



Sleep Apnea

WHAT IS SLEEP APNEA?

Sleep apnea is a serious, potentially life-threatening condition that is far more common than generally understood. First described in 1965, sleep apnea is a breathing disorder characterized by brief interruptions of breathing during sleep. It owes its name to a Greek word, apnea, meaning “want of breath.” There are two types of sleep apnea: central and obstructive. Central sleep apnea, which is less common, occurs when the brain fails to send the appropriate signals to the breathing muscles to initiate respirations. Obstructive sleep apnea is far more common and occurs when air cannot flow into or out of the person’s nose or mouth although efforts to breathe continue.

In a given night, the number of involuntary breathing pauses or “apneic events” may be as high as 20 to 30 or more per hour. These breathing pauses are almost always accompanied by snoring between apnea episodes, although not everyone who snores has this condition. Sleep apnea can also be characterized by choking sensations. The frequent interruptions of deep, restorative sleep often lead to early morning headaches and excessive daytime sleepiness.

Early recognition and treatment of sleep apnea is important because it may be associated with irregular heartbeat, high blood pressure, heart attack, and stroke.

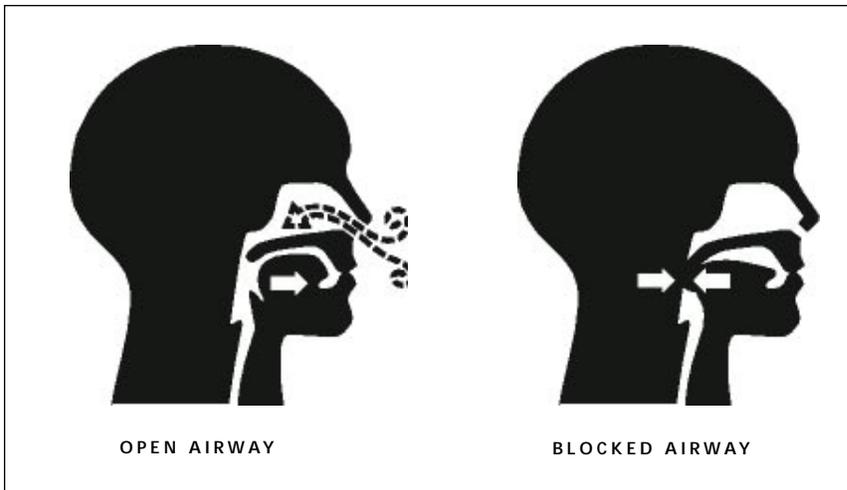
WHO GETS SLEEP APNEA?

Sleep apnea occurs in all age groups and both sexes but is more common in men (it may be underdiagnosed in women) and possibly young African Americans. It has been estimated that as many as 18 million Americans have sleep apnea. Four percent of middle-aged men and 2 percent of middle-aged women have sleep apnea along with excessive daytime sleepiness. People most likely to have or develop sleep apnea include those who snore loudly and also are overweight, or have high blood pressure, or have some physical abnormality in the nose, throat, or other parts of the upper airway. Sleep apnea seems to run in some families, suggesting a possible genetic basis.

WHAT CAUSES SLEEP APNEA?

Certain mechanical and structural problems in the airway cause the interruptions in breathing during sleep. In some people, apnea occurs when the throat muscles and tongue relax during sleep and partially block the opening of the airway. When the muscles of the soft palate at the base of the tongue and the uvula (the small fleshy tissue hanging from the center of the back of the throat) relax and sag, the airway becomes blocked, making breathing labored and noisy and even stopping it altogether. Sleep apnea also can occur in obese people when an excess amount of tissue in the airway





causes it to be narrowed. With a narrowed airway, the person continues his or her efforts to breathe, but air cannot easily flow into or out of the nose or mouth. Unknown to the person, this results in heavy snoring, periods of no breathing, and frequent arousals (causing abrupt changes from deep sleep to light sleep). Ingestion of alcohol and sleeping pills increases the frequency and duration of breathing pauses in people with sleep apnea.

HOW IS NORMAL BREATHING RESTORED DURING SLEEP?

During the apneic event, the person is unable to breathe in oxygen and to exhale carbon dioxide, resulting in low levels of oxygen and increased levels of carbon dioxide in the blood. The reduction in oxygen and increase in carbon dioxide alert the brain to resume breathing and cause an arousal. With each arousal, a signal is sent from the brain to the upper airway muscles to open the airway; breathing is resumed, often with a loud snort or gasp. Frequent arousals, although necessary for breathing to restart, prevent the patient from getting enough restorative, deep sleep.

WHAT ARE THE EFFECTS OF SLEEP APNEA?

Because of the serious disturbances in their normal sleep patterns, people with sleep apnea often feel very sleepy during the day and their concentration and daytime performance suffer. The consequences of sleep apnea range from annoying to life-threatening. They include depression, irritability, sexual dysfunction, learning and memory difficulties, and falling asleep while at work, on the phone, or driving. It has been estimated that up to 50 percent of sleep apnea patients have high blood pressure. Although it is not known with certainty if there is a cause and effect relationship, it appears that sleep apnea contributes to high blood pressure. Risk for heart attack and stroke may also increase in those with sleep apnea. In addition, sleep apnea is sometimes implicated in sudden infant death syndrome.

WHEN SHOULD SLEEP APNEA BE SUSPECTED?

For many sleep apnea patients, their spouses are the first ones to suspect that something is wrong, usually from their heavy snoring and appar-

ent struggle to breathe. Coworkers or friends of the sleep apnea victim may notice that the individual falls asleep during the day at inappropriate times (such as while driving a car, working, or talking). The patient often does not know he or she has a problem and may not believe it when told. It is important that the person see a doctor for evaluation of the sleep problem.

HOW IS SLEEP APNEA DIAGNOSED?

In addition to the primary care physician, pulmonologists, neurologists, or other physicians with specialty training in sleep disorders may be involved in making a definitive diagnosis and initiating treatment. Diagnosis of sleep apnea is not simple because there can be many different reasons for disturbed sleep. Several tests are available for evaluating a person for sleep apnea.

Polysomnography is a test that records a variety of body functions during sleep, such as the electrical activity of the brain, eye movement, muscle activity, heart rate, respiratory effort, air flow, and blood oxygen levels. These tests are used both to diagnose sleep apnea and to determine its severity.

The *Multiple Sleep Latency Test (MSLT)* measures the speed of falling asleep. In this test, patients are given several opportunities to fall asleep during the course of a day when they would normally be awake. For each opportunity, time to fall asleep is measured. People without sleep problems usually take an average of 10 to 20 minutes to fall asleep. Individuals who fall asleep in less than 5 minutes are likely to

require some treatment for sleep disorders. The MSLT may be useful to measure the degree of excessive daytime sleepiness and to rule out other types of sleep disorders.

Diagnostic tests usually are performed in a sleep center, but new technology may allow some sleep studies to be conducted in the patient's home.

HOW IS SLEEP APNEA TREATED?

The specific therapy for sleep apnea is tailored to the individual patient based on medical history, physical examination, and the results of polysomnography. Medications are generally not effective in the treatment of sleep apnea. Oxygen administration may safely benefit certain patients but does not eliminate sleep apnea or prevent daytime sleepiness. Thus, the role of oxygen in the treatment of sleep apnea is controversial, and it is difficult to predict which patients will respond well. It is important that the effectiveness of the selected treatment be verified; this is usually accomplished by polysomnography.

Behavioral Therapy

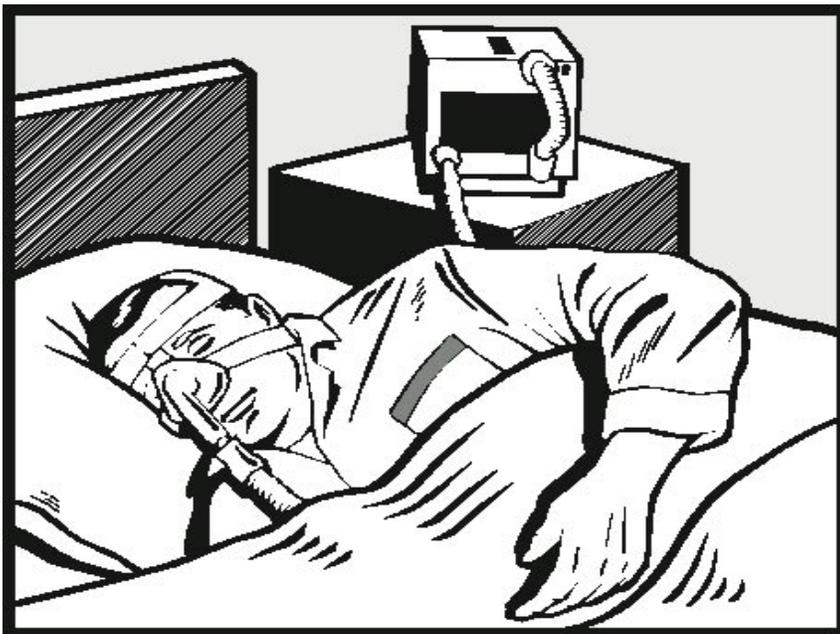
Behavioral changes are an important part of the treatment program, and in mild cases behavioral therapy may be all that is needed. The individual should avoid the use of alcohol, tobacco, and sleeping pills, which make the airway more likely to collapse during sleep and prolong the apneic periods. Overweight persons can benefit from losing weight. Even a 10 percent weight loss can reduce the number of apneic events for most patients. In some patients with mild sleep apnea, breathing pauses occur only when they sleep on their backs. In such cases, using pillows and other devices that help them sleep in a side position is often helpful.

Physical or Mechanical Therapy

Nasal *continuous positive airway pressure* (CPAP) is the most common effective treatment for sleep apnea. In this procedure, the patient wears a mask over the nose during sleep, and pressure from an air blower forces air through the nasal passages. The air pressure is adjusted so that it is just

NATIONAL CENTER ON SLEEP DISORDERS RESEARCH (NCSDR)

The mission of the NCSDR is to support research, training, and education about sleep disorders. The center is located within the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health. The NHLBI supports a variety of research and training programs focusing on cardiopulmonary disorders in sleep, designed to fill critical gaps in the understanding of the causes, diagnosis, treatment, and prevention of sleep-disordered breathing.



A PATIENT USING CPAP

enough to prevent the throat from collapsing during sleep. The pressure is constant and continuous. Nasal CPAP prevents airway closure while in use, but apnea episodes return when CPAP is stopped or used improperly.

Variations of the CPAP device attempt to minimize side effects that sometimes occur, such as nasal irritation and drying, facial skin irritation, abdominal bloating, mask leaks, sore eyes, and headaches. Some versions of CPAP vary the pressure to coincide with the person's breathing pattern, and others start with low pressure, slowly increasing it to allow the person to fall asleep before the full prescribed pressure is applied.

Dental appliances that reposition the lower jaw and the tongue have been helpful to some patients with mild sleep apnea or who snore but do not have apnea. Possible side effects include damage to teeth, soft tissues, and the jaw joint. A dentist or orthodontist is often the one to fit the patient with such a device.

Surgery

Some patients with sleep apnea may need surgery. Although several surgical procedures are used to increase the size of the airway, none of them is completely successful or without risks. More than one procedure may need to be tried before the patient realizes any benefits.

Some of the more common procedures include removal of adenoids and tonsils (especially in children), nasal polyps or other growths, or other tissue in the airway and correction of structural deformities. Younger patients seem to benefit from these surgical procedures more than older patients.

Uvulopalatopharyngoplasty (UPPP) is a procedure used to remove excess tissue at the back of the throat (tonsils, uvula, and part of the soft palate). The success of this technique may range from 30 to 50 percent. The long-term side effects and benefits are not known, and it is difficult to predict which patients will do well with this procedure.

Laser-assisted uvulopalatoplasty (LAUP) is done to eliminate snoring but has not been shown to be effective in treating sleep apnea. This procedure involves using a laser device to eliminate tissue in the back of the throat. Like UPPP, LAUP may decrease or eliminate snoring but not sleep apnea itself. Elimination of snoring, the primary symptom of sleep apnea, without influencing the condition may carry the risk of delaying the diagnosis and possible treatment of sleep apnea in patients who elect LAUP. To identify possible underlying sleep apnea, sleep studies are usually required before LAUP is performed.

Tracheostomy is used in persons with severe, life-threatening sleep apnea. In this procedure, a small hole is made in the windpipe and a tube is inserted into the opening. This tube stays closed during waking hours, and the person breathes and speaks normally. It is opened for sleep so that air flows directly into the lungs, bypassing any upper airway obstruction. Although this procedure is highly effective, it is an extreme measure that is poorly tolerated by patients and rarely used.

Other procedures. Patients in whom sleep apnea is due to deformities of the lower jaw may benefit from surgical reconstruction. Finally, surgical procedures to treat obesity are sometimes recommended for sleep apnea patients who are morbidly obese.

FOR MORE INFORMATION

Information about sleep disorders research can be obtained from the NCSDR. In addition, the NHLBI Information Center can provide you with sleep education materials as well as other publications relating to heart, lung, and blood diseases.

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service
National Institutes of Health
National Heart, Lung, and Blood Institute

NIH Publication No. 95-3798
September 1995