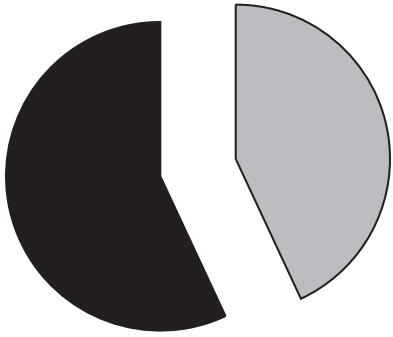
11

Obesity and Sleep Apnea

- One of every three adults is obese.
- Obesity increases the odds of having obstructive sleep apnea.
- Sleep apnea contributes to the Metabolic Syndrome, a deadly combination of obesity, hypertension, high cholesterol, and diabetes.
- Treatment of sleep apnea and weight management are the keys to overcoming the Metabolic Syndrome.

Most people who are overweight have some degree of sleep apnea. However, you don't have to be obese to have sleep apnea, and some overweight people do not have sleep apnea. But the correlation between obesity and sleep apnea is very high.



Fifty-seven percent of obese people have sleep apnea.

Obesity is important because it is a medical issue. It is not about clothing size or about losing weight. Obesity and sleep apnea together contribute to a host of medical disorders that lead to a downward spiral of worsening health.

Why Should You Care If You're Obese? The Sinking Spiral

The reasons obesity and sleep apnea tend to go hand in hand are threefold:

1. In obesity, fatty deposits accumulate within the layers of tissue in the neck. This causes constriction of the airway and contributes to snoring and sleep apnea.
2. In obese people, excess fatty tissue in the abdomen causes abnormal loading that interferes with the normal breathing mechanisms.
3. A sinking spiral develops. Sleep apnea destroys sleep and results in low oxygen during the nighttime and daytime drowsiness during the day. Repeated awakenings stress the sympathetic nervous system. This and the extra body weight contribute to hypertension. The body loses its ability to handle carbohydrates, slipping into insulin resistance, which equals adult-onset diabetes. Weight gain continues. Cholesterol levels increase and cardiovascular disease begins to take its toll. As sleep apnea worsens, excessive daytime sleepiness (EDS) also worsens. The person becomes less active, uses less energy, gains more weight, and further aggravates the apnea, diabetes, heart disease, becoming a candidate for, for example, heart attack and stroke.

The key is to break the cycle. Weight loss alone can do this, but it is extremely difficult to lose weight and keep it off in the face of all of the other challenges. Weight loss may be difficult or impossible to achieve as long as the sleep apnea is untreated. Treating the sleep apnea ends the spiral and opens the way to rebuilding total good health.

How Do You Know If You're Obese?

The simplest measure of central obesity is waist circumference. A waist larger than 40 inches in men or 34 inches in women is considered a sign of central obesity. Central obesity is a major cause of serious medical problems such as diabetes, sleep apnea, hypertension, high cholesterol, and heart disease. (Extra weight on hips or thighs is less of a medical concern.)

Another measurement is to compare your hip and waist sizes. If there is less than 4 inches between your hip size and your waist size, you have central obesity.

Body Mass Index (BMI) is a more precise measure of obesity (see illustration on page 105).

Body Mass Index is calculated by dividing body weight by the square of the height. You can find your precise BMI at the following National Institutes of Health web site, by typing in your height and weight: www.nhlbisupport.com/bmi/bmicalc.htm.

The Metabolic Syndrome and Sleep Apnea

The Metabolic Syndrome is a combination of disorders that often occur together and feed off of each other in a kind of downhill spiral of worsening health.

Body Mass Indes Table																																				
	Normal						Overweight					Obese										Extreme Obesity														
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Height (inches)	Body Weight (pounds)																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	128	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	265	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	114	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	118	120	126	132	138	144	150	158	162	168	174	180	188	192	198	204	210	216	222	228	234	240	278	252	258	264	270	276	282	288	294	300	306	312	318	324
66	121	124	130	138	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	268	272	278	284	291	297	303	309	315	322	328	334
67	125	127	134	140	148	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	128	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	132	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	136	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	308	313	320	327	334	341	348	355	362	369	376
71	140	143	150	157	165	172	179	188	193	200	208	215	222	229	238	243	250	257	265	272	279	286	293	301	308	315	322	329	333	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	318	324	331	338	348	353	361	368	375	383	390	397
73	144	151	159	168	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	258	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	166	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	338	344	353	361	369	377	385	394	402	410	418	426	435	443

Sourse: Adapted from Clinical Guidelines on the Identification, Evolauation, and Treatment of Overweight and Obesity in Adults. The Evidence Report.

BMI Table. Find your height on the left side of the chart, read across to find your weight, and look at the top of that column to find your BMI.
National Institutes of Health, www.nhlbisupport.com/bmi/bmicalc.htm.

These disorders include:

- Adult-onset diabetes (also called type 2 diabetes), which includes:
  - Poor glucose tolerance (body does not process sugar properly)
  - Insulin resistance (body does not use insulin properly)
- Central obesity (extra weight is mostly on the belly, not on hips and thighs)
- High blood pressure (higher than 140/90 mm Hg)
- High cholesterol

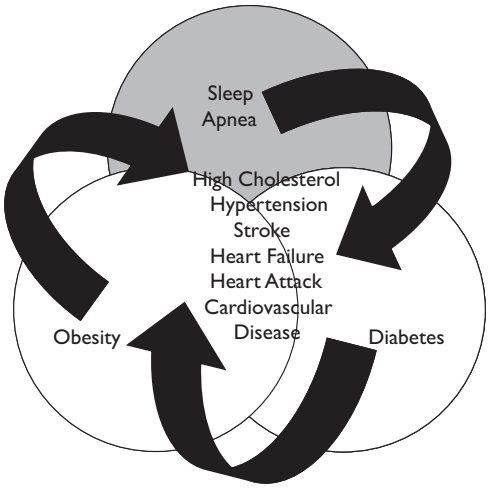
A person who has three of these conditions has the Metabolic Syndrome.

Sleep apnea is also part of the Metabolic Syndrome picture. We know this because treatment of sleep apnea in a person with the Metabolic Syndrome can improve the person's insulin use (1), lower their blood pressure (2), and improve their cholesterol levels (3).

Untreated, the Metabolic Syndrome leads downhill, toward permanently damaged kidneys, heart, blood circulation, eyes, lungs, brain . . . and premature death (see illustration on page 106). This is why it is so important for obese people to find out whether they have sleep apnea, and get it treated.

CASE STUDY

Mrs. Baker had gained 50 pounds and felt increasingly exhausted. Her sleep was restless and unrefreshing, and her terrible, irregular snoring concerned her husband because she appeared to be gasping for air. Her doctor told her to lose weight and refused to refer her to a sleep center because "that's what they will tell you to do anyway."



Untreated sleep apnea contributes to the Metabolic Syndrome.

Mrs. Baker joined a weigh- loss program and lost 50 pounds after spending $3,000. Her snoring improved a great deal, but it did not go away; and although her exhaustion had largely disappeared, she still felt drowsy when sitting, reading, or relaxing. Within 7 months her excess weight had returned, and with it her symptoms.

Another physician agreed to refer her to a sleep center. Moderately severe sleep apnea was diagnosed. Mrs. Baker was placed on CPAP, which eliminated her sleep apnea. On CPAP and with the help of a dietitian, she again lost the weight. Now at her ideal weight, she was again studied at the sleep center. To her dismay, she still had 50 percent of her sleep apnea unless she slept with CPAP.

Looking back, Mrs. Baker realized that after her initial and expensive weight loss, her apnea had continued to leave her fatigued and had decreased her activity level. As a result, her weight had increased; as she saw herself failing, she became depressed and ate more.

Now, using CPAP, Mrs. Baker is able to maintain her new weight.

CPAP eliminates the obstructive apnea, allowing more restful sleep, a better blood oxygen level, and improved metabolism which boost the person's energy level. The increase in energy and activity can then contribute to the weight loss effort.

The Obesity Hypoventilation Syndrome, or the "Pickwickian Syndrome"

The Pickwickian syndrome is a different combination of severe sleep apnea and obesity, in this case accompanied by a chronically decreased breathing pattern called *hypoventilation* and sometimes heart failure. This syndrome is found in approximately 5 percent of sleep apnea patients (4).

CASE STUDY

Mr. Roberts is a 45-year-old computer programmer and former college track star. He had always been active and energetic, with many outside interests.

Mr. Roberts first became aware that something was wrong with him in 1979. He realized that he felt tired a lot of the time. He had no energy. He became less and less active, and he started to gain weight. He began to take frequent naps. Eventually he began falling asleep at work. Fortunately, his boss liked and respected him, and he was sympathetic, although puzzled. He wondered if Mr. Roberts had a problem with alcohol or drugs and hoped that in time he would be able to work it out.

Between 1979 and 1985, Mr. Roberts changed from a trim, fun-loving, lively man into an overweight, lethargic, crabby near-invalid. He was asleep, or half asleep, nearly all the time. He also had developed heart problems. His doctor was stumped.

Mrs. Roberts was desperately worried. One day she heard by chance about a new sleep disorder center and talked her reluctant husband into making an appointment.

The sleep specialist immediately recognized Mr. Roberts's problem as a variety of sleep apnea. From the information in Chapter 1, you may recognize in Mr. Roberts one of the most common symptoms of sleep apnea—excessive daytime sleepiness.

Some clues from Mr. Roberts's past might have tipped you off further—his ability to fall asleep anywhere in any position and his loud snoring. When he was in the service, he was legendary; his snoring was so horrendous that his buddies often had to carry him outside in the middle of the night so that they could get some sleep. Many a morning Mr. Roberts woke up on his cot in the middle of the parade ground.

By the time he visited a sleep clinic, Mr. Roberts was showing all the symptoms of the Pickwickian syndrome.

In 1816, William Wadd, surgeon to King George III of England, connected obesity, lethargy, and breathing difficulty. He described three patients who were "suffocated by fat." In 1889, another medical man, A. Morison, reported a case of an obese, drowsy man whose drowsiness improved after he lost weight (5,6).

It was not until the 1950s that anyone came close to explaining what causes the Pickwickian syndrome. A respiratory physiologist was the first to suggest a cause-and-effect link between obesity and breathing difficulty. He proposed that obesity places an extra load on the respiratory system and suggested that this leads to lethargy and sleepiness (2), but he failed to connect sleep apnea with the total picture. Finally, in 1965, Gastaut demonstrated the relationship between sleep apnea and excessive daytime sleepiness.(7)

The term Pickwickian was first used as a medical term in an article by Bramwell in 1910. One of his patient's symptoms reminded him of the description and behavior of the fat boy, Joe, in Dickens's The Posthumous Papers of the Pickwick Club (1837). Joe was a "wonderfully fat boy" who was so sleepy he would fall asleep standing up.

To anyone who has no experience with the Pickwickian syndrome, this idea may seem far-fetched. But Charles Dickens was a keen observer of humankind and clearly depicted the most obvious symptoms:

- Marked obesity
- Daytime drowsiness
- Tendency to fall asleep during routine activities
- Snoring

Other features of the Pickwickian Syndrome that are less obvious to the casual observer are:

- Sleep apnea
- Bluish tone to face (cyanosis)
- Abnormal breathing reflexes
- Enlargement of right side of the heart
- Heart failure

What Causes the Pickwickian Syndrome?

The Pickwickian Syndrome is the result of several conditions coming together at once: sleep apnea, an abnormal breathing pattern, obesity, and usually some obstructive lung disease (4). Some people have a breathing reflex that is not very sensitive and allows the waste gas, carbon dioxide, to accumulate in their blood (see Chapter 6). This tendency becomes worse if the person's breathing is very shallow. Obesity causes shallow breathing by interfering with the work of the breathing muscles (7,8). This abnormally shallow breathing pattern becomes even worse when the person is lying down, and this in turn leads to such symptoms as frequent awakenings, sleep apnea, daytime sleepiness, low energy, and additional weight gain. A vicious circle develops, which is called the obesity-hypoventilation syndrome, or the Pickwickian Syndrome. The Pickwickian Syndrome may begin in childhood, and it can occur in adults who formerly were quite thin.

What Are the Effects of the Pickwickian Syndrome?

The Pickwickian Syndrome leads to the same problems that result from other kinds of sleep apnea. A person with Pickwickian Syndrome has fragmented sleep. Deep sleep and rapid eye movement (REM) sleep are reduced, sometimes nearly to zero. And because the person's shallow breathing does not take in sufficient oxygen during the night, a kind of slow asphyxiation occurs (7,9).

Excessive drowsiness during the daytime is common. People with Pickwickian Syndrome have a remarkable tendency to fall asleep whenever there is a moment's relaxation. They often fall asleep at their desks at work, in the middle of a conversation, or while driving a car.

Mr. Roberts tells of habitually driving to work and falling asleep in the parking lot. His coworkers would come out and find him, turn off the car, and guide him into his office, where he would spend the day sleeping at his desk. A Pickwickian doctor reported dozing off while examining a patient. He awoke to find his head resting on the patient's shoulder. A Pickwickian business executive finally sought treatment after falling asleep during a weekly poker game—he had drawn a full house (aces over kings) but then dropped off to sleep and missed the play (10).

Serious heart disease is closely associated with the Pickwickian Syndrome (7,9,10). In addition to the risks of hypertension, stroke, and coronary artery disease that accompany obesity, there are the risks of heart enlargement, arrhythmias, pulmonary complications, and heart failure that can result from sleep apnea. There is a relatively high rate of sudden death among the obese (9). The Pickwickian Syndrome should be treated seriously because in the long term it certainly is life threatening.

Treating the Pickwickian Syndrome

Continuous positive airway pressure (CPAP) combined with weight loss is the most conservative treatment. If CPAP is not able to eliminate the sleep apnea and low blood oxygen level, a temporary tracheostomy may be used (see Chapter 10).

The medical literature is mixed in its reports about the effectiveness of weight loss in reducing the symptoms of this syndrome. However, it may be that the more weight lost, the more likely it is that the person's apnea will improve. For any particular individual, there may be a critical weight above which the breathing difficulties of the Pickwickian Syndrome appear. Below that, weight improvement can be expected (10).

Mr. Roberts is a good example of a good outcome from the combination of CPAP and weighty loss.

CASE STUDY

Mr. Roberts was put on CPAP and a weight loss program. A year after beginning treatment for sleep apnea, Mr. Roberts was quite literally a different person. He had lost 100 pounds and was full of energy. He continued to steadily lose weight and was working at regaining his health. Thanks to a sympathetic boss, he still had his job. He was also remodeling his house (doing much of the work himself) and restoring several classic cars. He didn't hav e time to take naps.

Some people with Pickwickian Syndrome treated in this way appear to have a complete "remission." They can stop using CPAP, and they appear to be cured of sleep apnea (11).

Weight loss surgery (gastric bypass) is reported to be effective in treating the Pickwickian Syndrome, reducing sleep apnea to near zero and restoring deep sleep and REM sleep (9). However, gastric bypass surgery is not a trivial operation, and it

should not be considered a conservative treatment option (see Chapter 10 for further information on treatment of sleep apnea).

◆ Summary

- Obesity is common among obstructive apnea patients.
  - The Meta[sws4]bolic syndrome is a combination of obesity, diabetes, hypertension, and treating the accompanying sleep apnea can help greatly.
- The Pickwickian Syndrome is a form of sleep apnea caused by a combination of obesity and a shallow, abnormally insensitive breathing mechanism.
- Symptoms of the Pickwickian Syndrome include:
  - Obesity
  - Daytime drowsiness
  - Falling asleep during routine activities
  - Snoring and sleep apnea
- Treatment includes CPAP and weight loss.