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Cardio Sleep Review

Featured Articles:

Barriers to Integrating Sleep Medicine into Cardiology Care

New Insights Into Afib Ablation: Can Sleep Apnea Fill in the Gap?

Dedicated to the nexus of Cardiology and Sleep Apnea Management

itamar medical

Welcome !

It is with great pleasure that I introduce the inaugural issue of Itamar Medical's *Cardio Sleep Review*, created to help cardiologists, electrophysiologists and other healthcare professionals for whom sleep apnea management is fast becoming critical to their practice and their patients.

We've envisioned this review as a clinical and practical resource to provide the latest news, reports, and insights on the critical connection between sleep apnea and heart disease and how cardiology and EP practices around the world are approaching it. By creating a dialogue between these two fields, we can provide you with information that you can immediately utilize to enhance patient care.

In this issue we will discuss the burgeoning research demonstrating the close connection between sleep apnea and Atrial Fibrillation as well as other cardiac rhythm disorders. We know today that sleep apnea is a risk factor for AFib and other heart diseases. But more importantly, managing it effectively improves cardiac care outcomes such as AFib ablation and cardioversion, and reduces risk for stroke and sudden cardiac death. Sleep apnea may sometimes be the cause for night-time bradycardia and may not require a pacemaker, but rather CPAP may be a better solution.

At Itamar Medical, it is our vision to provide medical technology, practice tools and education that effectively and seamlessly integrates sleep apnea management into cardiac patient care. We look forward to the gains that will be made from sharing knowledge across disciplines and encourage you to voice your opinions, comments and suggestions by letting us know what areas of discussion you would find most helpful.

We hope you enjoy this first issue of *Cardio Sleep Review*.

Sincerely,
Gilad Glick, CEO

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Barriers to Integrating Sleep Medicine into Cardiology Care

By Gilad Glick
CEO, Itamar Medical

Why has sleep breathing management not been integrated into cardiology care pathways?

The increased awareness and broad acceptance of the role of sleep apnea in cardiac disease, and the main studies and scientific statements published by the European Society of Cardiology, American Heart Association, and American College of Cardiology were the drivers behind the American Sleep Academy's "Sleep Apnea Hurts Hearts" campaign.

The remaining questions are:

If the link between sleep apnea and several main cardiovascular diseases such as Atrial Fibrillation and hypertension has been broadly accepted, why do most heart patients remain undiagnosed? And why are the majority of cardiologists not integrating this factor into their care pathways?

There are two main barriers that we hear about from practitioners:

The first obstacle is awareness among cardiologists and their patients about how prevalent sleep apnea is and the fact that most will not be visually detected. Most cardiologists "eyeball" patients to assess obvious signs of sleep apnea, such as a thick neck, visually high BMI, chronically blocked nose, etc.

This results in significant under-diagnosis of sleep apnea, as demonstrated in a recent study conducted in Montefiore Medical Center in New York City by Dr. Wharton and Dr. Zaremski. Their conclusion was that systematic and broad screening is recommended in cardiology clinics: 84% of their patients screened positive for sleep apnea, while they found that BMI was a poor predictor of screening results.

The second obstacle lies in the dynamics of referring a patient to a sleep medicine physician. To start with, cardiology patients are preoccupied with their heart condition and do not understand the link between their sleep apnea and their heart. If not given a motivational explanation by the cardiologist or pressed hard to show up at the sleep doctor, most will not make the extra effort this requires.

Furthermore, when patients finally overcome this obstacle and wish to have a sleep study, they encounter a lack of sufficient sleep certified physicians, resulting in inconvenient wait times, sometimes reaching months, combined with

"Systematic and broad screening is recommended in cardiology clinics: 84% of their patients screened positive for sleep apnea, while they found that BMI was a poor predictor of screening results."

geographical accessibility limitations driven by the tendency to diagnose simple OSA with full in-lab polysomnography (PSG) as a first-line procedure, which has a host of barriers imbedded in it.

For example, more and more healthcare insurers are requiring Home Sleep Apnea Testing (HSAT) before authorizing PSG. Sleep physicians, preferring PSG, require the patient to undergo two procedures or challenge the insurance company. A not insignificant portion of the patients refuse to undergo in-lab PSG because they are worried about being hospitalized or fear the financial impact of the co-pay. Sleeping at a sleep lab is typically perceived to be an unpleasant experience.

HARNESSING THE SIMPLICITY OF HOME SLEEP TESTS

Cardiology and sleep need to be integrated differently. Home sleep tests, which revolutionized sleep medicine and made sleep studies available to all patients, whether they lived far away, had a disability, or simply liked sleeping in their own beds have the potential to enable the cardiology patient population to easily manage their sleep by either moving the point of dispatch to the cardiology practice or even to direct shipment just like Amazon did with retail.

How do we solve these challenges?

Recently Itamar Medical launched the Total Sleep Solution program that has all the components necessary to successfully integrate sleep medicine into cardiology patient care. It has:

A. **Cardiology oriented screening tools** combined with patient education materials to achieve efficient accessibility for all patients while maintaining a seamless and pleasant patient experience.

B. **Unique, Home Sleep Test-enabling technology** with the WatchPAT home sleep test offers an unparalleled, simple user experience and requires only a finger sensor and a watch instead of all the cumbersome home sleep tests available. It's FDA approved, listed as technically adequate in the AASM guidelines for HSATs,[1] and fully reimbursed.*

C. **Remote Sleep Expert Interpretation. Cloud based technology** enables immediate transmission of the test report to a sleep specialist for interpretation and diagnosis.

D. **Connection to sleep apnea management service providers** of high quality that understand the standards cardiologists are expecting and help ensure patient compliance and adherence.

To learn more about Total Sleep Solutions, you may always contact your local Itamar Sales Representative or leave your details at infousa@itamar-medical.com

*Please verify with your insurance mix as local policies varies.

1. Kapur VK, et al. 2017 "Clinical practice guideline for diagnostic testing for adult obstructive sleep apnea: an American Academy of Sleep Medicine clinical practice guideline."*J Clin Sleep Med.* 13(3):479–504.

Comorbid Sleep Apnea and Atrial Fibrillation: Evidence Mounts, Awareness Slowly Follows

By Sree Roy
Chief Editor, Sleep Review Magazine

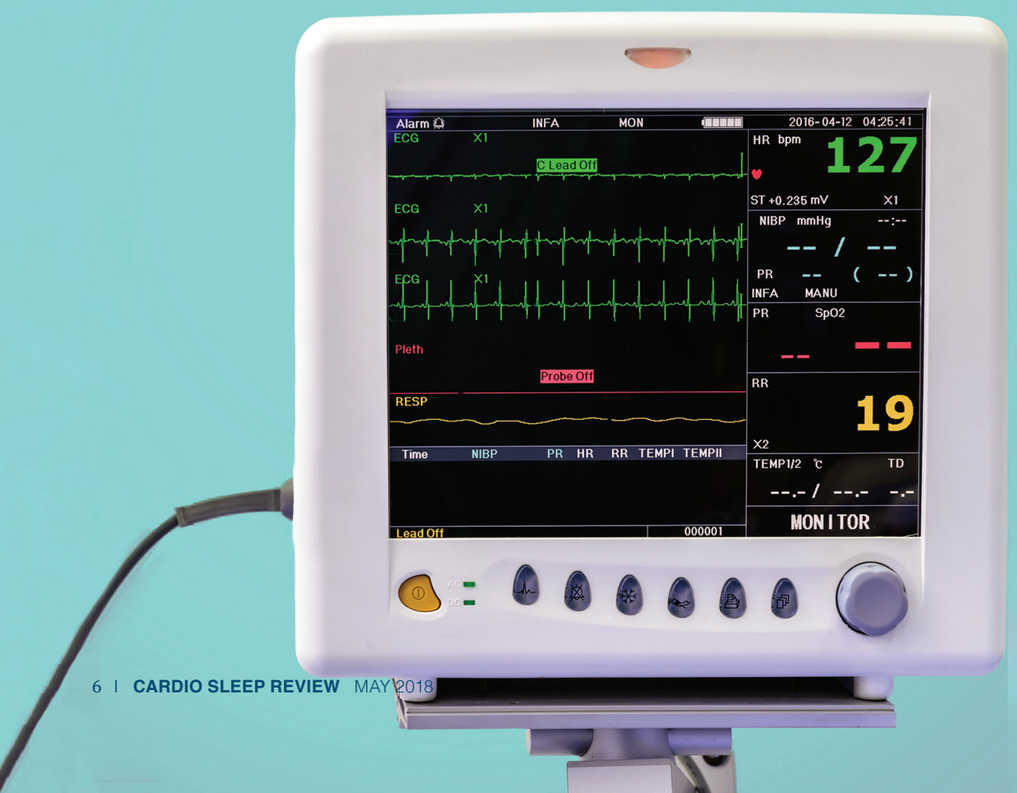
RESEARCH ON AFIB AND SLEEP APNEA

Research linking AFib to sleep apnea has been steadily increasing. But awareness that sleep apnea is a risk factor for AFib so far remains low. A recent survey of 1,013 Americans found that while nearly half are aware that the risk of developing AFib is increased by a family history (48%) and hypertension (43%), only 16% knew that sleep apnea is a risk factor.[1]

Meanwhile, studies have found that treating obstructive sleep apnea can improve AFib outcomes. A meta-analysis published in 2015 linked CPAP use with a 42% relative risk reduction in AFib recurrence in patients with OSA post ablation.[2] "Active screening for obstructive sleep apnea in all patients who undergo treatment for atrial fibrillation is imperative as the use of CPAP will influence the outcome of therapy and likely reduce some of the cardiovascular morbidity associated with atrial fibrillation," said study author and electrophysiologist Larry A. Chinitz.

Cardiologist Ronald H. Wharton published a study that supports systematic sleep apnea screening for all patients in cardiology clinics.[3] It found that body mass index (BMI) did not correlate to cardiology patients' likelihood of sleep apnea or to OSA's severity (as measured by AHI)

The study concludes that wide screening should be done. Wharton says, "The cardiologist's office is the natural place to look for sleep apnea; the patient population is naturally selected for you."



Wharton's findings are in line with the European Society of Cardiology's (ESC) AFib clinical practice guidelines issued in 2016, which state, "Interrogation for clinical signs of obstructive sleep apnea should be considered in all AF [atrial fibrillation] patients."[4]

SCREENING, REFERRALS, AND DIAGNOSIS

Though screening is relatively easy to implement (a sleep questionnaire can be administered at the initiation of the office visit), obstacles can arise during the referral and diagnosis process with sleep specialists.

> **"Interrogation for clinical signs of obstructive sleep apnea should be considered in all [AFib] patients."**

Home sleep testing company Itamar Medical began educating clinicians about the links between OSA and AFib in 2013 when CEO Gilad Glick joined. "I spent my first 20 years working for Biosense Webster (Johnson & Johnson). Still to date, 1-year outcomes, measured in AFib recurrence rate, are a mixed bag with 50% to 60% success rate and a poor chance to predict which patients will do well," Glick says in a phone interview. "Then came the 'aha moment': I was shown data that explained it all by Dr. Elad Anter, director of the electrophysiology lab at Beth Israel Deaconess Medical Center in Boston. This seemingly 50% outcome was made up of 2 groups: those with OSA who had a much lower result of <40%, and those without OSA or on an effective CPAP therapy with results of >70%. I realized it is probably sleep apnea causing such a big part of those failed ablations."[5]

ON TO TREATMENT

For patients who have been diagnosed with OSA and undergo ablation, Glick notes that sleep therapy is especially crucial in the time immediately following the AFib procedure. "It needs to be ensured that OSA is managed successfully…in what is called the 'remodelling period,' a period in which the electrical circuits in the heart are reforming around those ablation RF lines," he says.

Glick emphasizes that a simple, though not necessarily easy, solution is a "true seamless integration of sleep medicine into the AFib patient care pathway every step of the way," He continues, "From systematic screening with a questionnaire when the patient shows up with the first symptoms of AFib in the cardiology office through a thorough explanation of the link between the two diseases by the electrophysiologists through an easy to do initial home sleep test (and if needed, a deeper polysomnography study) all the way to feeding back the CPAP compliance information right into the patient's medical record so the electrophysiologist can know if the recurrence may be associated with lack of compliance or ineffectiveness of CPAP therapy."

For full article go to: www.sleepreviewmag.com

1. iRhythm. September is national atrial fibrillation awareness month: survey shows Americans lack awareness about "afib," its risk factors and symptoms. 22 Sept 2014. http://investors.irhythmtech.com/phoenix.zhtml?c=254373&p=irol-newsArticle&ID=2174676%20 **2.** Shukla A, Aizer A, Holmes D, et al. Effect of obstructive sleep apnea treatment on atrial fibrillation recurrence: a meta-analysis. *JACC Clinical Electrophysiology.* 2015;1(1-2):41-51. **3.** Zaremski L, Wharton R. Wide screening of obstructive sleep apnea in a cardiology clinic. *Cardiovasc Investig.* 2017;1:1. **4.** Kirchhof P, Benussi S, Kotecha D, et al. 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS. *Eur Heart J.* 2016;37(38):2893–962. **5.** Fein AS, Shvilkin A, Shah D, et al. Treatment of obstructive sleep apnea reduces the risk of atrial fibrillation recurrence after catheter ablation. J *Am Coll Cardiol.*2013;62(4):300-5.

New Insights into AFib Ablation: Can Sleep Apnea Fill in the Gap?

By Melih Alvo
Senior Marketing Manager, Itamar Medical

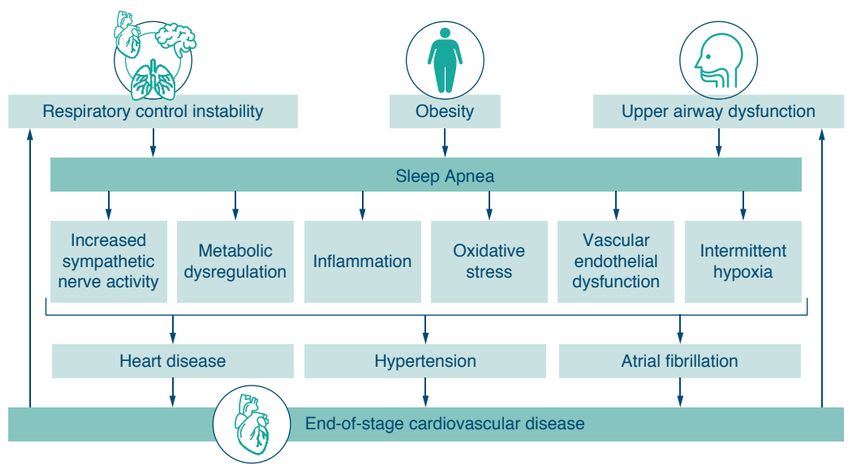
AFib affects 6 million lives in the US.[1] Each year ~350,000 patients undergo an ablation procedure to treat this condition. Intracardiac AFib ablation carries significant risk . In particular, complications associated with the transeptal puncture and esophageal fistulas are associated with significant cost to the healthcare system and the patient. Unfortunately, about 50% of AFib patients who undergo their first ablation procedure experience reoccurrence of AFib[2] within one year. There are multiple theories on the underlying reasons for this huge variance in outcome—with much dialogue and effort focusing on the procedure itself. Recently, new data published has suggested one of the gaps may not be in the ablation lines but in another condition—sleep apnea and the implications it has on the heart tissue and physiology.

"...about 50% of AFib patients who undergo their first ablation procedure experience reoccurrence of AFib[2] within one year."

There has been a recent uptick in new clinical studies that show the effect of sleep apnea on AFib recurrence. In March 2017 the American College of Cardiology was invited to review a paper discussing the evidence demonstrating the causal relationships between sleep apnea and higher AFib burden. Figure A is a recreation of a similar diagram featured in that publication.

In light of this information, Dr. Elad Anter of the Boston Beth Israel Deaconess Medical Center and Harvard Medical Institute recently published a clinical study which may change the

CENTRAL ILLUSTRATION: Potential Etiological Risk Factors for Sleep Apnea and the Downstream Consequences



Javaheri, S. et al. J am Coll Cardiol. 2017;69(7):841-58.

Figure A

electrophysiologist's (EP's) approach to AFib ablation.

In this multi-center, prospective, randomized study, two groups, each of 43 patients, with Paroxysmal Atrial Fibrillation were studied: group one with diagnosed OSA and group two without OSA. Diagnosis was done both with traditional means and with the novel WatchPAT home sleep test technology. All patients underwent comprehensive mapping of their atrial substrate, PV trigger identification and PV Isolation, and non-PV trigger mapping and ablation. In addition, there were two retrospective control groups, one without OSA and one with moderate OSA. Both of those groups underwent PVI alone without mapping and ablation of Non-PV triggers.

The findings of the study were amazing. After PV isolation, patients with OSA had significantly increased incidence of clinically relevant, additional Non-PV triggers (41.8% vs. 11.6%; P=0.003). Patients with OSA who only underwent PV isolation without ablating non-PV triggers had increased risk of arrhythmia recurrence (83.7% vs. 64.0%; P=0.003). Also, 1-year arrhythmia-free survival was similar between patients with and without OSA who underwent both PVI and non-PV triggers ablation (83.7% vs 81.4%; P=0.59).[3]

In conclusion, OSA is associated with structural and functional remodeling and increased incidence of non-PV triggers. Eliminating these triggers will improve arrhythmia free survival. In other words, patients with OSA have a higher chance to have non-PV triggers and therefore require a different approach to AFib ablation.[3] Knowing the patient's OSA status prior to the ablation process will become a critical piece of information that may help to define the right ablation strategy.

1. Seet et al. 2010 "Obstructive Sleep Apnea: Preoperative Assessment" *Anesthesiology Clin* 28 (2010) 199-215. **2.** Chinitz et al. 2015 "Effect of Obstructive Sleep Apnea Treatment on Atrial Fibrillation Recurrence: A Meta-Analysis" *JACC: Clinical Electrophysiology* Vol. 1, No. 1-2, March/April 2015: 41-51. **3.** Anter et al. "Circulation: Arrhythmia and Electrophysiology," 10(11):e005407, NOV 2017.

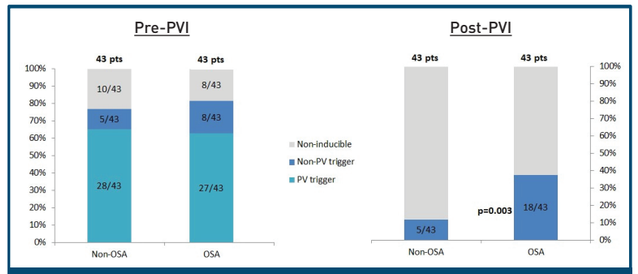


Figure 1. Distribution of atrial fibrillation (AF) triggers in patients with and without obstructive sleep apnea (OSA). PVI indicates pulmonary vein isolation.

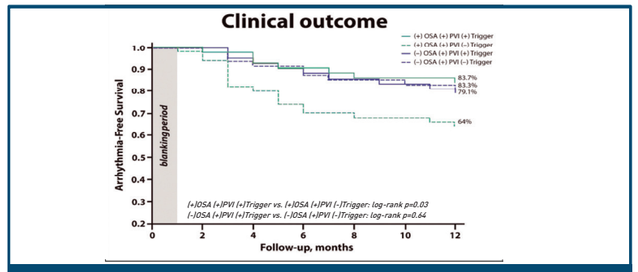


Figure 2. Kaplan–Meier survival curves according to treatment groups.
OSA indicates obstructive sleep apnea; and PVI, pulmonary vein isolation.

The Unexpected Role of OSA Treatment in SCD, Risk Stratification and Prevention

By Efrat Magidov
Scientific Consultant

Sudden cardiac death (SCD) is defined as an "unexpected natural death from a cardiac cause within a short time period, generally ≤1 hour from the onset of symptoms, in a person without any prior condition that would appear fatal".[1]

In most cases SCD results from a malfunction of the heart electrical system, causing a sudden loss of heart function (sudden cardiac arrest). Without organized electrical input to the heart, there is no consistent constriction of the ventricles which manifests in an irregular rhythm (arrhythmia) and an inadequate cardiac output. Loss of consciousness shortly follows due to lack of blood flow to the brain, and unless emergency treatment is given immediately death is inevitable.

Although SCD is one of the largest causes of natural death, accounting for up to 450,000 deaths annually in the US,[2] strategies for risk stratification and prevention are still far from ideal. This is mainly due to the fact that SCD mostly occurs in people without any diagnosed cardiac problems, and thus, an adequate characterization of risk factors is highly essential.

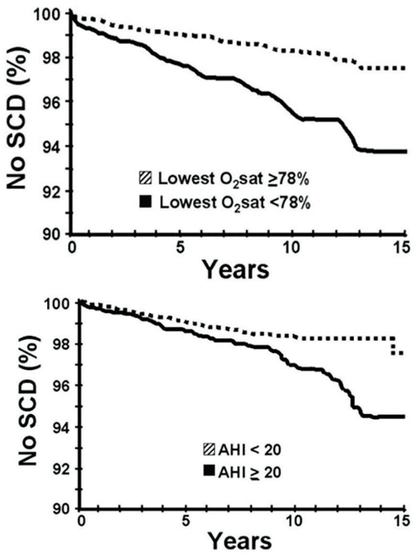


Figure 1

Such a risk factor, poorly identified until recently, is obstructive sleep apnea (OSA). The biological plausibility for OSA as a risk factor for arrhythmogenesis stems from its interventions with all three mechanisms of arrhythmias:

1. Increased automaticity—triggered by the hypoxemia and respiratory acidosis accompanying the apneic event.

2. Triggered activity—the enhanced sympathetic activity following an obstructive event can alter the afterhyperpolarization timing of the heart pacemaker cells.

3. Reentry—respiration against a partially occluded airway results in a vagal stimulation which in turn can initiate a premature cardiac action potential and negative intrathoracic pressure is believed to cause micro scarring in the heart tissue as well.

In line with such important observations on the potential relationship between these two phenomena, a growing number of studies is trying to assess the risk of SCD in OSA patients. One such attempt, and perhaps the most extensive one, was led by Dr. Virend Somers, the director of the Cardiovascular Facility and the Sleep Facility within Mayo Clinic's Center for Clinical and Translational Science in Rochester, Minnesota. In this 15-year controlled longitudinal study, 10,701 adults with suspected sleep disordered breathing were admitted to the Mayo Clinic Sleep Disorders Center for a full night evaluation, the polysomnography over-night test. The apnea-hypopnea index (AHI) was calculated as the number of apneas/hypopneas per hour of sleep, and OSA diagnosis was established for an AHI[3] in accordance with AASM criteria.

"These findings are in line with previous studies demonstrating a two-to-fourfold greater risk of abnormal heart rhythms in people with OSA than people without OSA."

The collection of follow-up data took place over 15 years (mean 5.3 years) from date of polysomnography to the date of SCD, resuscitated SCD, death from other causes, or last follow-up. SCD was established when the cause of death was sudden cardiac death, (fatal) cardiac dysrhythmia, (fatal) cardiac arrhythmia, cardiac arrest, cardiorespiratory arrest, or coronary heart disease or myocardial infarction when the time interval from symptoms to death was specified ≤ 1 hour. Overall, 142 patients had resuscitated or had a fatal SCD, representing an annual rate of 0.27% for the study population.

In accordance with the researchers' hypothesis, the presence of OSA predicted incident SCD and the magnitude of risk (hazard rate, HR) was predicted by multiple parameters that characterize OSA severity, including the AHI and nocturnal hypoxemia (AHI>20: HR 1.60; mean O2sat<93%: HR 2.93; lowest O2sat<78%: HR 2.60, all p<0.0001, Figure 1).

These findings are in line with previous studies demonstrating a two-to-fourfold greater risk of abnormal heart rhythms in people with OSA than people without OSA.[4,5] This risk had been shown to disappear completely in patients with treated OSA.[3] Taken together, these findings increase the importance of OSA diagnosis and treatment in SCD risk reduction.

1. Zipes, D. P., & Wellens, H. J. (1998). Sudden cardiac death. *Circulation*, 98(21), 2334-2351. **2.** Kong, M. H., Fonarow, G. C., Peterson, E. D., Curtis, A. B., Hernandez, A. F., Sanders, G. D., ... & Al-Khatib, S. M. (2011). Systematic review of the incidence of sudden cardiac death in the United States. J*ournal of the American College of Cardiology*, 57(7), 794-801. **3.** Doherty, L. S., Kiely, J. L., Swan, V., & McNicholas, W. T. (2005). Long-term effects of nasal continuous positive airway pressure therapy on cardiovascular outcomes in sleep apnea syndrome. *Chest*, 127(6), 2076-2084. **4.** Mehra, R., Benjamin, E. J., Shahar, E., Gottlieb, D. J., Nawabit, R., Kirchner, H. L., ... & Redline, S. (2006). Association of nocturnal arrhythmias with sleep-disordered breathing: The Sleep Heart Health Study. *American Journal of Respiratory and Critical Care Medicine*, 173(8), 910-916. **5.** Gami, A. S., Howard, D. E., Olson, E. J., & Somers, V. K. (2005). Day–night pattern of sudden death in obstructive sleep apnea. *New England Journal of Medicine*, 352(12), 1206-1214.

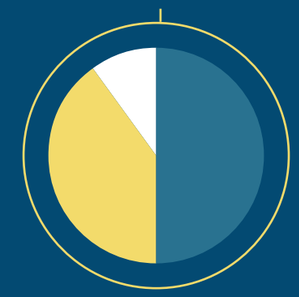
Simple Facts in the Connection Between Cardiology and Sleep Apnea

of Americans with Drug-resistant Hypertension have Sleep Apnea [1]

of Americans with Congestive Heart Failure have Sleep Apnea [2]

of Americans with TYPE 2 Diabetes have Sleep Apnea [3]

85 million cardiology patients in the USA[4]



50% of them suffer from Sleep Apnea
80% or more are not diagnosed[4]

Sleep Apnea increases the risk for Stroke and Sudden Cardiac Arrest two-fold.[4]

Sleep Apnea increases the risk for Cardiovascular Death five-fold.[4]

1. Logan et al. *J Hypertens* 2001 **2.** Oldenburg et al. *Eur J Heart Fail* 2007 **3.** Seet & Chung, *Anestsiology Clin* 2010 **4.** http://www.itamar-medical.com/wp-content/uploads/2018/04/Itamar-Medical-Investors-English-April-2018.pdf

" Patients with sleep apnea may have episodes of significant bradycardia. With inpatient WatchPAT™ Home Sleep Apnea Testing on-hand, we were able to avoid unnecessary pacemaker implant."

Dr. Zalmen Blanck

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