

## Sleep Apnea Facts and Figures

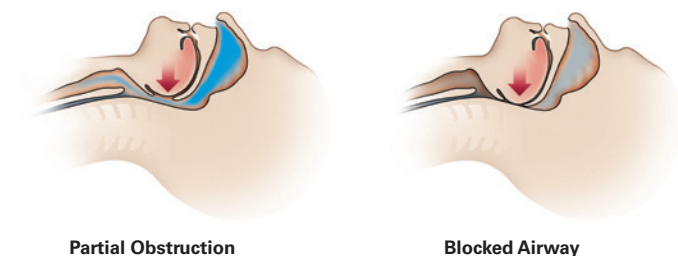
### What is sleep-disordered breathing (SDB)?

**SDB describes a number of breathing disorders that occur during sleep**

- Obstructive sleep apnea (OSA)
- Central sleep apnea (CSA)
- Nocturnal hypoventilation
- Cheyne–Stokes respiration (CSR)

### What is obstructive sleep apnea (OSA)?

- A partial or complete collapse of the upper airway caused by relaxation of the muscles controlling the soft palate and tongue
- Person experiences apneas, hypopneas and flow limitation
  - Apnea: a cessation of airflow for  $\geq 10$  seconds
  - Hypopnea: a decrease in airflow lasting  $\geq 10$  seconds with a 30% oxygen reduction in airflow and with at least a 4% oxygen desaturation from baseline
  - Flow limitation: narrowing of the upper airway and an indication of an impending upper airway closure



### Signs and Symptoms of Sleep Apnea

- Lack of energy
- Morning headaches
- Frequent nocturnal urination
- Depression
- Large neck size
- Excessive daytime sleepiness
- Nighttime gasping, choking or coughing
- Gastroesophageal reflux (GE reflux)
- Irregular breathing during sleep (eg, snoring)

### Classification of sleep apnea

Apnea–hypopnea index (AHI)

- Number of apneas and/or hypopneas per hour of sleep (or study time)
- Reflects the severity of sleep apnea

**AHI = 0–5** Normal range

**AHI = 5–15** Mild sleep apnea

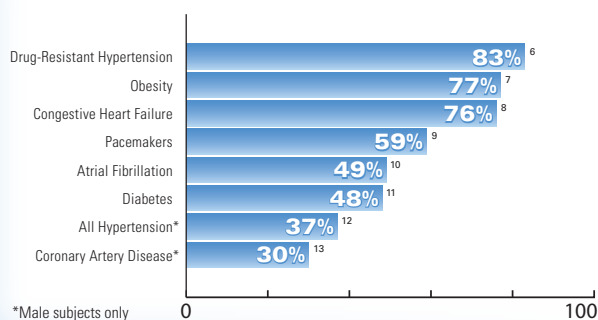
**AHI = 15–30** Moderate sleep apnea

**AHI > 30** Severe sleep apnea

### Prevalence of sleep apnea

- Approximately 42 million American adults have SDB<sup>1</sup>
- 1 in 5 adults has mild OSA<sup>2</sup>
- 1 in 15 has moderate to severe OSA<sup>2</sup>
- 9% of middle-aged women and 25% of middle-aged men suffer from OSA<sup>3</sup>
- Prevalence similar to asthma (20 million) and diabetes (23.6 million) of US population<sup>4</sup>
- 75% of severe SDB cases remain undiagnosed<sup>5</sup>

#### Prevalence of Sleep Apnea in Comorbidities



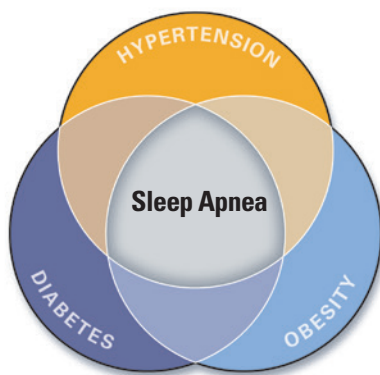
### Increased risk factors for sleep apnea

- Male gender
- Obesity (BMI >30)
- Diagnosis of hypertension
- Excessive use of alcohol or sedatives
- Upper airway or facial abnormalities
- Smoking
- Family history of OSA
- Large neck circumference (>17" men; >16" women)
- Endocrine and metabolic disorders

## Sleep Apnea Facts and Figures

### Hypertension links

- Studies have shown that sleep apnea is an independent risk factor for hypertension
- 30–83% of patients with hypertension have sleep apnea<sup>6,12</sup>
- 43% of patients with mild OSA and 69% of patients with severe OSA have hypertension<sup>5</sup>
- AHA guidelines on drug-resistant hypertension have shown treatment of sleep apnea with CPAP likely to improve blood pressure control



### Stroke risk

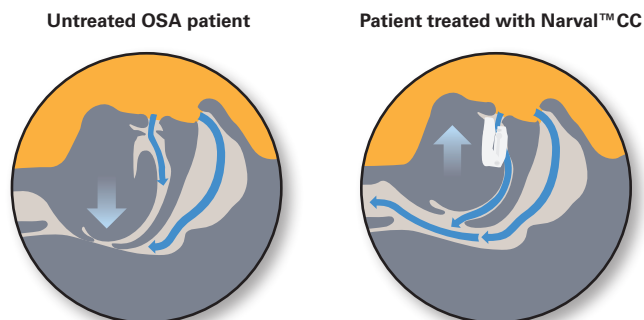
- 65% of stroke patients have SDB<sup>14</sup>
- Up to 70% of patients in rehabilitation therapy following stroke have significant SDB (AHI >10)<sup>15</sup>

### Health care costs (Economic consequences of untreated SDB)

- Undiagnosed patients used \$200,000 more in the two-year period prior to diagnosis than matched controls<sup>16</sup>
- Prior to sleep apnea diagnosis, patients utilized 23–50% more medical resources<sup>17</sup>
- Total economic cost of sleepiness = approximately \$43–56 billion<sup>18</sup>
- Undiagnosed moderate to severe sleep apnea in middle-aged adults may cause \$3.4 billion in additional medical costs in the US<sup>19</sup>

### Treatment of OSA with MRD

- Mandibular repositioning device (MRD) is a custom made, adjustable, oral appliance (available from a dentist) that maintains the lower jaw in a forward position during sleep. This mechanical protrusion widens the space behind the tongue and reduces the vibration and physical obstruction to breathing and the tendency to snore.
- MRD treatment offers significant improvement of sleep apnea symptoms including sleepiness, quality of life, systolic or diastolic blood pressure and cognitive performance<sup>20</sup>
- MRDs offer an equally efficacious alternative in mild to moderate OSA patients who are not compliant or refuse CPAP therapy<sup>21</sup>
- MRDs are indicated as primary treatment for patients with mild to moderate OSA<sup>22</sup>
- Mandibular advancement can increase upper airway capacity by 50–75% with maximum mandibular protrusion<sup>23</sup>
- OSA is a chronic condition; MRD or CPAP treatment must be used nightly



### Traffic accidents

- People with moderate to severe sleep apnea have an up to 15-fold increase of being involved in a traffic accident<sup>24</sup>
- People with sleep apnea are at twice the risk of having a traffic accident<sup>25</sup>
- Treating all US drivers suffering from sleep apnea would save \$11.1 billion in collision costs and save 980 lives annually<sup>26</sup>

1 Young et al. *New Engl J Med* 1993

2 Young et al. *J Am Med Assoc* 2004

3 Marshall et al. *Sleep* 2008

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13 Schafer et al. *Cardiology* 1999

14 Dyken et al. *Stroke* 1996

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22 Practice Parameters for the Treatment of Snoring and Obstructive Sleep Apnea with Oral Appliances: An Update for 2005, AASM report, *Sleep* 2006

23 Aarab et al. *Clin Oral Invest* 2010

24 Horstmann et al. *Sleep* 2000

25 Teran-Santos et al. *New Engl J Med* 1999

26 Sassani et al. *Sleep* 2004