
 - ◆ Independent of age, BMI, BP and smoking
 - ◆ Reduced by reversal of OSA (J Chest 1996)
- ◆ Sleep Heart Health Study
 - ◆ 16% of patients with OSA reported 1 more major event
 - ◆ MI or angina
 - ◆ Coronary re-vascularization
 - ◆ HF or Stroke

Sleep Apnea and Heart Disease:
Inevitable Consequence
Which Can Be Prevented



ApneaTreatmentCenter.com

OSA and Heart disease

- ◆ Possible mechanisms for greater risk of heart disease in patients with OSA
 - ◆ Endothelial dysfunction
 - ◆ Hyper coagulable state
 - ◆ Increased plasma fibrinogen levels
 - ◆ Increased platelet activity
 - ◆ Decreased fibrinolytic activity
 - ◆ Insulin resistance
 - ◆ Increased inflammatory markers
 - ◆ Increased sympathetic activity
 - ◆ Marked sleep related hypotension (low BP)

OSA and Heart Disease

- ◆ At a mean follow of 10.1 years
 - ◆ Untreated severe OSA significantly increased the risk of fatal and non fatal cardiac events compared with health controls
 - ◆ In **treated OSA patients** the incidence of fatal and non fatal events was **decreased by 50%**



OSA and Sudden Cardiac death

- General population
 - Sudden cardiac death peaks from 6am to noon
- Patients with OSA
 - Peaks from midnight to 6am



Treatment ...talk to your doctor!

- ◆ Avoidance of alcohol, smoking and muscle relaxants
- ◆ Sleep hygiene
- ◆ Safety counseling
- ◆ Optimal Weight management
- ◆ CPAP therapy, Oxygen therapy, Drugs
- ◆ Dental devices
- ◆ Upper airway surgery
- ◆ Tracheostomy

