

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## Glossary

---

### Abbreviations:

<b>AASM</b>	<b>American Academy of Sleep Medicine</b>
<b>AADSM</b>	<b>American Academy of Dental Sleep Medicine</b>
<b>EEG</b>	<b>electroencephalogram</b>
<b>PSG</b>	<b>Polysomnography</b>
<b>OSA</b>	<b>Obstructive Sleep Apnea</b>
<b>AHI</b>	<b>Apnea Hypopnea Index</b>
<b>ArI</b>	<b>Arousal Index</b>
<b>TST</b>	<b>Total sleep time</b>
<b>R&amp;K</b>	<b>Rechtschaffen – Kales</b>
<b>SE</b>	<b>Sleep efficiency</b>
<b>SL</b>	<b>Sleep latency</b>
<b>RL</b>	<b>REM latency</b>
<b>EOG</b>	<b>electrooculogram</b>
<b>ECG</b>	<b>electrocardiogram</b>
<b>EMG</b>	<b>electromyogram</b>
<b>M3EEG</b>	<b>Montage including 3 EEG derivations from frontal, central, occipital regions</b>
<b>M1EEG</b>	<b>Montage including 1 central EEG derivation only;</b>
<b>PSA</b>	<b>proportion of specific agreement</b>
<b>N1</b>	<b>stage 1 sleep</b>
<b>N2</b>	<b>stage 2 sleep</b>
<b>N3</b>	<b>stage 3 sleep</b>

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

**R**      **rapid eye movement sleep**

**NR**     **non-rapid eye movement sleep**

**W**      **wake**

**ESS**    **Epworth sleepiness scale**

## A

### ABDOMINAL FAT

Fat deposits around the gut. Chronic stress preferentially promotes the deposition of abdominal fat, which is of the type that is worse for cardiovascular health.

### ACTIGRAPHY

Use of recordings of body motion to display activity patterns across many consecutive days and nights. These temporal patterns are used for classifying periods of relative rest that usually indicate sleep, and periods of relative activity and usually indicate wakefulness. Actigraphy can be performed on subjects in their usual setting (e.g. at home) by wearing a wristwatch-sized actimeter device that measures and records accelerations of the wrist. Thus, overall sleep and wakefulness patterns can be estimated over many days and nights without the need for directly recording sleep and wakefulness by use of a polysomnogram in a lab setting.

### ADENOSINE

An essential molecule found in all cells and involved in providing the energy needed for many biochemical processes. Adenosine also appears to play an important role in sleep initiation. The concentration of adenosine surrounding cells in some of the arousal centers of the brain increases with prolonged wakefulness and inhibits arousal. For that reason, adenosine is thought to be involved in the initiation of sleep. In contrast, use of caffeine promotes wakefulness by blocking the action of adenosine.

### ADRENALINE

see **EPINEPHRINE**

### ADVANCED SLEEP PHASE SYNDROME

A daily sleep/wake rhythm in which the onset of sleep and the time of awakening are earlier than desired. A person with ASPS wakes up earlier and wants to go to sleep earlier than most individuals.

### AIRFLOW LIMITATION (FLOW LIMITATION)

Reduced airflow into the lungs due to a partial closure of the upper airway.

### ALPHA ACTIVITY

A pattern of brainwave activity detected by electroencephalography with a rhythm at 8-13 Hz (cycles/second). The presence of alpha activity usually indicates relaxed wakefulness with eyes closed, which often precedes the onset of sleep.

### AMBULATORY MONITOR

Portable system used to test multiple physiological variables during sleep. This equipment can be used in the patient's home.

### AMINO ACIDS

Approximately 20 different kinds of closely related molecules that are the building blocks of protein.

### AMPLITUDE

The height of a wave. The amplitude of brainwaves derived from EEG changes with depth of sleep. For EEGs, amplitude is measured in voltage, typically microvolts.

### AMYGDALA

A part of the brain's limbic system that plays an important role in fear and anxiety.

### ANALGESIA

The blocking of pain perception. Stress-induced analgesia is the phenomenon where extreme, acute stress blocks pain perception.

### ANAPHYLAXIS

A severe life-threatening allergic reaction to a drug or other substance such as latex in surgical gloves.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **ANHEDONIA**

The inability to feel pleasure; a defining symptom of depression.

**ANTERIOR CINGULATE CORTEX** A region of the brain's frontal cortex that plays a role in evaluating pain and in empathy. Abnormalities in its function have been noted in people with depression.

#### **ANTIHISTAMINES**

Drugs that block the action of histamine, lessening the effects of allergic reactions. Antihistamines have a sedative side effect and are often found in many over-the-counter sleep medications.

#### **APNEA (APNEIC EVENT)**

A period when breathing stops for at least 10 seconds or more during sleep. When an apneic event occurs, airflow to the lungs stops. Apnea literally means "without breath." Apnea may also be defined as at least a 4% drop in the saturation of oxygen in the blood. When breathing stops or is reduced, the oxygen level in the blood falls because the oxygen is blocked. Therefore, oxygen can't be absorbed into the blood and circulated through the body. There are two types of apnea. *Obstructive Apnea* is caused by a closure of the air passage despite efforts to breathe; *Central Apnea* is a lack of effort to breathe. Obstructive sleep apnea is by far the most common type. True apnea during wakefulness is extremely rare. *Mixed Apnea* is a combination of effort to breathe and lack of effort to breathe.

#### **APNEA-HYPOPNEA INDEX (AHI)**

A measure that indicates the severity of sleep apnea. It is the average number of apneas and hypopneas per hour of sleep. This is calculated by adding the total number of all apneas and hypopneas and dividing by the number of hours the patient spends asleep. This measure represents the severity of sleep apnea including sleep disruptions and desaturations (a low level of oxygen in the blood). See *Hypopnea*. A related measure is respiratory disturbance index (RDI).

#### **APNEA INDEX**

The number of apneas that occur per hour of sleep.

#### **AROUSAL**

An abrupt change from sleep to wakefulness, or from a "deeper" stage of non-REM sleep to a "lighter" stage. Can be caused by a drop in blood oxygen, high blood carbon dioxide, leg movements, or environmental factors such as loud noises. (Arousal Index measures total number of arousals per hour of sleep)

#### **ARRHYTHMIA**

Any disorder of the regular heart beat or rhythm. The abnormal heartbeats may be too slow, too rapid, too irregular, or too early.

#### **ATELECTASIS**

Partial or total collapse of a lung or segment of a lung which has been previously expanded.

#### **ATHEROSCLEROSIS**

A disease of the vascular system in which portions of the inner lining of blood vessels are degenerated and inflamed and deposits of cholesterol form plaques that impede blood flow.

#### **AUTO ADJUSTING CONTINUOUS POSITIVE AIRWAY PRESSURE DEVICE (AUTO CPAP)**

A type of CPAP machine that measures changes in the individual's breathing and compensates automatically by making the appropriate adjustment in air pressure. See *CPAP*.

#### **AUTOIMMUNE DISEASE**

A disease in which the immune system mistakenly responds to a part of the body as if it is an invasive pathogen and attacks it. Examples include juvenile diabetes, in which insulin-secreting cells in the pancreas are attacked; rheumatoid arthritis, in which joints are attacked; and multiple sclerosis, in which aspects of the spinal cord are attacked.

#### **AUTONOMIC NERVOUS SYSTEM**

A part of the nervous system that mediates aspects of the body's function that are often automatic, or involuntary. Consists of the sympathetic nervous system (generally involved in arousal and stress-responses) and the opposing parasympathetic nervous system (generally involved in calm, vegetative bodily function).

---

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## B

### **BENZODIAZEPINES**

Anxiety-reducing tranquilizers such as Valium and Librium. The brain contains receptors for them, indicating that the brain makes still-undiscovered natural versions of these drugs.

### **BETA ACTIVITY**

A pattern of brainwave activity detected by EEG with a rhythm at 13-35 Hz. The presence of beta activity usually indicates alert wakefulness or vigilance.

### **BETA-ENDORPHIN**

A hormone released during stress, predominately from the pituitary gland. It plays a role in stress-induced analgesia and in some of the disruptive effects on reproduction.

### **BI-LEVEL POSITIVE AIRWAY PRESSURE (BI-LEVEL OR BI-PAP)**

A PAP device providing two measured pressure levels of continuous airflow: one level for inhalation and a lower level for exhalation. May be used when CPAP is insufficient, such as in the case of neuromuscular weakness or scoliosis.

### **BODY MASS INDEX (BMI)**

An estimate of an individual's relative body fat calculated from his or her height and weight. The formula for calculating BMI is weight in kilograms (kg) divided by height in meters (m) squared.

### **BRACHYCARDIA**

A heart rate that is too slow for the patient. Adults less than 60 beats/minute; children varies according to age.

### **BRAINWAVES**

Patterns of electrical activity in the brain. These patterns can be recorded from scalp recordings using EEG and are described based on frequency, amplitude, and shape characteristics.

### **BRUXISM**

Grinding one's teeth while asleep. In a small percentage of patients, symptoms include tooth wear, jaw pain and headaches.

---

## C

### **CAPNOGRAPH**

A monitor that detects the amount of carbon dioxide in each breath.

### **CARDIAC ARREST**

Sudden cessation of a heart's beating.

### **CARDIOVASCULAR**

Pertaining to the heart and blood vessels.

### **CATAPLEXY**

An abnormal sudden paralysis of some or all skeletal muscles brought on by strong emotions such as those that accompany laughter and anger. Cataplexy is a hallmark of narcolepsy.

### **CATATHRENIA**

Nocturnal groaning, a relatively rare and undocumented parasomnia, in which the subject groans during their sleep, often quite loudly. It can occur during any sleep stage, but seems to happen with the most frequency during REM or deep sleep. Contrary to snoring, which occurs during inhalation, groaning occurs during exhalation; one groan can last as long as 30 seconds. The groans are usually succeeded by a snort or sigh at the end. Groaning is not related in any way to sleep talking. It also has shown no connection to general breathing problems or sleep-related breathing difficulties, any abnormal brain activity or mental disorders, or any other sleep-related disorders in general. The cause is still a mystery.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **CENTRAL SLEEP APNEA (CSA)**

A period of at least 10 seconds without airflow, during which there is no respiratory effort. Occurs when the brain doesn't send proper signals from respiratory control centers to activate the muscles that control breathing. This occurs most often during sleep when the carbon dioxide levels in the blood are reduced below normal, and can be triggered by prior over-breathing. CSA can also occur with damage to certain neural pathways involved in respiratory control. Unlike obstructive sleep apnea, snoring is typically not present.

#### **CHOLESTEROL**

For the purposes of this course, there is "bad," LDL (low-density lipoprotein) cholesterol, which promotes atherosclerosis; and "good," HDL (high-density lipoprotein) cholesterol, which does the opposite.

#### **CIRCADIAN**

A term derived from the Latin words *circa* and *dies*, meaning "about a day." An internal circadian pacemaker in the hypothalamus of the brain organizes our physiology and behavior over a 24-hour period, including the sleep/wake cycle.

#### **CIRCADIAN CLOCK**

The internal pacemaker in the hypothalamus regulating physiology and behavior in a 24-hour period; also known as circadian pacemaker or internal biological clock.

#### **CIRCADIAN RHYTHM**

A day/night pattern in many physiological and behavioral variables occurring over a 24-hour period, generated internally by a circadian pacemaker, and persisting under constant environmental conditions.

#### **CIRCADIAN RHYTHM SLEEP DISORDER**

A condition in which a person's sleep/wake schedule is out of synchrony with, or occurs at an unusual phase of, the internal circadian clock. Circadian rhythm sleep disorder can occur, for instance, with shift work, jet lag, advanced sleep-phase syndrome, and delayed sleep-phase syndrome. The mismatch can lead to insomnia during attempted sleep times and excessive sleepiness throughout scheduled wake times.

#### **COMPLIANCE**

The process of complying with or adhering to a regimen of treatment.

#### **CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)**

Medical device used to treat obstructive sleep apnea. A machine supplies positive air pressure to inflate the airway like a balloon which eliminates blockages and prevents the collapse of the upper airway during sleep. Air pressure is delivered through a hose to a mask that fits over the nose, or both nose and mouth. The complete system consists of a programmable pressure generator, tubing, mask and headgear (straps). It acts as a pneumatic splint for a collapsing airway.

#### **CORTEX**

The outer surface of the brain, it is the most recently evolved and involved in the most abstract brain functions. Most pertinent to this course is the frontal cortex.

#### **CORTISOL**

See **GLUCOCORTICOIDS**.

#### **CPAP PRESSURE**

The amount of air pressure required to keep the patient's airway open when being treated with CPAP; expressed in centimeters of water (cm H2O). The positive pressure may range from 5 to 20 cm H2O. Different patients will require different pressures. This value is determined in a CPAP titration study.

#### **CUSHING'S SYNDROME**

A collection of diseases involving pathologically elevated levels of glucocorticoids.

#### **CYANOSIS**

Dusky blue appearance of the skin, tongue or mucous membranes due to a low level of oxygenated hemoglobin in blood vessels near the skin surface.

---

**Study Objectives:** Both anatomical and nonanatomical traits are important in obstructive sleep apnea (OSA) pathogenesis. We have previously described a model combining these traits, but have not determined its diagnostic accuracy to predict OSA. A valid model, and knowledge of the published effect sizes of trait manipulation, would also allow us to predict the number of patients with OSA who might be effectively treated without using positive airway pressure (PAP).

**Design, Participants and Intervention:** Fifty-seven subjects with and without OSA underwent standard clinical and research sleep studies to measure OSA severity and the physiological traits important for OSA pathogenesis, respectively. The traits were incorporated into a physiological model to predict OSA. The model validity was determined by comparing the model prediction of OSA to the clinical diagnosis of OSA. The effect of various trait manipulations was then simulated to predict the proportion of patients treated by each intervention.

**Measurements and Results:** The model had good sensitivity (80%) and specificity (100%) for predicting OSA. A single intervention on one trait would be predicted to treat OSA in approximately one quarter of all patients. Combination therapy with two interventions was predicted to treat OSA in ~50% of patients.

**Conclusions:** An integrative model of physiological traits can be used to predict population-wide and individual responses to non-PAP therapy. Many patients with OSA would be expected to be treated based on known trait manipulations, making a strong case for the importance of non-anatomical traits in OSA pathogenesis and the effectiveness of non-PAP therapies.

**Keywords:** arousal threshold, non PAP therapy, obstructive sleep apnea, upper airway anatomy

**Citation:** Owens RL, Edwards BA, Eckert DJ, Jordan AS, Sands SA, Malhotra A, White DP, Loring SH, Butler JP, Wellman A. An integrative model of physiological traits can be used to predict obstructive sleep apnea and response to non positive airway pressure therapy. *SLEEP* 2015;38(6):961–970.

## INTRODUCTION

In addition to compromised upper airway anatomy, other physiological traits are increasingly recognized for their contributions to the development of obstructive sleep apnea (OSA). These nonanatomical traits include: (1) poor pharyngeal muscle responsiveness during sleep, (2) an overly sensitive ventilatory control system (i.e., high loop gain [LG]), and (3) a low respiratory arousal threshold that leads to arousal rather than stable ventilation.<sup>1–4</sup> Given the variable adherence to continuous positive airway pressure (CPAP),<sup>5,6</sup> we and others have suggested that an alternative approach for nonadherent patients would be targeted manipulation of one or more of the underlying traits that contribute to OSA pathogenesis. However, no such method or model is yet validated to predict how many patients might benefit from non-PAP therapy, or how to guide therapy in an individual patient.

There are several prerequisites before such an approach to OSA management could be attempted. First, the traits would need to be measured in an easy and relatively noninvasive

fashion. Second, the traits must be modifiable by existing therapies (medications or devices) that are safe, known to be effective, and acceptable to patients. Third, a model is needed that integrates all of the traits in a given individual and predicts the effect of trait modification on OSA. Such a model could serve as a clinical decision making tool to aid physicians in selecting appropriate therapy, i.e., personalized treatment for OSA.

Advances in the first two areas have been made. We recently described techniques for measuring the aforementioned physiological traits *in vivo* during sleep by manipulating the CPAP level, in some respects similar to a CPAP titration study.<sup>18</sup> Measurement of the traits suggests that many patients might be eligible for non-PAP therapies. Using their pharyngeal critical pressure (Pcrit), arousal threshold, loop gain, and muscle responsiveness (PALM) scale, Eckert and colleagues proposed dividing patients with OSA into those who have OSA due to anatomical compromise; those with an anatomical predisposition with other contributing traits; and those with some mild anatomical predisposition to collapse but with other traits largely responsible for their OSA.<sup>9</sup> The PALM score is useful because it provides a framework for dividing patients between those who will likely require CPAP (23% in the Eckert article) and those who might be treated with non-CPAP therapies (77%). Potential non-PAP therapies based on trait manipulation have also been described by multiple authors. For example, supplemental oxygen and acetazolamide can reduce loop gain<sup>10,11</sup>; sedatives such as eszopiclone and trazodone can increase the

Submitted for publication July, 2014

Submitted in final revised form October, 2014

Accepted for publication November, 2014

Address correspondence to: Robert L. Owens, MD, 9300 Campus Point Drive, Mail Code 7381, San Diego, CA 92037; Tel: (858) 657-6771; Fax: (858) 657-5021; Email: rowens@ucsd.edu.

*SLEEP*, Vol. 38, No. 6, 2015

961

A Physiological Model of OSA Pathogenesis—Owens et al.

## E

### ELECTROENCEPHALOGRAM (EEG) or ELECTROENCEPHALOGRAPH

A recording of brain waves obtained by attaching flat metal discs (electrodes) to the scalp. EEGs reflect the summation of activity of millions of neurons that are close to the electrode. They show characteristic changes in brain wave amplitude and frequency during sleep and wakefulness.

### ELECTROMYOGRAM (EMG) or ELECTROMYOGRAPH

A test of electrical activity of the muscles. Sensing electrodes can be placed over any muscle, but are usually placed on the skin over the muscles under the jaw to detect upper airway muscle activity, on the ribcage to detect the contraction of the breathing muscles, and on the legs to detect leg movements.

### EPINEPHRINE

A hormone released during times of stress by the adrenal glands under the control of the sympathetic nervous system; it is also known as adrenaline. Epinephrine plays a key role in virtually all aspects of the stress-response.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **EPWORTH SLEEPINESS SCALE (ESS)**

A simple questionnaire that measures overall level of sleepiness by assessing the likelihood of a patient falling asleep in certain situations. The maximum score is 24; Each situation (sitting, reading, watching TV, driving, lying down, after lunch) is assessed on a scale of 0 (no chance of dozing) to 3 (high chance of dozing). A score greater than 8 indicated sleepiness. Higher scores indicate greater sleepiness.

#### **ESOPHAGEAL INTUBATION**

A tracheal tube that is incorrectly inserted into the esophagus.

#### **EXCESSIVE DAYTIME SLEEPINESS (EDS)**

The inability to stay awake and alert during the major waking episodes of the day. Individuals often experience unintended lapses into drowsiness or fall asleep when sedentary or in situations that require no active participation. It may be quantitatively measured by use of subjectively defined rating scales of sleepiness. Also known as somnolence and hypersomnia.

---

## **F**

#### **FATIGUE**

A feeling of tiredness or weariness usually associated with decreased performance; the inability to sustain emotional, physical or mental effort.

#### **FETAL ORIGINS OF ADULT DISEASE (FOAD)**

This is an emerging concept in medicine, focusing on the fact that events during fetal life can program lifelong aspects of bodily function. As the example covered most in this course, fetal malnutrition often causes increased insulin secretion throughout life.

#### **FOLLICLE STIMULATING HORMONE (FSH)**

A pituitary hormone that stimulates follicle maturation in females and sperm maturation in males.

#### **FRONTAL CORTEX**

The brain region involved in decision making, impulse control, long-term planning, and gratification postponement.

---

## **G**

#### **GASTROESOPHAGEAL REFLUX DISEASE (GERD)**

The flow of stomach acid upwards into the esophagus, which can cause arousals and disrupt sleep.

#### **GHRELIN**

A hormone produced in the stomach that stimulates appetite. The body's production of ghrelin may be influenced by the amount of sleep a person gets.

#### **GLUCAGON**

A hormone released from the pancreas during stress that helps mobilize energy from storage sites in the body.

#### **GLUCOCORTICOID**

Any of a class of hormones released from the adrenal gland during stress that play a key role in virtually all facets of the stress-response. The primate/human version is cortisol, also known as hydrocortisone. Synthetic versions often prescribed by dentists and physicians include dexamethasone and prednisone. The circadian-related increase in cortisol usually occurs before waking up and is thought to be a way of preparing the body for the stresses of the waking day. Cortisol release may inhibit sleep and is one reason that stressful activities before bedtime are not recommended.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **GLUTEAL FAT**

Fat deposits around the buttocks.

#### **GLYCOGEN**

The storage form of glucose/carbohydrates in the body.

---

## **H**

#### **HABITUAL SNORERS**

Individuals who snore nearly every night.

#### **HEART ATTACK**

Acute blockage of an artery supplying the heart.

#### ***HELIOBACTER PYLORI***

A bacteria that causes a large percentage of cases of peptic ulcer. Chronic stress can impair the ability of the body to repair such ulcers.

#### **HERTZ (Hz)**

The number of cycles per second; the unit of measurement applied to a rhythmic event, such as brainwaves.

#### **HIGH UPPER AIRWAY RESISTANCE**

Limitation of airflow due to breathing through a narrowed or small airway.

#### **HIPPOCAMPUS**

A part of the brain's limbic system that is centrally involved in learning and memory and highly sensitive to the effects of stress.

#### **HISTAMINE**

A substance released by cells that causes symptoms of an immediate allergic reaction. Histamine released in certain areas of the brain promotes arousal. Conversely, antihistamine medications can promote sleep.

#### **HOMEOSTASIS**

A state of equilibrium, with physiological endpoints functioning in an optimal range.

#### **HORMONE**

A chemical messenger released by glands into the bloodstream, where it travels and has effects elsewhere in the body.

#### **HYDROCORTISONE**

See **GLUCOCORTICOID**s.

#### **HYPERALGESIA**

Exaggerated pain sensitivity.

#### **HYPERCAPNIA**

An excess of carbon dioxide in the blood.

#### **HYPERGLYCEMIA**

Elevated blood-sugar (glucose) levels.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

**HYPERSOMNIA**

Sleeping for uncharacteristically long periods of time.

**HYPERSOMNOLENCE**

Excessive daytime sleepiness.

**HYPERTENSION (HTN)**

High blood pressure.

**HYPNAGOGIC**

Occurring in the time period surrounding sleep onset.

**HYPNAGOGIC HALLUCINATIONS**

Dream-like sounds or images occurring just prior to sleep. These hallucinations are a symptom of narcolepsy that can be mistaken for psychosis.

**HYPNOGRAM**

A graph that summarizes the pattern of sleep stages across a night, for instance, as recorded in the sleep laboratory.

**HYPNOTIC**

In sleep medicine, this term refers to an agent that promotes sleep.

**HYPOTENSION**

Low blood pressure.

**HYPOTHALAMUS**

A region of the brain that helps regulate hormone activity, directs autonomic nervous system functions, and influences or manages many critical functions including sleep.

**HYPOTHERMIA**

Low body temperature (less than 36°C)

**HYPOVENTILATION**

Breathing at a rate and/or depth that is less than required. This is accompanied by elevated CO<sub>2</sub> levels while awake, which further rises during sleep. This may be seen throughout the night and may not be due to apneas and hypopneas; it often occurs in obese subjects, when the increased body mass hinders the lungs and abdominal muscles.

**HYPOVolemia**

Reduced blood volume.

**HYPOPNEA**

A partial blockage of the airway or decrease in breathing that is not as severe as apnea. It is marked by a drop in the body's oxygen saturation level by 3% or more and results in a diminished but not absent airflow. The reduction in airflow is typically 50% or greater.

**HYPOXIA**

Lack of oxygen supply to the body.

**HYPOXEMIA**

Below normal level of oxygen in the blood.

---

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## I

### **INSOMNIA**

Sleeplessness; chronic difficulty with falling asleep, staying asleep, awaking too early, or a perception of nonrefreshing sleep. Associated with feelings of irritability, daytime sleepiness or fatigue.

### **INSULIN**

A hormone released from the pancreas that promotes the storage of glucose throughout the body. It is normally secreted when blood glucose levels rise; secretion is inhibited in the early phases of the stress-response.

### **INVASIVE**

Refers to a medical procedure which penetrates or breaks the skin or a body cavity for the purpose of collecting data, or for diagnosing or treating a disorder (e.g. surgery).

---

## J

### **JOHN HENRYISM**

A personality style where one perceives oneself to have control over circumstances where, in fact, that is not the case. It has been specifically applied to working-class African Americans and is associated with a greatly associated risk of cardiovascular disease.

---

## K

### **K COMPLEX**

An EEG waveform pattern with a distinct shape; associated with N2 (stage 2) sleep.

---

## L

### **LARK**

A term describing individuals who are predisposed to wake early and to be at their best in the morning. Also termed "morning type." Contrasts with "owl." Owl and lark predispositions may have a genetic component.

### **LASER ASSISTED UVULOPLASTY (LAUP)**

A surgical procedure that removes a portion of the uvula and soft palate tissues with a laser to open the airway. It is used to treat simple snoring or mild obstructive sleep apnea. Typically, this is an in-office procedure.

### **LEARNED HELPLESSNESS**

A term often used in the context of depression, describing a state where an individual, due to repeated psychological stress, has lost the capacity to recognize circumstances where it is possible to effectively cope with a stressor.

### **LETTER OF MEDICAL NECESSITY (LMN)**

Special document that is a certification by a physician that the prescribed item(s) is medically indicated, reasonable and necessary with reference to the standards of medical practice and treatment of the patient's condition.

### **LEPTIN**

A hormone that stimulates satiety, and thus decreases appetite. Reduced sleep duration may lead to a reduction in leptin, thereby stimulating appetite.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

**LIMBIC SYSTEM**

A region of the brain that plays a central role in emotion.

**LONG-TERM POTENTIATION (LTP)**

An increase in the ease with which neurons communicate with each other across synapses; this increase in excitability is thought to be a cellular building block of memory formation.

**LUTEINIZING HORMONE (LH)**

A pituitary hormone that stimulates estrogen synthesis in females and testosterone synthesis in males.

---

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## M

### **MAINTENANCE OF WAKEFULNESS TEST (MWT)**

Similar protocol to the MSLT, occurring 4 times a day at two hour intervals, but the patient is asked to stay awake, sitting still in a dimly lit room.

### **MAXILLOFACIAL**

Pertaining to the jaws and face.

### **MAXILLOMANDIBULAR ADVANCEMENT**

A surgical procedure to open the airway. The surgeon cuts the bone of the upper and lower jaws and repositions these structures in a forward position. This surgery is usually performed only when other treatments or procedures have failed.

### **MELATONIN**

A hormone produced by the pineal gland in vertebrates. The secretion of melatonin occurs in a predictable pattern across the day and night, and plasma melatonin concentration is one of the most distinctive circadian rhythms. Melatonin secretion is suppressed by light. Melatonin can assist with sleep onset in humans and may be involved in regulating other circadian rhythms.

### **METABOLIC SYNDROME**

An emerging concept in medicine focusing on the fact that there is often overlap between the causes and symptoms of cardiovascular disease and of metabolic diseases such as diabetes; the syndrome refers to a constellation of symptoms that can include hypertension, obesity, hyperglycemia, and insulin resistance.

### **MICROPROCESSOR**

A mini-computer that can calculate readings of pulse rate and peripheral hemoglobin saturation from signals detected by the probe.

### **MICROSLEEP**

A very brief period of sleep, lasting only a few seconds. Microsleeps occur most frequently when a very sleepy person is trying to stay awake—for example, when driving while sleeping.

### **MIXED APNEA**

A breathing disorder characterized by both obstructive apneas and central apneas. It is apnea that begins as a central apnea and ends as an obstructive apnea.

### **MODAFINIL (PROVIGIL, ALERTEC, MODAVIGIL, MODALERT, MODIODAL, MODAFINILO, CARIM, VIGIA)**

A central nervous system stimulant that promotes wakefulness. Modafinil is primarily used to treat the symptoms of excessive daytime sleepiness (EDS) in people with narcolepsy.

### **MULTIPLE SLEEP LATENCY TEST (MSLT)**

A sleep laboratory test that consists of a series of 20-minute nap opportunities during the daytime to measure a human's sleepiness. People who regularly fall asleep in less than ten minutes, or who enter REM sleep rather than NREM sleep, may suffer from EDS and perhaps narcolepsy.

---

## N

### **N1 (STAGE 1) SLEEP**

The lightest stage of non-REM (NREM) sleep. Slow eye movements are often present.

### **N2 (STAGE 2) SLEEP**

The second stage of NREM sleep. EEGs during N2 sleep show sleep spindles and K complexes on a background of relatively low-voltage, mixed-frequency EEG activity.

### **N3 (STAGE 3) SLEEP**

The deepest stage of NREM sleep, characterized by a larger amount of synchronized slow-wave EEG (brainwave) activity than in other stages. These slow waves are one form of delta activity. The brain is less responsive to external stimuli, and it is difficult to awaken a person during slow wave sleep (SWS). As such, this is considered the deepest stage of sleep. The 2007 revision of the sleep scoring manual reclassified what were previously stage 3 and 4 sleep into a single class, Stage N3.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **NADIR**

The lowest point. SaO2 nadir means the lowest saturation at the time specified (can analyze REM nadir as compared to NREM nadir).

#### **NARCOLEPSY**

A rare sleep disorder marked by excessive sleepiness or sudden sleep attacks. A person with narcolepsy may immediately go from wakefulness to REM sleep. The disorder is also associated with cataplexy.

#### **NEUROGENESIS**

The generation of new neurons. The fact that this can occur in the adult brain has been a revolution in neurobiology.

#### **NEUROTRANSMITTER**

A chemical messenger with which one neuron communicates with another. Examples include serotonin, dopamine, and norepinephrine.

#### **NON-INVASIVE**

Refers to a medical procedure that does not penetrate the skin or a body cavity.

#### **NON-RAPID EYE MOVEMENT (NREM) SLEEP**

The stages of sleep that do not include rapid eye movement patterns. According to current guidelines for sleep stage classification, NREM consists of three different stages: N1, N2, and N3.

#### **NOREPINEPHRINE (a.k.a. NORADRENALINE)**

A type of neurotransmitter closely related to epinephrine. There is good evidence that its release in one region of the brain is blunted in depression; in a different part of the nervous system, it plays a central role in the sympathetic nervous system (along with epinephrine).

---

## **O**

#### **OBESITY-HYPOVENTILATION SYNDROME**

Occurs when a very obese person does not breathe enough oxygen while sleeping. Breathing is characterized by slow and shallow respiration (hypoventilation) during wakefulness which results in an increased level of carbon dioxide in the blood.

#### **OBSTRUCTIVE SLEEP APNEA SYNDROME (OSAS)**

A disorder characterized by frequent interruptions in breathing for 10 seconds or more during sleep. Although the upper airway (throat) collapses and is physically obstructed, the individual often continues to have respiratory effort. This results in intermittent decreases in blood oxygen levels and brief arousals from sleep. Often associated with loud snoring, snorting or choking sounds, poor sleep quality, excessive daytime sleepiness, and other symptoms of fatigue.

#### **OREXIN (Also known as HYPOCRETIN)**

A neurotransmitter that promotes wakefulness by stimulating brainstem arousal centers.

#### **OWL**

A term describing individuals who are predisposed to stay up late and to be at their best in the evening. Also termed "evening-type." Contrasts with "lark." Owl and lark predispositions may have a genetic component.

#### **OXIMETER**

A device that can detect a pulsatile signal in an extremity such as a finger or toe and can calculate the amount of oxygenated hemoglobin and the pulse rate.

#### **OXIMETRY**

A test that measures a patient's pulse and oxygen saturation level in his/her blood.

#### **OXYGEN DESATURATION**

Less than normal amount of oxygen carried by hemoglobin in the blood. A value below 90% is considered abnormal.

#### **OXYGEN SATURATION**

Amount of oxygen carried by hemoglobin in the blood. Normal values range from 90% to 100%. An important indicator of sleep disordered breathing that is directly affected by the degree of throat closure (partial vs. complete) and its duration.

---

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## P

### **PARASOMNIAS**

Troubling or undesirable behaviors that intrude during sleep, such as sleepwalking. They are often associated with abnormal or partial arousal and typically disrupt normal sleep.

### **PARASYMPATHETIC NERVOUS SYSTEM** See **AUTONOMIC NERVOUS SYSTEM**

### **PERIOD**

A duration of time derived from the cyclical recurrence of a given phenomenon. In relation to circadian rhythms, period refers to the length of time for one cyclical occurrence of a circadian rhythm. In humans, the circadian pacemaker has a period of about 24.2 hours.

### **PERIODIC LIMB MOVEMENT DISORDER (PLMD)**

A sleep disorder characterized by leg movements or jerks that typically occur every 20 to 40 seconds during sleep, causing sleep to be disrupted and leaving the person with excessive daytime sleepiness.

### **PERIODIC LIMB MOVEMENTS OF SLEEP (PLMS)**

Leg movements or jerks that typically occur every 20 to 40 seconds during sleep. The term periodic limb movement disorder is used if the leg movements produce daytime symptoms.

### **PHARYNX**

The area at the back of the mouth behind the nares (nasal passages) and the oral cavity, commonly known as the throat. It acts as a passageway for air from the nostrils and the mouth to the lungs; and for food and liquids from the mouth to the esophagus.

### **POLYSOMNOGRAPH, POLYSOMNOGRAM or POLYSOMNOGRAPHY (PSG)**

A test that records multiple physiological variables during sleep (including brain waves [electroencephalogram], electrical activity of muscles [electromyogram], eye movement [electrooculogram], breathing rate, blood pressure, blood oxygen saturation, and heart rhythm [electrocardiogram] ). The test is usually conducted in a sleep lab and involves direct observation of the person during sleep.

### **POST-TRAUMATIC STRESS DISORDER (PTSD)**

A psychiatric disorder comprising a constellation of symptoms (e.g., sleep disruption, flashbacks, and hypersensitivity to stimuli) caused by severe trauma (e.g., combat trauma, childhood abuse, or rape).

### **PNEUMOTHORAX**

Lung collapse caused by air leaking from the lung, usually following trauma. Air enters the space outside the lung (pleural space) and stops the lung from expanding (also see Tension Pneumothorax).

### **PREDNISONE**

See **GLUCOCORTICOIDS**

### **PRIMARY SNORING**

Snoring during sleep with no apneas, hypopneas or hypoventilation, and no alterations to blood gases.

### **PROLACTIN**

A hormone released from the pituitary gland in response to stress, exercise, and nursing. It inhibits aspects of reproductive physiology.

### **PSYCHOGENIC**

Generated by psychological factors.

### **PSYCHOMOTOR RETARDATION**

A key symptom of major depression, in which thought and action seem exhausting.

### **PULSE OXIMETER: SEE OXIMETER**

### **PYREXIA**

Raised body temperature (greater than 37°C).

---

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## Q

### **QUIET SLEEP**

An alternate term for non-REM sleep. In the quiet phase of sleep most physiological activities are very stable and regular, and many are reduced compared to wakefulness.

---

## R

### **RAPID EYE MOVEMENT (REM) SLEEP**

The sleep state during which dreaming occurs. It unexpectedly involves higher levels of activity in some brain regions than during normal waking. It is named for the rapid eye movements that occur during this times. General skeletal muscle paralysis occurs as well. Also called paradoxical or dreaming sleep.

### **RECEPTOR**

A hormone or neurotransmitter carrying messages from one cell to another. Each type of hormone or neurotransmitter binds to a specific receptor on a target cell and exerts its actions through that route (e.g., estrogen stimulates uterine growth by binding to estrogen receptors in uterine cells).

### **RELATIVE NORMAL OXYGEN SATURATION LEVELS**

Average oxygen level in a healthy person, usually above 95%. It is altitude dependent.

### **RERA**

Respiratory effort related arousals. It is presently considered in RDI totals.

### **RESPIRATORY DISTURBANCE INDEX (RDI)**

A measure of the severity of sleep apnea, including sleep disruptions and desaturations (a low level of oxygen in the blood). Unlike the apnea hypopneas index (AHI), the respiratory disturbance index counts the number of arousals caused by respiratory effort. It is the average number of sleep disordered breathing events that cause an arousal from sleep per hour of sleep. It is calculated by adding the number of apneas, hypopneas and respiratory effort related arousals (RERAs) and dividing by the number of hours the patient spends asleep.

### **RESTLESS LEG SYNDROME (RLS)**

Syndrome characterized by a need to move one's legs due to achy or unpleasant feelings with the legs associated with the need to move. An annoying deep crawling sensation exists in ones legs during sitting or lying down at nighttime. It can interfere with the ability to fall asleep or stay asleep.

---

## S

### **SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRI)**

Any of a class of antidepressants (e.g., Prozac) that increase serotonin signaling in the synapse by blocking their reuptake (i.e., removal) from the synapse.

### **SEROTONIN**

A type of neurotransmitter. Of greatest relevance, evidence suggests that a shortage of serotonin in some brain regions contributes to depression.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **SLEEP**

A period of inactivity in which an individual rests quietly in a recumbent position, disengages from the environment, and become unresponsive to stimuli.

#### **SLEEP APNEA**

Cessation of breathing for 10 or more seconds during sleep. There are two basic types of sleep apnea: *Obstructive Apnea* is caused by a closure of the air passage despite efforts to breathe; *Central Apnea* is a lack of effort to breathe. Obstructive Sleep Apnea is by far the most common type. In children, the cessation of breathing lasts at least the duration of two breath cycles.

#### **SLEEP DEBT**

The accumulated effect of lack of sufficient sleep (sleep deprivation) regardless of cause; often results in fatigue and sleepiness. The larger the sleep debt, the stronger the tendency to fall asleep.

#### **SLEEP DEPRIVATION**

An acute or chronic lack of sufficient sleep. It may contribute to a decreased quality of life, the onset of related health problems, and the increased risk of injury and/or accident.

#### **SLEEP DISORDER**

A disturbance of normal sleep patterns usually related to one of three major symptoms: insomnia, excessive daytime sleepiness or an abnormal event during sleep. The condition can affect the amount, quality, or timing of a person's sleep.

#### **SLEEP EFFICIENCY**

The proportion of sleep in the period available for sleep; that is, the ratio of total sleep time to time in bed.

#### **SLEEP HYGIENE**

Behaviors and environmental conditions that influence the quantity and quality of sleep. Good sleep hygiene practices include such as going to bed the same time each night, sleeping in a dark room, restricting caffeine intake, and avoiding naps during the day.

#### **SLEEP LATENCY**

The duration of time (measured in minutes) required to fall asleep.

#### **SLEEP ONSET**

The transition from awake to asleep.

#### **SLEEP PARALYSIS**

The immobility of the body that occurs in the transition from sleep to wakefulness; often considered to be a partial manifestation of REM sleep.

#### **SLEEP SPINDLE**

Spindle-shaped burst waves on the EEG occurring at 12-14 Hz for over half a second. Sleep spindles are one of the identifying features of N2 sleep.

#### **SLEEP STAGES**

- **Stage I:** Approximately 5% of sleep. Very light sleep between a person being fully awake and sleeping.
- **Stage II:** Approximately 50% of sleep. Still considered light sleep but is considered to be the true first sleep state. Characterized by sleep spindles and K complexes.
- **Stage III & IV:** Approximately 20% of sleep, depending on age. Known as delta or slow wave sleep and is deeper, more relaxing sleep.
- **REM (Rapid Eye Movement):** Approximately 25% of sleep time. Dreams take place in this stage. Many physiologic changes including muscle paralysis. Eyes move side to side.

#### **SLOW-WAVE SLEEP (SWS)**

N3 (Stage 3) sleep. The deepest stage of sleep, in which the most energy restoration occurs. This is the sleep stage most disrupted by stress.

#### **SNORING**

Noise produced during sleep as air passes through the throat and causes the soft tissue to vibrate. The soft palate is only one part of snoring dynamics.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **SOCIOECONOMIC STATUS (SES)**

An aggregate measure that incorporates level of education, wealth, and place of residence. Low SES is a predictor of increased risk for a wide variety of disease, as well as for significantly shortened life expectancy.

#### **SOFT PALATE**

The muscular fold of tissue that is suspended from the roof of the mouth and extends back from the hard palate. It closes off the nasal cavity from the oral cavity during swallowing or sucking.

#### **SOMNOLENCE**

Oppressive drowsiness with a high likelihood of falling asleep.

#### **SOMNOPLASTY**

Procedure to stiffen soft palate using radio frequency waves.

#### **STEROIDS**

A class of structurally related hormones. For the purpose of this course, the most important ones are glucocorticoids, estrogen, progesterone and testosterone.

#### **STRESS DWARFISM (a.k.a. PSYCHOGENIC DWARFISM, PSYCHOSOCIAL DWARFISM)**

A disorder in which growth in a child is significantly impaired by severe psychological stress.

#### **STRESSOR**

An external perturbation that disrupts homeostasis; also, the psychological anticipation of such a perturbation occurring.

#### **STRESS-RESPONSE**

The array of hormonal and neural adaptations in the body meant to reestablish homeostasis.

#### **SUPRACHIASMATIC NUCLEUS (SCN)**

Also referred to as the circadian clock, circadian pacemaker, or internal biological clock. The internal circadian pacemaker is a small group of nerve cells located in the hypothalamus that controls the circadian cycles and influences many physiological and behavioral rhythms occurring over a 24-hour period, including the sleep/wake cycle.

#### **STROKE (a.k.a. CEREBROVASCULAR ACCIDENT, or CVA)**

A disease that occurs when there is a sudden interruption in blood flow to the brain. The lack of oxygen and nutrients to the brain causes brain cells to die and may lead to paralysis, speech problems, loss of memory or reasoning ability, coma, or death. There are two forms: *ischemic* - blockage of a blood vessel supplying the brain, and *hemorrhagic* - bleeding into or around the brain.

#### **SUBJECTIVE SLEEPINESS**

Feelings of sleepiness.

#### **SYMPATHETIC NERVOUS SYSTEM**

See **AUTONOMIC NERVOUS SYSTEM**

#### **SYNAPSE**

The microscopic gap between the branches of two neurons; excitation in one neuron leads to the release of specific neurotransmitters, which float across the synapse, bind to specialized receptors, and alter the function of the other neuron.

---

## **T**

#### **TENSION PNEUMOTHORAX**

The pressure in the pleural space is very high, the patient has severe breathing difficulties and distortion of the heart may cause cardiac arrest.

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

#### **THETA ACTIVITY**

EEG activity with a frequency of 4 to 7 Hz.

#### **THYROID HORMONE**

Secreted by the thyroid gland, its main function is to increase metabolism. Abnormally low thyroid hormone levels (i.e., hypothyroidism) can give rise to depression.

#### **TITRATION**

A method of determining optimal CPAP (continuous positive airway pressure) or oral appliance treatment parameters for sleep apnea. This involves automatic or manual adjustment of the device to a level that eliminates airway blockage.

#### **TONSILLECTOMY**

Surgical procedure to remove the tonsils.

#### **TOXIC HOSTILITY**

A personality style where an individual consistently interprets benign events as being threatening and calling for a hostile coping response. This modern incarnation of the type A personality concept carries an increased risk of cardiovascular disease.

#### **TRACHEOTOMY**

Surgical procedure to create an opening in the trachea (windpipe). The opening (tracheostomy) bypasses an obstruction in the airway so breathing can occur. Occasionally used to treat severe obstructive sleep apnea that is non-responsive to other treatment.

#### **TRIGLYCERIDES**

The storage form of fats.

#### **TYPE A PERSONALITY**

A personality style first described in the 1950s that carries an increased risk of cardiovascular disease. In its original formulation, type A individuals tend to be highly competitive, overachieving, time-pressured, impatient, and hostile. See also **TOXIC HOSTILITY**.

#### **TUBERMAMMILLARY NUCLEUS (TMN)**

An area of the hypothalamus that contains neurons that release histamine. This neurotransmitter stimulates arousal.

---

## **U**

#### **ULCER**

An area of tissue erosion (e.g., on skin, oral mucosa or on the stomach lining).

#### **UPPER AIRWAY**

The part of the respiratory anatomy that includes the nose, nostrils, sinus passages, septum, turbinates, tongue, jaw, and palate.

#### **UPPER AIRWAY RESISTANCE SYNDROME (UARS)**

An obstructive sleep-related breathing disorder in which repetitive increases in resistance to airflow in the upper airway lead to brief arousals (RERAs) and daytime fatigue. Usually associated with loud snoring. Obstructive sleep apnea, characterized by apneas and hypopneas, may be totally absent. Although blood oxygen levels may be in the normal range, the patient can still have symptoms of obstructive sleep apnea (e.g. excessive daytime sleepiness).

#### **UVULA**

Small soft structure hanging from the bottom of the soft palate in the midline above the back of the tongue. It is composed of connective tissue and mucous membrane.

#### **UVULOPALATALPHARYNGEOPLASTY (UPPP)**

Surgical treatment for obstructive sleep apnea and snoring. The procedure removes the tonsils, adenoids, uvula, and excess palatal tissue to open the airway behind the palate. The procedure is performed under general anesthesia and usually requires a one or two day hospital stay.

---

James E. Metz, DDS  
1271 E. Broad St. Columbus,  
Ohio 43205  
[www.ColumbusDentistry.com](http://www.ColumbusDentistry.com)

Phone: 614-252-4444  
Fax: 614-252-6474  
[DrJamesMetz@Yahoo.com](mailto:DrJamesMetz@Yahoo.com)

## V

### **VASOPRESSORS**

Drugs such as adrenaline, ephedrine or phenylephrine that raise blood pressure by causing constriction of blood vessels or increased cardiac output.

### **VENTILATION**

The rhythmical entry and exit of air into the lungs. It requires a trigger from the brain and muscles to keep the throat open and muscles to expand the chest to draw the air in and force it out. Alternatively, it can be provided by a machine (a ventilator) and may be used in people with central sleep apnea.

### **VENTROLATERAL PREOPTIC AREA (VLPO)**

An area of the brain in the hypothalamus that plays a key role in promoting sleep by inhibiting the brain's primary arousal centers, such as the TMN.

---