

A good night's sleep

SLEEP CENTER SETS SLEEPLESS ON PATH TO SWEET SLUMBER

In May 2004, Floridian Robert Bartolotta packed up his motorcycle and cruised to the nation's capital where he met his father, a veteran, and other relatives for the dedication of the National World War II Memorial. He could have flown to this historic event with the rest of his family, but instead jumped at the chance to tour the scenic Blue Ridge Parkway.

If the dedication had been five months earlier, Bartolotta would have passed on this once-in-a-lifetime experience. His then undiagnosed sleep apnea, which involves interruptions in breathing throughout the night, deprived him of deep sleep and turned him into a "walking zombie" by early afternoon every day. He simply would not have felt safe on the nearly 3,000-mile roundtrip motorcycle excursion. He didn't even feel entirely safe on his daily drive to work.

"At least two times on my 24-mile commute I can remember doing a quick nod behind the wheel," says Bartolotta. In February, this ongoing fatigue brought him to the Sleep Disorders Program at Cleveland Clinic Florida Weston, where he was diagnosed with severe obstructive sleep apnea. Through overnight observation, it was determined that Bartolotta actually stopped breathing several hundred times a night, anywhere from a few seconds to a minute at a time.

"I was shocked. I knew I had apnea, but I didn't realize I was on the 'top ten' list," he says.

Surprise and denial are common reactions to an obstructive sleep apnea diagnosis, says Laurence Smolley, M.D., Sleep Center Medical Director and Chairman of the Department of Pulmonology at Weston. These episodes of halted breathing, referred to individually as an "apnea," cause a drop in blood oxygen levels and trigger the brain to try to wake the body, which is when an apnea sufferer gasps for air and rouses from sleep. But because the individual awakens for such a short period, he or she does not remember the apnea.

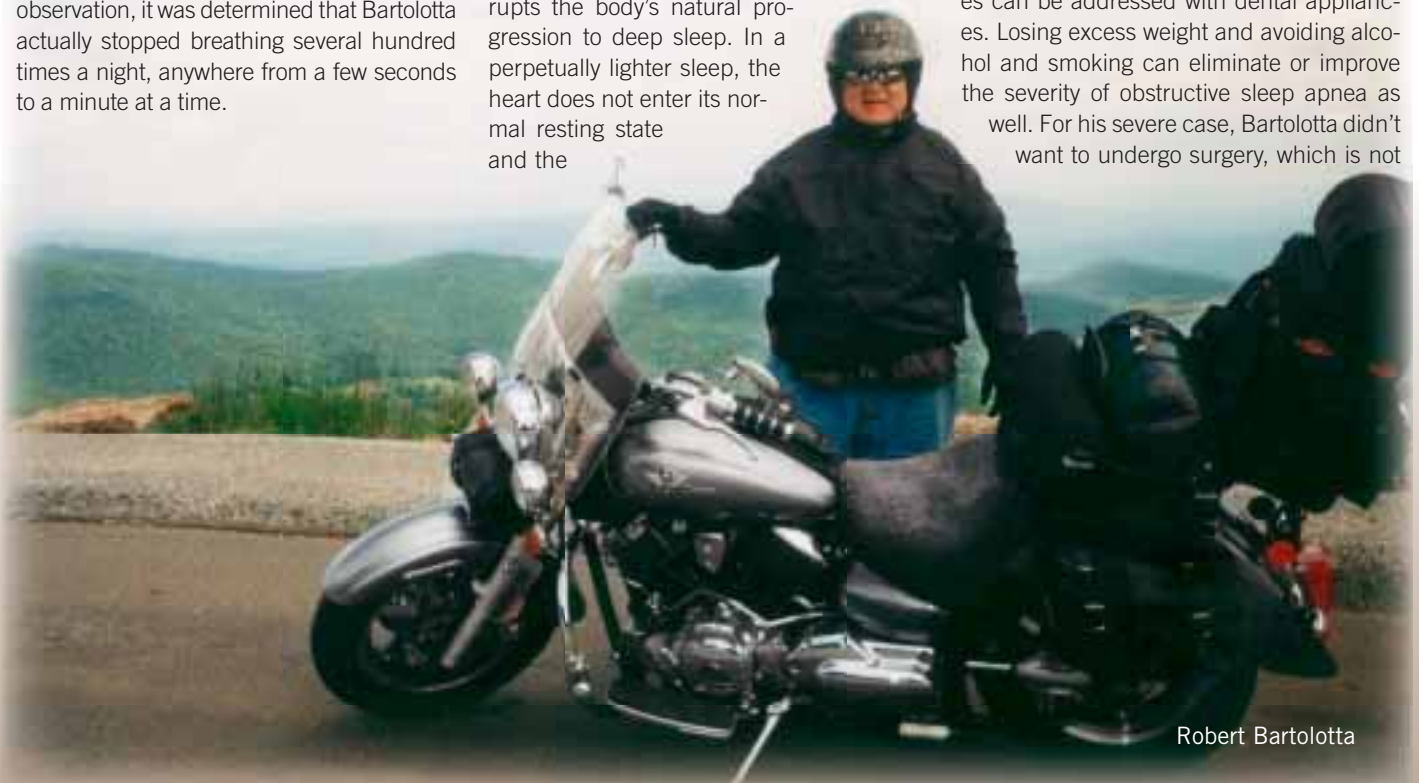
The effects, however, can be serious.

Each apnea occurrence disrupts the body's natural progression to deep sleep. In a perpetually lighter sleep, the heart does not enter its normal resting state and the

body's blood pressure does not temporarily drop as it would during deeper sleep. When breathing stops during an apnea, additional stress is placed on the heart. All this effort prevents both the mind and body from rejuvenating and can lead to cardiovascular problems such as a round-the-clock increase in blood pressure.

"It's like exercising all night," explains Sleep Center chief polysomnographic technologist Patrick McMahon. "That's why excessive night sweating is a common side effect of sleep apnea."

The most drastic treatments for obstructive sleep apnea include surgery to remove the tonsils, uvula (the little piece of flesh that hangs down in the back of the throat) or other tissue, while mild to moderate cases can be addressed with dental appliances. Losing excess weight and avoiding alcohol and smoking can eliminate or improve the severity of obstructive sleep apnea as well. For his severe case, Bartolotta didn't want to undergo surgery, which is not



Robert Bartolotta



Image, left: Electrode placement for a sleep study.

Image, right: A sleep technologist monitors a patient during a study.



guaranteed to fix the problem, and instead opted for a treatment called Continuous Positive Airway Pressure (CPAP).

Sleep Center technologists fitted Bartolotta with a mask and machine to keep his airway open at night. This CPAP device is a shoebox-sized air pump connected to a facemask by a long tube. It pressurizes the air he breathes just enough to prevent his airway from collapsing as his throat muscles relax during sleep, but not so much that he can't easily exhale. Bartolotta compares it to wearing a scuba regulator, from the feel of the mask to the oddly comforting sound of air streaming in and out.

From the first night Bartolotta wore the CPAP device, the number of apneas he experienced was significantly reduced. He felt more energetic during the day and his daytime blood pressure went down as well. His commute was no longer a cause for worry. After nearly a year of using the device, he returned to the Sleep Center to undergo evaluation for a more compact, travel-friendly version.

At the Sleep Center, a technologist carefully measures Bartolotta's head and attaches small metal electrodes to his scalp and face with a toothpaste-like adhesive. These will measure brain waves and facial muscle movements as he sleeps. The sleep technologist also adheres electrodes trailed by a rainbow of wires to Bartolotta's legs and chest to track muscle motion and heart rate. A blood oxygen monitor clips onto a finger, and a tube to measure airflow is inserted in his nostrils. Belts around the chest and waist will measure the physical motion of breathing, and a video camera stands by to capture tossing and turning. Two technologists will be on hand all night to ensure the electrodes stay attached and indicate activity in patient data logs.

Though all this wiring and equipment might seem a bit intimidating, the room in which Bartolotta sleeps is anything but. With soft lighting, rich wood paneling and jewel-toned bed linens framed by an ornate headboard, the accommodations are more reminiscent of a hotel than a medical laboratory. "Except, of course, for the white board with the 'Nursing Assistant' note on it," laughs Bartolotta.

The unusually inviting hospital setting is one of the quality assurance requirements that recently earned the four-bed Sleep Center accreditation by the American Academy of Sleep Medicine (AASM). To gain this status, the center passed a full inspection by an accrediting physician who scrutinized everything from lab techniques to bathroom facilities. The academy standards are designed to ensure the highest quality levels in patient care and comfort.

Staff credentials also are an important factor in AASM accreditation. After a patient such as Bartolotta visits the lab, one of three registered polysomnographic technologists pours over the sleep study, called a polysomnogram, viewing six hours' worth of captured data in 30-second increments. (see graph, page 40). As lines plotting the patient's life functions zigzag across the computer screen, the technologist notes transitions into various sleep states and sleep disturbances, such as apneas. He assigns a score based on the number of disturbances. As the American Board of Sleep Medicine-certified director, Dr. Smolley reviews any conclusions made.

Almost all of the more than 1,000 patients referred to the Sleep Center each year are suspected sleep apnea sufferers. The Sleep Center also evaluates individuals with other sleep disorders, such as restless leg syndrome and narcolepsy, which entails extreme sleepiness and a tendency to fall asleep at inappropriate times.

In cases of suspected sleep apnea, the sleep study is recommended to confirm diagnosis, which is based mainly on medical history. A follow-up study, usually performed on a second night but sometimes during the second half of a single-night study, allows technologists to customize the pressure setting on a CPAP machine.

Eyes light up behind metal-rimmed glasses when Dr. Smolley, an exuberant pulmonologist, describes his team's work. The center's contributions have been added to a recent wave of change in the field of sleep medicine, a development driven by the serious health risks posed to at least 40 million Americans who suffer from chronic sleep disorders, according to the National Institutes of Health.

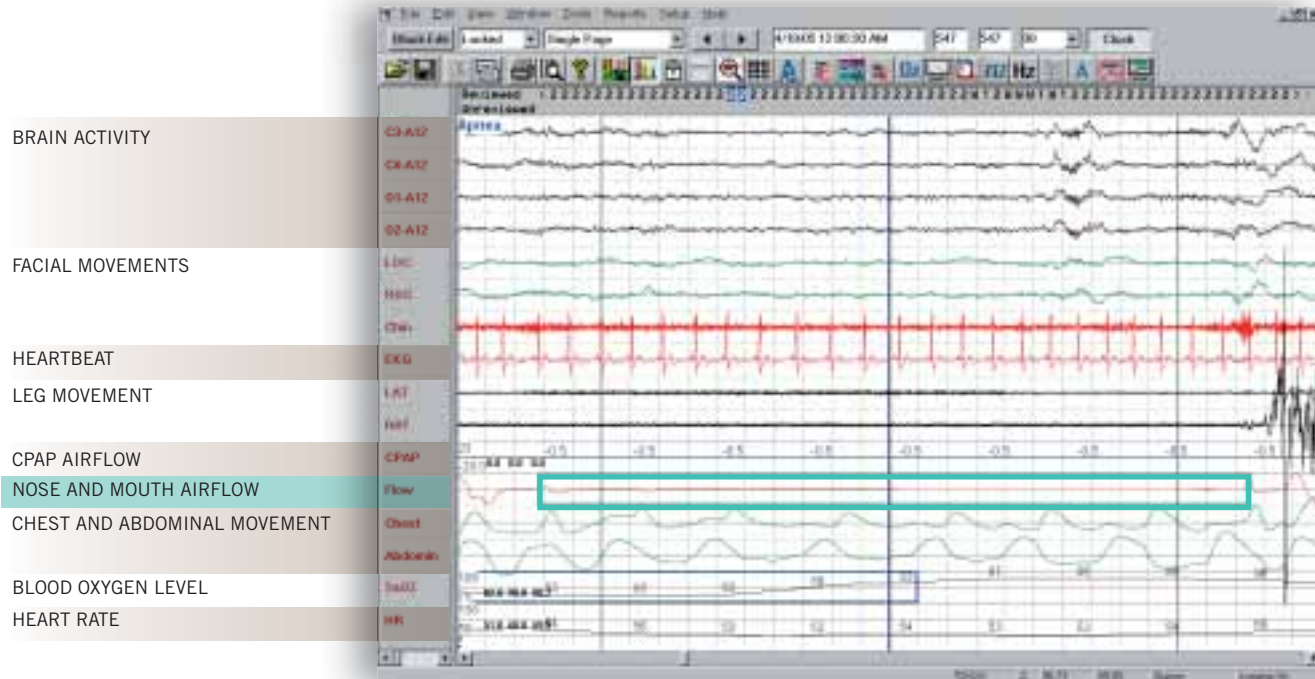
While physicians have been aware of cardiovascular implications of sleep apnea since the 1970s, it was only in the late 1990s that physicians and researchers started assembling solid clinical and laboratory data, says Dr. Smolley, who built the Sleep Disorders Program from the ground up when he came to Cleveland Clinic Florida in 1995.

"There's strong evidence today that CPAP treatment for obstructive sleep apnea is invaluable. It not only helps a patient get a good night's sleep and feel better the next day, but it can abort the cardiovascular consequences of sleep apnea - the high blood pressure, the heart failure and cardiac arrhythmia," says Dr. Smolley. "And there's a very strong association between atrial fibrillation and sleep apnea."

Beyond cardiovascular consequences, in April 2005 the *Archives of Internal Medicine* reported study results associating sleeping for less than six hours or for more than nine hours a night with increased risk

Tracking Apnea

In the sleep study graph below, each line represents the signal from a different electrode on the body. By tracking brain waves, breathing, heart rate and muscle movements, technicians can identify sleep patterns and disturbances, such as the apnea evidenced here by the halt in airflow through the nose and mouth (green box).



of diabetes and impaired blood sugar (glucose) tolerance.

With the dangerous effects of sleep disorders better defined, the latest industry research and development efforts have focused on successful treatments. Recently a new sleeping pill, eszopiclone, was determined safe for use for up to 12 months.

“The conventional wisdom was that sleeping pills shouldn’t be taken for more than two to three weeks,” says Dr. Smolley. “The whole sleep community is in a bit of an upheaval regarding any possible change in the AASM’s recommendations on how long a sleeping pill can be taken.”

Dr. Smolley believes the controversy is going to be between behavioral and cognitive therapists and pharmacologists who

study drug therapies. He says that he typically finds success treating disorders, such as insomnia, with behavioral therapies including relaxation techniques and having patients get out of bed when not drowsy instead of “trying too hard” to fall asleep.

Dr. Smolley also applies his behavioral expertise to introducing the CPAP machine gradually. The Sleep Center team regularly holds talks on sleep apnea and CPAP for at-risk groups, such as seniors and gastric bypass surgery candidates. Education about sleep apnea and the benefits of CPAP treatment and gradual acclimation to the device are crucial to an individual sticking with the treatment, says Dr. Smolley. “A CPAP machine is like a pair of dress shoes: It takes some getting used to.”

To further enhance the comfort and effectiveness of CPAP treatment, Dr. Smolley expects an explosion in engineering for new CPAP masks and interfaces in coming years, offering more consistent pressure and customized comfort. He also anticipates the fine-tuning of “smart” CPAP machine designs that automatically adjust air pressure on the fly to improve the effectiveness for patients such as Bartolotta.

“I would like to not have to use CPAP someday,” says Bartolotta. “But until that day comes, I’m really glad it’s there.”

In addition to the Sleep Center in Weston, Fla., The Cleveland Clinic operates a Sleep Disorders Center with a sleep lab in Cleveland, Ohio.

RATE YOUR SLEEP ONLINE

Do you wake up tired? Wonder if you should undergo a sleep study? The Epworth Sleepiness Scale is a screening tool that helps determine whether individuals are candidates for a sleep study. Take the quiz online at www.clevelandclinic.org/clevelandclinicmagazine.