

# SLEEP APNEA- A PREVENTABLE RISK FACTOR FOR STROKE

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# Sleep apnea

- A common, yet underestimated, chronic disorder with a major impact on morbidity and mortality in the general population.

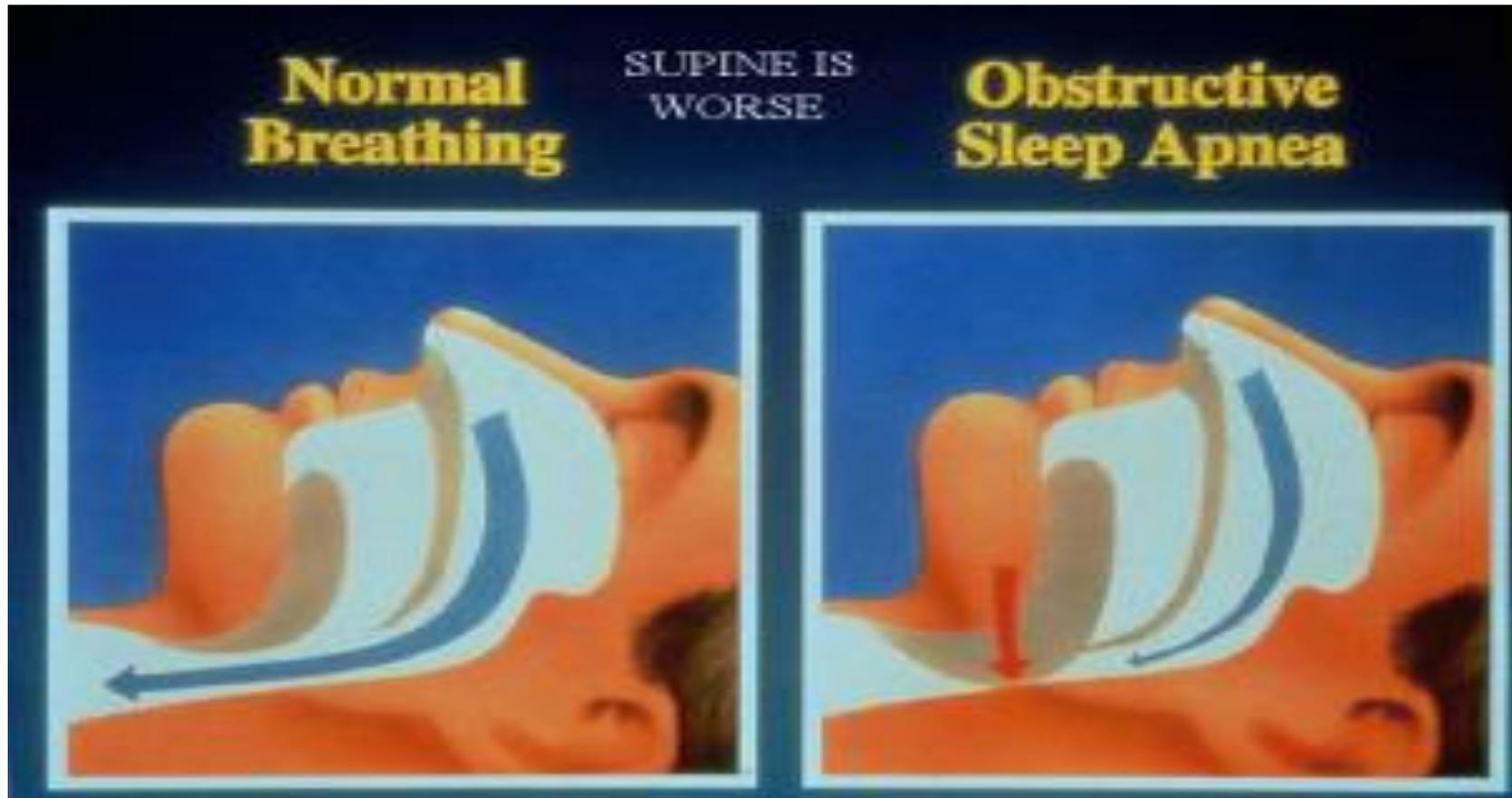
# Sleep apnea

- **The condition affects more than 20 million adults in the U.S. and is associated with a number of serious health consequences and early death.**
- **Women are much less likely to be diagnosed than men as symptoms are more subtle, but long term implications same in both.**

# What is Sleep Apnea

- A disorder that occurs when a person's breathing is **repeatedly interrupted** during sleep.
- **Due to repetitive collapse of the airway during sleep resulting** in apneas and hypopneas
- Each time, the oxygen level in the blood drops, eventually resulting in **damage to many cells in the body.**

# A picture is worth a thousand words



# Stroke

- Stroke is the 3<sup>rd</sup> leading cause of death in US and second world wide.
- Leading cause of long term disability.
- OSA is a potentially modifiable risk factor of stroke.

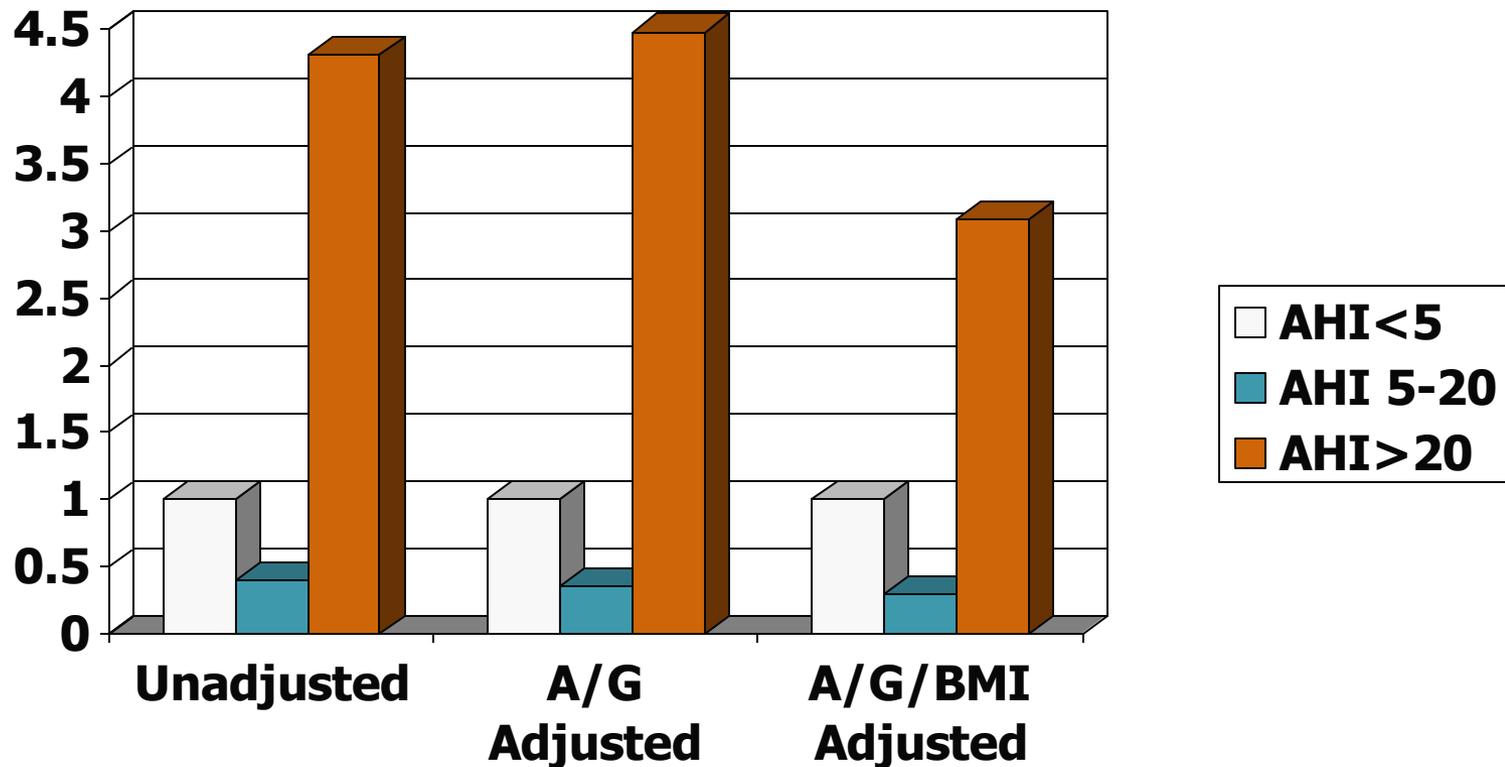
# Stroke and OSA

- About 25% of strokes occur in sleep.
- Wake up strokes occur close to awakening.
- Afib , OSA and stroke are closely linked.
- They are a cause and effect for each other.

# Potential mechanisms

- **Intermittent hypoxia**
- **Nocturnal sympathetic activation**
- **Sleep loss and metabolic dysregulation**

# OSA and Stroke – from AASM 2009- Wisconsin Cohort Study – OSA and Stroke risk



# OSA and Stroke

- **Wisconsin Sleep Cohort Study**
- **In a cross-sectional analysis, subjects with an AHI > 20 had increased odds of having prevalent stroke compared to subjects without OSAS (AHI < 5) after correcting for confounding factors.**
- 1200 subjects from the cohort were followed for 4 years after their initial sleep study.
- **These indicate that OSA is associated with prevalent stroke and may precede and contribute to the development of the stroke.**
- **Arzt M, Young T, Finn L, Skatrud JB, Bradley TD. Association of sleep-disordered breathing and the occurrence of stroke. Am J Respir Crit Care Med 2005;172(11):1447-51.**

# Sleep apnea and lacunar infarcts

- **The prevalence of silent cerebrovascular lesions in patients with obstructive sleep apnea (OSA) and the correlation between OSA severity and prevalence of silent cerebrovascular lesions in Japanese patients.**
- Study subjects were 192 polysomnography (PSG)-confirmed patients who visited the sleep disorders clinic in our university hospital. None had a history of cerebrovascular disease (CVD). A cross-sectional study on OSA severity and the prevalence of silent cerebrovascular lesions detected by brain MRI analysis.
- CONCLUSION:
- **Results indicate that patients with moderate to severe (AHI > or = 15/h) OSA have a higher prevalence of silent cerebrovascular lesion(lacunar infarcts) than those with less severe OSA.**
- Ref. Journal of Clinical Sleep MedicineJ Clin Sleep Med 2008; 4(3)Correlation between severity of obstructive sleep apnea and prevalence of silent cerebrovascular lesions.Momoka Nishibayashi, Masayuki Miyamoto, Tomoyuki Miyamoto, Keisuke Suzuki, Koichi Hirata

# Wake up TIA and Stroke

- **Long obstructive sleep apneas (LOSAs) can cause brain ischemia through paradoxical embolism since they can lead to right to left shunting (RLSh)**
- There were significantly more wake-up strokes/TIAs in subjects with RLSh plus LOSA than those without this association (27/69 vs 70/266; OR 1.91, controlled for age, sex, hypertension, diabetes, atrial fibrillation, antithrombotic therapy; 95% CI 1.08 to 3.38; p=0.03).
- No other risk factor was associated with an increase in the incidence of events on waking.
- **The study suggests that the combination of LOSA and RLSh could be a new major, potentially treatable risk factor for cerebrovascular ischemic events.**
- *Thorax 2013; 68(1)* **Wake-up stroke and TIA due to paradoxical embolism during long obstructive sleep apnoeas: a cross-sectional study.**

# CVA, CAD and Sleep Apnea

- **Tstudy whether sleep apnea is related to stroke, death, or myocardial infarction in patients with symptomatic coronary artery disease.**
- *Methods and Results*— A total of 392 men and women with coronary artery disease referred for coronary angiography were examined by use of overnight sleep apnea recordings.
- All patients were followed up prospectively for 10 years, and no one was lost to follow-up.
- Stroke occurred in 47 (12%) of 392 patients during follow-up. Sleep apnea was associated with an increased risk of stroke,
- Thus with an adjusted hazard ratio of 2.89 (95% confidence interval 1.37 to 6.09,  $P=0.005$ ), independent of age, body mass index, left ventricular function, diabetes mellitus, gender, intervention, hypertension, atrial fibrillation, a previous stroke or transient ischemic attack, and smoking. Patients with an apnea-hypopnea index of 5 to 15 and patients with an apnea-hypopnea index  $\geq 15$  had a 2.44 (95% confidence interval 1.08 to 5.52) and 3.56 (95% confidence interval 1.56 to 8.16) times increased risk of stroke, respectively, than patients without sleep apnea, independent of confounders ( $P$  for trend=0.011).
- Intervention in the form of coronary artery bypass grafting or percutaneous coronary intervention was related to a longer survival but did not affect the incidence of stroke.
- **Conclusions— Sleep apnea is significantly associated with the risk of stroke among patients with coronary artery disease who are being evaluated for coronary intervention.**
- **Ref. Circulation 2008; 118(9). Increased risk of stroke in patients with coronary artery disease and sleep apnea: a 10-year follow-up.**

# OSA and Acute CVA

- Sleep-disordered breathing (SDB) is a disease of increasing importance and it is frequent in stroke patients. SDB is being recognized as an independent risk factor for several clinical consequences, including cardiovascular and cerebrovascular disease.
- **METHODS:**
- The present review summarizes the current evidence for an independent association between SDB and stroke, defining SDB subgroups, mechanisms, confounding factors and other epidemiological aspects. We analyze stroke outcome and prognosis in SDB patients. A search for recent data on this issue was made in several population-based studies and reference lists of articles.
- **RESULTS:**
- Many recent studies have shown an association between SDB and stroke. Moreover, there is a high prevalence of sleep apnea in patients with stroke. The pathogenesis of stroke in obstructive sleep apnea syndrome is not completely understood and likely to be multifactorial. Several mechanisms like hemodynamic disturbances and inflammatory or endothelial dysfunction could be involved.
- The presence of SDB in stroke patients may lead to a poor outcome and recurrence. Noninvasive treatments such as continuous positive airway pressure may decrease the risk of stroke in terms of secondary, and possibly, primary prevention.
- **CONCLUSIONS:**
- **SDB is associated with cerebrovascular morbidity and an unfavorable clinical course. The presence of SDB should be systematically screened in patients with acute stroke.**

# OSA and CVA

- **More than 50% of stroke patients have sleep-disordered breathing (SDB), mostly in the form of obstructive sleep apnea (OSA).**
- SDB represents both a risk factor and a consequence of stroke.
- The presence of SDB has been linked with poorer long-term outcome and increased long-term stroke mortality.
- Continuous positive airway pressure is the treatment of choice for OSA. Oxygen and other forms of ventilation may be helpful in other (e.g., central) forms of SDB. SDB can improve spontaneously after stroke. About 20 to 40% of stroke patients have sleep-wake disorders (SWD), mostly in form of insomnia, excessive daytime sleepiness/fatigue, or hypersomnia (increased sleep needs).
- Depression, anxiety, SDB, stroke complications, and medications may contribute to SWD and should be addressed first therapeutically. Brain damage per se, often at thalamic or brainstem level, can be also a cause of persisting SWD.
- Ref [Semin Neurol](#). 2005 Mar;25(1):19-32. Sleep and stroke. [Bassetti CL](#).

# Stroke and OSA

- **Sleep-disordered breathing (SDB) is more probably the cause rather than the consequence of stroke because:** apneas are essentially obstructive rather than central, the frequency of SDB is not different between transient ischemic attack and cerebral infarction; and previous excessive daytime sleepiness is significantly more frequent among stroke patients with SDB than those without.
- The presence of SDB in stroke patients could lead to a poor outcome.
- Experimental and clinical studies have shown that both short- and long-term factors may play a role in increasing the susceptibility to stroke in patients with obstructive sleep apnea syndrome.
- [Ref Clin Exp Hypertens.](#) 2006 Apr-May;28(3-4):225-31. Cerebrovascular diseases and sleep-disordered breathing. [Ferini-Strambi L](#), [Fantini ML](#).

# Osa and CVA

- Due to changes in cerebral hemodynamics, hematologic alterations, and cardiocirculatory dysfunctions that typically and repeatedly occur during apnea episodes and also may persist during wakefulness.
- Regarding long-term factors, some changes in the anatomical characteristics of carotid arteries wall have been recognized in SDB patients.
- This finding seems to suggest **that the link between SDB and cerebrovascular disease might be explained, at least in part, by an increase in the progression of the atherosclerosis process involving cerebral vessels.**
- There are several practical implications from the demonstrated significant role of sleep apnea in increasing the predisposition to developing stroke.
- Specific treatment of SDB may reduce the possibility of further cerebrovascular disturbances.
- Ref [Clin Exp Hypertens](#). 2006 Apr-May;28(3-4):225-31. **Cerebrovascular diseases and sleep-disordered breathing.** [Ferini-Strambi L](#), [Fantini ML](#).

# Sleep apnea risk factors

- Obesity
- Increasing age
- Male gender
- Anatomic abnormalities of upper airway
- Family history
- Alcohol or sedative use
- Smoking
- Associated conditions

# Diagnosis/what are symptoms?

- Snoring (loud, chronic)
- Nocturnal gasping and choking
  - Ask bed partner (witnessed apneas)
- Automobile or work related accidents
- Personality changes or cognitive problems
- Risk factors
- Excessive daytime sleepiness( under recognized due to caffeine and other stimulant use and under reporting by patient)

# How to diagnose?

- Signs and symptoms poorly predict disease severity
- Sleep Study is gold standard
- Appropriate therapy dependent on severity
- Failure to treat leads to:
  - Increased morbidity
  - Accident and Injury/Motor vehicle crashes
  - Mortality
- Rule out other causes of daytime sleepiness

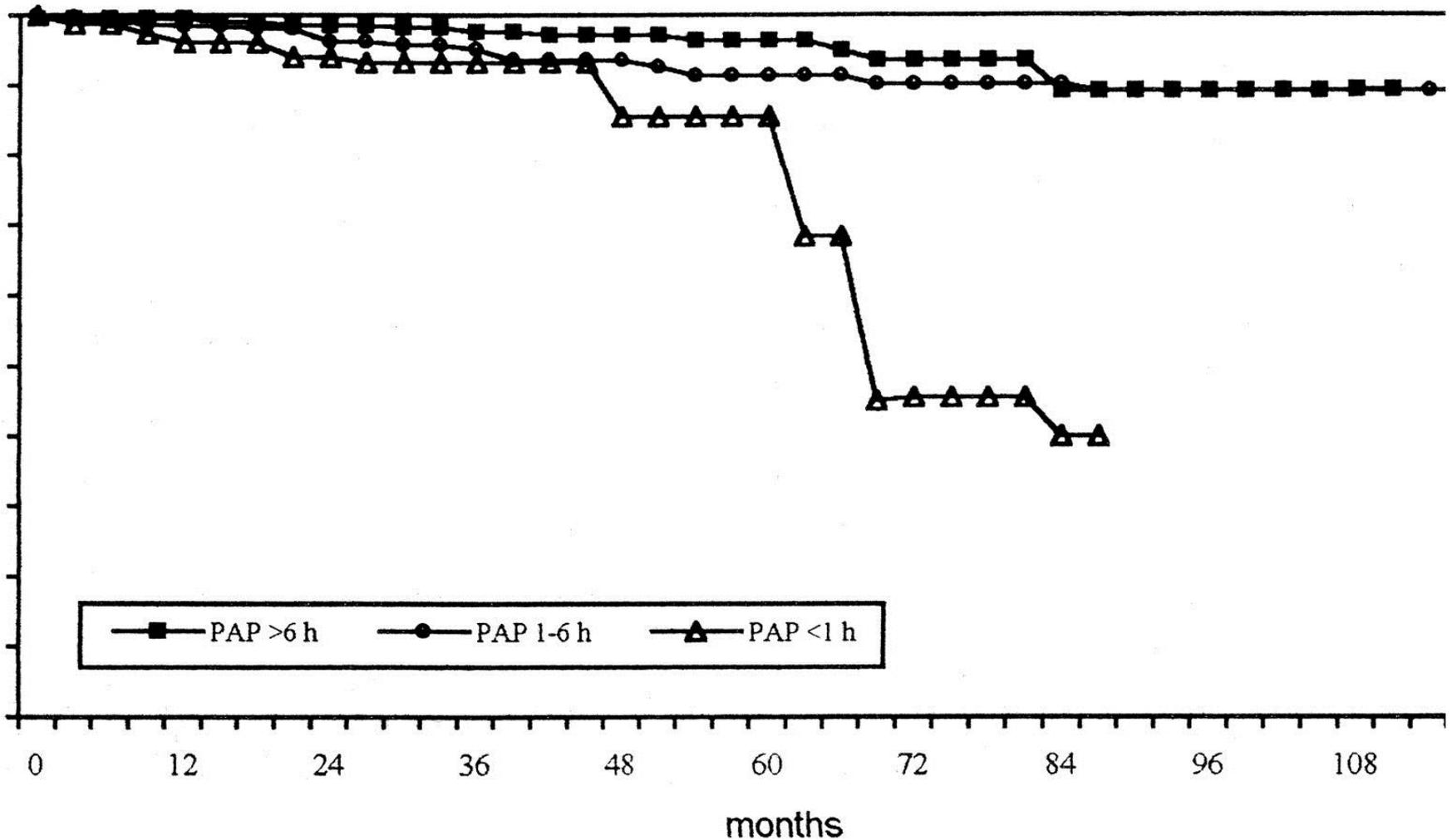
# What are tests available

- Home sleep testing
- Diagnostic PSG
- Split night study
- Titration study

# Treatment goals

- Reduce morbidity and mortality
  - Reduce sleepiness
  - Decrease cardiovascular/CVA consequences
- Improve quality of life

# Treatment-CPAP- provides mortality benefit



# Mortality decreased

- Several observational cohort studies have shown that treatment with continuous positive airway pressure (CPAP) **reduces mortality**.
- Data from a historical cohort study performed in Spain in which 871 patients diagnosed with OSAS between 1994 and 2000 were followed through 2001.
- The cohort was divided into 3 groups based upon their compliance with CPAP: > 6 hr per night, 1-6 hr per night and < 1 hr per night.
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- **At 5 years of follow-up, the group using their CPAP < 1 hr/night had a significantly decreased survival (86%) compared to the group using their CPAP > 6hr (96%) and 1-6 hr (91%) per night.**<sup>61</sup>

Campos-Rodriguez F, Pena-Grinan N, Reyes-Nunez N, et al. Mortality in obstructive sleep apnea-hypopnea patients treated with positive airway pressure. Chest 2005;128(2):624-33.

# Summary

- **Why find and treat Sleep apnea?**
- Common
- Dangerous
- Under recognized
- 100% Treatable
- If treated can prevent morbidity and mortality – including that from stroke
- If Untreated → leads to→
- Wake up Strokes/TIAs, Afib, Alzeihmers, Cancer, CKD, CAD, Obesity

# Conclusions

- OSA is associated with cerebrovascular vascular events.
- Treatment improves mortality and morbidity

Questions??

- Thank You !!!
- My references are quoted at the bottom of pertinent slides