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Metabolic Health Resource Guide





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Type 1 Diabetes



DEFINITION

Type 1 diabetes, which used to be called insulin-dependent or juvenile diabetes, is a chronic disease that destroys the body's ability to make insulin, a hormone used to break down and store energy (in the form of glucose or "sugar") from foods. Without insulin, high levels of fat and glucose remain in the bloodstream, which can damage blood vessels and vital organs over time.

Scientists do not know exactly what causes type 1 diabetes, but they believe that a combination of genetic and environmental factors are to blame. Diabetes is an autoimmune disease. This means that the immune system, which normally ignores healthy cells but destroys germs and foreign substances that could cause illness, mistakenly launches an attack on the body itself – in this case destroying insulin-producing islet cells in the pancreas. People may develop type 1 diabetes at any age, but it is frequently diagnosed before adulthood. It accounts for about 5%-10% of all diabetes cases, and affects approximately one in every 400 to 500 children in the U.S

http://www.joslin.org/733_1924.asp http://www.diabetes.org/about-diabetes.jsp

SYMPTOMS

Generally, people with Type 1 diabetes present with acute symptoms of diabetes and markedly elevated blood glucose levels. Because of the acute onset of symptoms, most cases of type 1 diabetes are detected soon after symptoms develop. Symptoms can include one or more of the following:

- Frequent urination
- Excessive thirst
- Extreme hunger
- Unusual weight loss
- Increased fatigue
- Irritability
- Blurry vision

INCIDENCE & PREVALENCE

	Age	Incidence		
	(years)	(per 100,000)	Incidence	Population*
NORTH AMERICA				
U.S. (1)	children	21.3	13,000	61,146,753
U.S. (2)	14 and under	15	9,172	61,146,753
Canada (3)	14 and under	24	1,380	5,751,805
EUROPE				
UK (4)	14 and under	17	1,755	10,324,471
France (5)	14 and under	8	952	11,904,072
Germany (6)	14 and under	11	1,249	11,350,634
Italy (7)	14 and under	7.0 36.6	555 2,902	7,929,716
Spain (8)	14 and under	12.3	719	5,844,603
ASIA				
Japan (9)	14 and under	2.37	412	17,387,068
China (10)	14 and under	1	2,674	267,386,056
OTHER				
Mexico (11)	14 and under	2	651	32,556,149
WORLDWIDE				
Worldwide (12)	14 and under	3	65,000	1,812,757,508

*Census figures represent the total population or a sub-set population, depending on the age group specified. *U.S. Census Bureau, 2008



COMORBID CONDITIONS

Hypertension

- Hypertension (blood pressure ≥140/90 mmHg) is a common comorbidity of diabetes
- Hypertension affects the majority of people with diabetes, depending on type of diabetes, age, obesity, and ethnicity.
- Hypertension is also a major risk factor for CVD and microvascular complications such as retinopathy and nephropathy.
- In Type 1 diabetes, hypertension is often the result of underlying nephropathy.



http://www.hypertensiononline.org/slides2/slide01.cfm?tk=22&pg=1

Heart Disease

People with diabetes have extra reason to be mindful of heart and blood vessel disease. Diabetes carries an increased risk for heart attack, stroke, and complications related to poor circulation.







Data from presentation by Jaime A. Davidson, Professor of Clinical Medicine, University of Texas Southwestern Medical School at Southwestern Medical Center, Dallas, Texas. "Confronting diabetes: the coronary heart disease risk equivalent" available at

www.worldwidediabetes.org/system/html_site/slide_resources/Slides/Confronting%20diabetes.pdf

Kidney Disease (Nephropathy)/Kidney Transplantation

 Diabetes can damage the kidneys, which not only can cause them to fail, but can also make them lose their ability to filter out waste products. This is called nephropathy.

Eye Complications

• Diabetes can cause eye problems and may lead to blindness. People with diabetes do have a higher risk of blindness than people without diabetes. Early detection and treatment of eye problems can save your sight.

Diabetes, Oral Health and Hygiene

• There are more bacteria in your mouth right now than there are people on Earth. If those germs settle into your gums, you've got gum disease.

• Diabetic Neuropathy and Nerve Damage

One of the most common complications of diabetes is diabetic neuropathy. Neuropathy means damage to the nerves that run throughout the body, connecting the spinal cord to muscles, skin, blood vessels, and other organs.

Foot Complications

• People with diabetes can develop many different foot problems. Foot problems most often happen when there is nerve damage in the feet or when blood flow is poor. Learn how to protect your feet by following some basic guidelines.

Skin complications

 As many as one-third of people with diabetes will have a skin disorder caused or affected by diabetes at some time in their lives. In fact, such problems are sometimes the first sign that a person has diabetes. Luckily, most skin conditions can be prevented or easily treated if caught early.

Depression

• Feeling down once in a while is normal. But some people feel a sadness that just won't go away. Life seems hopeless. Feeling this way most of the day for two weeks or more is a sign of serious depression.

ASSOCIATED RISK FACTORS

- Family history: having a parent, brother, or sister with diabetes
- Ethnicity: Alaska Native, American Indian, African American, Hispanic/Latino, Asian American, or Pacific Islander.
- Previous diagnosis of gestational diabetes, or having given birth to at least one baby weighing more than 9 pounds
- Increased blood pressure reading of 140/90 mm Hg or higher, or having a diagnosis of hypertension (high blood pressure)
- Cholesterol levels are not normal. HDL cholesterol—"good" cholesterol—is below 35 mg/dL, or triglyceride level is above 250 mg/dL
- Inactivity, exercising fewer than three times a week.
- Diagnosis of polycystic ovary syndrome, also called PCOS—women only
- Diagnosis of impaired glucose tolerance (IGT) or impaired fasting glucose (IFG) on previous test
- Presence of clinical conditions associated with insulin resistance, such as acanthosis nigricans
- History of cardiovascular disease
- Diabetes is the sixth leading cause of death. Over 200,000 people die each year of diabetes-related complications.
- Diabetes is a leading cause of kidney failure, new blindness in adults, and leg and foot amputations unrelated to injury.
- Diabetes is a major cause of heart disease and stroke, which are responsible for about 65% of deaths among people with diabetes

http://diabetes.niddk.nih.gov/dm/pubs/riskfortype2/index.htm#3

Treatment Goals

- Patients with diabetes should be treated to a systolic blood pressure <130 mmHg.
- Patients with diabetes should be treated to a diastolic blood pressure <80 mmHg.
- Patients with hypertension (systolic blood pressure ≥140 or diastolic blood pressure ≥ 90 mmHg) should receive drug therapy in addition to lifestyle and behavioral therapy.
- Multiple drug therapy (two or more agents at proper doses) is generally required to achieve blood pressure targets.
- Patients with a systolic blood pressure of 130–139 mmHg or a diastolic blood pressure of 80–89 mmHg should be given lifestyle and behavioral therapy alone for a maximum of 3 months and then, if targets are not achieved, in addition, be treated with pharmacological agents that block the renin-angiotensin system.
- Initial drug therapy for those with a blood pressure >140/90 mmHg should be with a drug class demonstrated to reduce CVD events in patients with diabetes (ACE inhibitors, angiotensin receptor blockers [ARBs], ß-blockers, diuretics, and calcium channel blockers).
- Initial drug therapy for those with a blood pressure >140/90 mmHg should be with a drug class demonstrated to reduce CVD events in patients with diabetes (ACE inhibitors, angiotensin receptor blockers [ARBs], ß-blockers, diuretics, and calcium channel blockers).
- All patients with diabetes and hypertension should be treated with a regimen that includes either an ACE inhibitor or an ARB. If one class is not tolerated, the other should be substituted. If needed to achieve blood pressure targets, a thiazide diuretic should be added.

ECONOMIC IMPACT

Direct and Indirect Costs of Diabetes in the United States

- The total annual economic cost of diabetes in 2007 was estimated to be \$174 billion.
- Medical expenses totaled \$116 billion
 - o \$27 billion for diabetes care
 - \$58 billion for chronic diabetes-related complications
 - o \$31 billion for excess general medical costs
- Indirect costs resulting from increased absenteeism, reduced productivity, diseaserelated unemployment disability, and loss of productive capacity due to early mortality totaled \$58 billion.

- This is an increase of \$42 billion since 2002. This 32% increase means that the dollar amount has grown over \$8 billion each year.
- The 2007 per capita annual costs of health care for people with diabetes is \$11,744 a year, of which \$6,649 (57%) is attributed to diabetes.
- One out of every five health care dollars is spent caring for someone with diagnosed diabetes, while one in ten health care dollars is attributed to diabetes.

Medical Expenditures Attributed to Diabetes:

- Estimated at \$116 billion, including \$27 billion for care to directly treat diabetes,
- \$58 billion to treat diabetes-related chronic complications
- \$31 billion in excess general medical costs
- People with diagnosed diabetes, on average, have medical expenditures that are approximately 2.3 times higher than those without diabetes.
- Diagnosed diabetes patients account for 5.8 percent of the total U.S. population.
- \$58.3 billion was spent on inpatient hospital care and \$9.9 billion on physician's office visits directly attributed to diabetes.
- Diabetes-related hospitalizations totaled 24.3 million days in 2007, an increase of 7.4 million from the 16.9 million days in 2002.
- The average cost for a hospital inpatient day due to diabetes is \$1,853 and \$2,281 due to diabetes-related chronic complications, including neurological, peripheral vascular, cardiovascular, renal, metabolic, and ophthalmic complications.

Indirect Cost of Diabetes:

- Estimated to be \$58 billion in 2007.
- In 2007, diabetes accounted for
 - 15 million workdays absent
 - o 120 million work days with reduced performance,
 - o 6 million reduced productivity days for those not in the workforce
 - o 107 million work days lost due to unemployment disability
- Diabetes caused 445,000 cases of unemployment disability in 2007
- The value of lost productivity due to premature death related to diabetes is \$26.9 billion per year.

ADA. Economic Costs of Diabetes in the U.S. in 2007, *Diabetes Care* 2008, v31 pp1-20.

A1_c: A test that measures how much glucose has been sticking during the past 3–4 months to hemoglobin, the substance in the red blood cells that carries oxygen to the cells of the body. The A1C test is important in diabetes as a long-term measure of control over blood glucose. Even outside of diabetes, an elevated A1C level may be a cardiovascular risk factor.

acetone: A ketone formed in greater abundance in the liver from fatty acids when glucose is not available to the cells for energy. Acetone, one of three ketones, is found in the blood and urine of people with uncontrolled diabetes and causes the breath to have a fruity odor.

acidosis: An acid condition of the body resulting from abnormal amounts of acid, such as acetoacetic and beta hydroxybutyric acids. Acidosis occurs in people who are not producing insulin or who do not receive enough insulin.

ADA: American Diabetes Association, Incorporated, is a national voluntary health organization of professional and lay people interested in research, service, and education in the field of diabetes.

adrenal glands: Two tent-shaped organs that secrete epinephrine (see epinephrine) and glucocorticoids (see glucocorticoids) and aldosterone.

adult diabetes: Now called Type 2 or non-insulin-dependent diabetes mellitus. (See Type 2 diabetes.)

alpha cells: Cells that produce glucagon; found in the islets of Langerhans of the pancreas.

angiopathy: Blood-vessel disease (see microangiopathy and macroangiopathy).

atrophy: The shrinking of a body part due to lack of nutrition. In diabetes, this may mean a decrease in the amount of fat under the skin. This sometimes occurs at the sites of insulin injection and results in hollowed-out areas that are cosmetically undesirable.

beta cells: Cells that produce insulin; found in the islet of Langerhans of the pancreas.

biguanides: Drugs, such as phenformin (DBI and DBI-TD), have also been used in treating diabetes. They do not stimulate the pancreas to produce more insulin but prevent glucose uptake from the intestine, prevent gluconeogenesis, and promote the breakdown of glucose, among other actions. Although these drugs are not now available in the United States, a new phenformin called metformin is being tested. It is found to be less of a cause of lactic acidosis, a side effect seen in the use of the earlier drugs.

blood-glucose level: The concentration of glucose in the blood. It is commonly called blood sugar and is usually measured in milligrams per deciliter (mg/dl) or in millimoles (mmol).

blood-glucose meter: A hand-held machine that tests blood-glucose levels. A drop of blood, obtained by pricking a finger, is placed on a small strip that is inserted in the meter which calculates and displays the blood-glucose level.

brittle diabetes: A type of Type 1 diabetes in which the blood-glucose level fluctuates widely from high to low. Brittle diabetes can be caused by the complete loss of ability to produce any insulin, by too high an insulin dose, or by other factors. It can often be improved through a good treatment program. Also called unstable diabetes.

calorie: A unit for the measurement of heat. The heat-producing, or energy-producing, value of foods is measured in calories. A true calorie is such a small unit that 1,000 calories—a kilocalorie—is usually referred to as a calorie when discussing caloric values of food.

calorie content: The amount of heat released on the burning of one gram of food, most correctly called a kilocalorie (k).

carbohydrate: One of the three main constituents of foods. Carbohydrates are composed mainly of sugars and starches.

cardiovascular disease: Disease of the heart and large blood vessels; tends to occur more often and at a younger age in people with diabetes and may be related to how well the diabetes is controlled.

cell membrane: The material that surrounds all cells and acts to retain helpful substances, exclude harmful substances, and allow glucose to pass into the cells (with the help of insulin).

cholesterol: A mixture of lipoproteins found in blood, consisting of HDL (high-density lipoproteins), LDL (low-density lipoproteins), and VLDL (very-low-density lipoproteins). Present recommendations are to keep cholesterol levels below 200 mg/dl.

closed-loop system: A self-controlled blood-glucose control system (artificial pancreas or artificial beta cell).

conventional control: One or two doses of insulin with blood sugars higher than normal 50 percent or more of the time.

DCCT: Diabetes Control and Complications Trial—A 10-year research study sponsored by the National Institutes of Health (NIH) involving more than 1,400 people with Type I diabetes. The study proved that tight blood-glucose control can prevent or delay diabetic complications related to hyperglycemia.

dawn phenomenon: An early-morning rise in blood-glucose levels, believed to be due to a delayed response in growth-hormone release.

diabetes mellitus: A disease in which the body is unable to use and store glucose normally because of a decrease or lack of insulin production. Diabetes mellitus is usually inherited, but it may be caused by any process that destroys the pancreas (usually the beta cells) or alters the effectiveness of the receptor site on the cell membrane.

diabetic coma: Unconsciousness occurring during ketoacidosis. Associated symptoms include dry skin and mouth, fruity odor of the breath, very deep and rapid respirations, rapid pulse, and low blood pressure. Diabetic coma is caused by a deficiency of insulin.

diabetic ketoacidosis (DKA): The most severe state of diabetes, in which there are markedly elevated glucose levels in blood and urine, elevated ketones in blood and urine, dehydration, and electrolyte imbalance. (*See ketoacidosis*.)

diabetic ketosis: A serious state of diabetes in which there is glucose in blood and urine, ketones in blood and urine, and possibly some dehydration. (See ketosis.)

dialysis: A method of washing the toxins out of the blood. Peritoneal dialysis is done at home (usually 4 hours in, 4 hours out); hemodialysis is done at home (usually 12 hours in, 12 hours out) or at a center.

double-void technique: The procedure of collecting a urine specimen 30 minutes after first voiding of all the urine. The double-voiding technique is often used in collecting urine to test for glucose and acetone levels. It is a rough measure of diabetes control at that particular time.

epinephrine: A hormone released from the adrenal glands. Its main function in diabetes is to release glucose from the liver, increase the circulation rate, and prevent release of secreted insulin.

fasting blood glucose: Blood-glucose concentration in the morning before breakfast. Commonly called fasting blood sugar (FBS).

fat: One of the three main constituents of foods. Fats occur in nearly pure form as liquids or solids, such as oils and margarines, or they may be a component of other foods. Fats may be of animal or vegetable origin. They have a higher energy content than any other food (9 calories per gram).

fatty acids: Constituents of fat. When there is an insulin deficiency, as in diabetes, fatty acids increase in the blood and are used by the liver to produce ketones.

fiber: Aids in the normal functioning of the digestive system, specifically the intestinal tract.

gangrene: The death of tissue caused by a very poor blood supply, as sometimes occurs in the feet and legs of persons with diabetes. Infection may be a contributing cause.

genes: Basic units of hereditary characteristics passed on through reproduction (part of chromosomes).

gestational diabetes: A period of abnormal glucose tolerance that occurs during pregnancy, usually controlled by diet and possibly insulin.

globin insulin: Modified form of insulin produced by attaching a globin molecule to Regular insulin, slowing absorption and extending the peak and duration of action. Globin insulin is a clear insulin with acidic pH and intermediate action. It is no longer on the market.

glucagon: A hormone produced by the alpha cells in the islet of Langerhans of the pancreas. Glucagon causes a rise in the blood—glucose level by releasing glucose from liver and muscle cells. It is used by injection for the treatment of severe insulin reactions at home, school, or work.

glucocorticoids: Hormones released from the cortex of the adrenal gland; in relation to diabetes, they cause amino acids to be changed into new glucose (gluconeogenesis).

gluconeogenesis: The process of converting amino acids and glycerol to new glucose. This process takes place in the liver and muscle cells of the body.

glucose: The simple sugar, also known as dextrose, that is found in the blood and is used by the body for energy.

glucose tolerance: The ability of the body to use and store glucose. Glucose tolerance is zero in persons with diabetes mellitus.

glucose-tolerance test: A test for diabetes mellitus. The person being tested is given a measured amount of glucose to drink; blood—glucose levels are measured before ingestion and 1/2, 1 1/2, 2, 3, and sometimes 4 to 6 hours after ingestion. Also called oral glucose tolerance test (OGTT).

glucose toxicity: A state in which the lack of insulin, due to a decreased availability and/or function of the cell receptor site to receive insulin, results in an increase of glucose in the body, which is toxic to the beta cells in the islet of Langerhans. This toxicity is such that it may even lead to beta cell death.

glycogen: Glycogen is glucose in storage form in the liver. It may be broken down to form blood glucose during an insulin reaction or during a fast.

glycogenesis: The process whereby the liver converts a portion of glucose to glycogen.

glycogenolysis: The breakdown of glycogen to glucose.

glycohemoglobin: A test that reflects average blood-glucose control for about 3 to 4 months before the test. One test is the hemoglobin A1c.

glycolysis: The breakdown of glucose to carbon dioxide and water.

glycosuria: The presence of glucose in the urine (glyco refers to sugar, uria to urine).

gram: A small unit of weight in the metric system. Used in weighing food to determine a specific amount to eat or to burn in calories (1 pound [16 ounces] equals 453 grams).

health-care team: The group of professionals who help manage diabetes and which may include a physician, registered dietitian, and certified diabetes educator, ophthalmologist, podiatrist, or other specialists.

heart disease: A cardiovascular condition in which the heart does not efficiently pump blood. People with diabetes are at greater risk for developing heart disease than is the general population.

heredity: The transmission of a trait, such as blue eyes, from parents to offspring.

hormone: A chemical substance produced by one gland or tissue and carried by the blood to other tissues or organs, where it stimulates action and causes a specific effect. Insulin and glucagon are hormones.

hyperglycemia: A greater-than-normal level of glucose in the blood (high blood glucose). Fasting blood-glucose values greater than 105 mg/dl (5.8 mmol) are suspect; greater than 140 mg/dl (7.8 mmol) are diagnostic.

hyperinsulinism: An excessive amount of insulin, which may be caused by overproduction of insulin by the beta cells of the islets of Langerhans in the pancreas or by an excessive dose of insulin. Hyperinsulinism may cause hypoglycemia (low blood-glucose levels).

hypertension: High blood pressure. Found to aggravate diabetes control or the complications already developed.

hypocalcemia: Less-than-normal value (10-12 mg/dl in the infant) of calcium in the blood. Signs: convulsive seizure and irritability of the neuromuscular system.

hypoglycemia: A less-than-normal level of glucose in the blood (low blood-glucose level). Fasting blood-glucose value less than 60 mg/dl (3.3 mmol).

hypoglycemic agent: A drug or substance, such as sulfonylureas (e.g., Tolbutamide) and glipizide, used to reduce blood-glucose levels.

impaired glucose tolerance: Condition that exists when blood-glucose values are elevated above normal but are inconclusive for diabetes. Sometimes mistakenly called borderline diabetes.

insulin: A hormone secreted by the beta cells of the islets of Langerhans in the pancreas. Promotes the utilization of glucose.

insulin-dependent diabetes mellitus (IDDM): Also called Type 1 diabetes or juvenile diabetes.

insulin reaction: A condition with rapidly occurring onset that is the result of low bloodglucose levels. It may be caused by too much insulin, too little food, or an increase in exercise without a corresponding increase in food or decrease in insulin. Symptoms may vary from nervousness, shakiness, headaches, and drowsiness to confusion and convulsions, and even to coma. **insulin resistance**: A condition in which the body does not properly respond to insulin. It is the most common cause of Type 2 diabetes.

intensive control: Three or more doses of insulin per day or use of the insulin infusion pump with blood sugars in the normal or near normal range 80 percent or more of the time.

islets of Langerhans: The small groups of cells in the pancreas that contain alpha, beta, and delta cells and produce glucagon, insulin, and somatostatin.

isophane insulin: NPH (neutral protamine Hagedorn) insulin, a neutral pH, intermediateacting insulin.

juvenile diabetes: Now called Type 1 or insulin-dependent diabetes mellitus (IDDM).

ketoacidosis: A condition of the body in which there is not enough insulin. Free fatty acids are released from fat cells and produce ketones in the liver. These ketones or acids result in an imbalance of the blood (acidosis). In the more acute state, the result is ketoacidosis. Large amounts of sugar and ketones are found in urine, electrolytes are imbalanced, and dehydration is present. The onset is usually slow. The condition leads to loss of appetite, abdominal pain, nausea and vomiting, rapid and deep respiration, and coma. Death may occur.

ketone bodies: A name given by some to a mixture of ketones and other metabolism products that may break down into ketones. These other metabolism products are usually acetoacetic acid (which has a ketone group within the molecule) and beta hydroxybutyric acid (a molecule very similar to acetoacetic acid).

ketonemia: The presence of ketones in the blood.

ketones: Substances formed in the blood when a fat is broken down because of insufficient insulin. Fats are broken down into fatty acids, which are then chemically changed into ketones. Ketones (usually acetone) are often found in the blood and urine of persons with uncontrolled diabetes. Ketones may produce a fruity odor in the breath and urine of a person.

ketonuria: The presence of ketones in the urine.

ketosis: The presence of large amounts of ketones in the body, secondary to excessive breakdown of fat caused by insufficient insulin in a person with diabetes mellitus. Acidosis precedes and causes ketosis; the combination (ketosis and acidosis) is called ketoacidosis. Ketosis can also result from starvation or illness in nondiabetic individuals.

kidney threshold: The level of a substance (such as glucose) in the blood in the kidney, above which it will be spilled into the urine. Also called renal threshold.

Kimmelstiel-Wilson syndrome: Lesions of the filtered tubules of the kidney, caused by blood-vessel degeneration related to poorly controlled diabetes, as described by doctors Kimmelstiel and Wilson.

Kussmaul's inspiration: The rapid, deep, and labored respiration observed in patients with diabetic ketoacidosis; an involuntary mechanism to excrete carbon dioxide in order to reduce carbonic-acid level.

labile diabetes: A term used for unstable diabetes control. (See brittle diabetes.)

lente insulin: An intermediate-acting insulin that is a mixture of 30 percent Semilente and 70 percent Ultralente insulin.

lipolysis: The increased fat breakdown in the body tissues that occurs in ketosis (lysis of fat).

liver activation treatment: (Pulsatile IntraVenous Insulin Treatment) insulin given by vein in a pulselike fashion (insulin based on total body needs given in short spurts every few seconds while the person sips a high glucose-loaded drink).

macroangiopathy: Disease related to the large blood vessels of the body.

maturity-onset diabetes: Another name for Type 2 diabetes (also called adult diabetes, non-insulin-dependent diabetes, mild diabetes, ketone-resistant diabetes).

Mauriac syndrome: A condition observed before puberty in children with prolonged, poorly controlled diabetes. It involves an enlarged, fatty liver, pitting edema, and short stature. The Mauriac syndrome is seldom seen today due to proper treatment, with adequate food and insulin provided for growth.

meal plan: An arrangement whereby the total food allowed daily is expressed in terms of a certain number of points or exchanges, with the foods to be eaten at specific times.

metabolism: All the chemical processes in the body, including those by which foods are broken down and used for tissue or energy production.

mg/dl (milligrams per deciliter): The unit of measure used to describe blood-glucose levels.

microaneurysms: Small ballooned-out areas on the capillary blood vessels, such as might be found on the retina of the eye. They may burst and bleed.

microangiopathy: Disease related to the small blood vessels of the body.

monounsaturated fat: Has effect similar to that of polyunsaturated fat but does not lower HDL cholesterol. Found in olive oil and other oils.

nephropathy: Disease of the kidneys which can be life-threatening.

neuritis: Inflammation of the nerves.

neuropathy: Any disease of the nervous system. Neuropathy may occur in persons with diabetes and be related to poor control. Symptoms such as pain, loss of sensation, loss of reflexes, and/or weakness may occur.

non-insulin-dependent diabetes (NIDDM): Also called Type 2 diabetes.

obesity: An abnormal and excessive amount of body fat. Obesity is a risk factor for Type 2 diabetes.

open-loop system: A mechanical system of insulin injection that is not self-controlled but must be controlled or programmed externally.

oral agents (oral hypoglycemic agents): Medications taken orally to lower blood glucose. They are used by people with Type 2 diabetes and should not be confused with insulin.

oral glucose-tolerance test (OGGT): See glucose-tolerance test.

oral hypoglycemia agent: Another name for a blood-glucose-lowering agent. (See *hypoglycemic agent*.)

pancreas: A gland that is positioned near the stomach and that secretes at least two hormones—insulin and glucagon—and many digestive enzymes.

pancreas, artificial: A mechanical device that stimulates the functions of the beta cells. It withdraws blood continuously, measures the glucose level, and injects an appropriate dose of insulin or glucose to reestablish a normal blood-glucose level.

polydipsia: Excessive thirst, with increased drinking of water.

polyphagia: Excessive hunger or appetite, resulting in increased food intake.

polyunsaturated fat: The type of fat that is liquid at room temperature, unless hydrogenated. Includes corn and certain other vegetable oils.

polyuria: Excessive output of urine.

postprandial: Occurring after a meal.

potential abnormality of glucose tolerance: The time during the life of a diabetic person before any abnormality in glucose tolerance can be demonstrated. The identical twin of a person with diabetes is thought to have potential abnormality of glucose tolerance.

protamine zinc insulin (PZI): A long-acting insulin, prepared with large amounts of protamine combined with Regular insulin in the presence of zinc.

protein: One of the three main constituents of foods. Proteins are made up of amino acids and are found in foods such as milk, meat, fish, and eggs. Proteins are essential constituents of all living cells and are the nitrogen-containing nutrient. The calorie content of protein is four calories per gram.

regular insulin: Short-acting insulin crystallized from the pancreas of animals or synthetically made. This insulin is neutralized and can be premixed with NPH insulin. Also known as clear insulin or crystalline insulin.

renal: Pertaining to the kidneys.

renal threshold: Another name for kidney threshold.

retina: The light-sensitive layer at the back of the inner surface of the eyeball.

retinopathy: Disease of the retina. Retinopathy occurs in persons with prolonged, poorly controlled diabetes and involves abnormal growth of and bleeding from the capillary blood vessels in the eye.

saturated fat: The type of fat, such as butter, that is usually solid at room temperature. Saturated fats are usually derived from animal sources.

self-monitoring of blood glucose (SMBG): A technique of testing a person's blood-glucose level in order to determine the body response to activity, food, and medication.

serum glucose: The concentration of glucose in the liquid part of the blood after the cells have been removed (clotted blood).

single-void technique: The procedure of collecting a urine specimen four times a day, before meals and at bedtime. The bladder is not emptied for 30 minutes before the specimen is collected.

spot test: A urine test performed on a sample collected using the single-void technique.

sugar: A form of carbohydrate that provides calories and raises blood glucose levels.

sugar substitutes: Sweeteners, such as saccharin, acesulfame K, and aspartame, that are used as a substitute for sugar.

sulfonylureas: Chemical compounds that stimulate production or release of insulin by the beta cells in the pancreas and/or prevent release of glucose from the liver. They are used in the treatment of Type 2 diabetes.

twenty-four-hour urine: Used to measure quantitative glucose levels in urine from a pooled, twenty-four-hour specimen.

type I diabetes: Results from inability to make insulin due to a combination of genetics or inheritance and environmental stressors. Insulin-dependent diabetes mellitus is associated with insulin's lack of availability, its action on the receptor sites, and/or its function with the glycolytic pathway. Also called insulin-dependent diabetes or juvenile diabetes.

type 2 diabetes: A type of diabetes that is usually found in adults over 30 years of age. The onset is gradual, and the symptoms are often minimal. Patients are often overweight. Those with Type 2 are less prone to acute complications, such as acidosis and coma, than are patients with Type 1. Type 2 diabetes is treated through diet alone or through diet plus oral hypoglycemic agents. Insulin injections may or may not be required. Also called non-insulin-dependent diabetes, non-ketosis-prone diabetes, or maturity-onset diabetes. (Previously called adult diabetes or maturity-onset diabetes in the young [MODY].)

unsaturated fats: The type of fat, such as vegetable oil, that is usually liquid at room temperature. (*See monounsaturated fat and polyunsaturated fat.*)

unstable diabetes: Another name for brittle diabetes.

urine tests: Tests that measure substances in the urine. They provide a general idea of a patient's blood-glucose level several hours before the test. Urine tests for ketones are important for preventing ketoacidosis.

http://www.webmd.com/content/pages/1/1667_50207

EMPLOYER INTERVENTIONS

- Aldana, S. A Worksite Diabetes Prevention Program. AAOHN 2006; 54(9): 389-395
- Tuncelli, K. Glycemic Control and Absenteeism, Diab Care 2007, 30(5): 12835.

ADDITIONAL RESOURCES

An Unhealthy America: The Economic Burden of Chronic Disease:

http://www.milkeninstitute.org/publications/publications.taf?function=detail&ID=38801018&ca t=ResRep

The American Association of Diabetes Educators (AADE):

http://www.diabeteseducator.org/

The American Diabetes Association: http://www.diabetes.org/for-parents-and-kids/resources.jsp

The American Dietetic Organization:

http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/index.html

Joslin Diabetes Center: http://www.joslin.org/

National Diabetes Education Initiative:

http://www.slideshare.net/david7s/ndei-cardiovascular-disease-in-diabetes-epidemiology/

TOOLS FOR EMPLOYEES / PATIENTS

The American Association of Clinical Endocrinologists (AACE): http://www.aace.com/public/awareness/mangdiab/index.php

The American Association of Clinical Endocrinologists (AACE) – Diabetes Backgrounder: Understanding the Disease and Its Impact: http://www.aaco.com/public/awaroness/omerging/Diabetes_Backgrounder.pdf

http://www.aace.com/public/awareness/emerging/Diabetes_Backgrounder.pdf

The State of Diabetes: http://www.stateofdiabetes.com/tools_resources.html

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- Heine, R.J., Balkau, B., Ceriello, A. What does postprandial hyperglycaemia mean? *Diabetic Medicine*. 2004; 21: 208-13.
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Type 2 Diabetes



DEFINITION

Most Americans who are diagnosed with diabetes have type 2 diabetes. Type 2 diabetes is the most common form of diabetes. In type 2 diabetes, either the body does not produce enough insulin or the cells ignore the insulin. Insulin is necessary for the body to be able to use glucose for energy. When you eat food, the body breaks down all of the sugars and starches into glucose, which is the basic fuel for the cells in the body. Insulin takes the sugar from the blood into the cells. When glucose builds up in the blood instead of going into cells, it can cause two problems:

- Right away, your cells may be starved for energy.
- Over time, high blood glucose levels may hurt your eyes, kidneys, nerves or heart.

While diabetes occurs in people of all ages and races, some groups have a higher risk for developing type 2 diabetes than others. Type 2 diabetes is more common in African Americans, Latinos, Native Americans, and Asian Americans/Pacific Islanders, as well as the aged population.

http://www.diabetes.org/type-2-diabetes.jsp

INCIDENCE & PREVALENCE

- Over 18.2 million Americans have diabetes, and about one-third of them don't know that they have the disease.
- By 2050, an estimated 39 million U.S. residents are expected to have diagnosed diabetes.
- American Indians, African Americans, and Hispanics are about 2 times more likely than whites to have diabetes.
- Type 2 diabetes, once believed to affect only adults, is being diagnosed increasingly among young people.
- One in three U.S. children born in 2000 could develop diabetes during their lifetime.
- Diabetes is the sixth leading cause of death. Over 200,000 people die each year of diabetes-related complications.

A total of 1.6 million new cases of diabetes were diagnosed in people aged 20 years or older in 2007.



	Age group	Prevalence	Prevalence	
	(years)	rate (%)	number	Population*
NORTH AMERICA				
U.S. (1)	all ages	3.9	11,967,400	303,824,646
Canada (2)	all ages	3.6	1,206,600	33,679,263
EUROPE				
United Kingdom (3)	all ages	1.9	1,146,000	60,943,912
France (4)	all ages	2.9	1,876,400	64,094,658
Germany (5)	all ages	4.1	3,353,500	82,369,548
Italy (6)	all ages	4.9	2,824,200	58,145,321
Spain (7)	all ages	4.2	1,683,100	40,491,051
ASIA				
Japan (8)	adults	7.4	7,677,684	103,752,491
Japan (9)	all ages	5.6	7,120,700	127,288,419
China (10)	adults	2.6	20,000,000	948,478,746
India (11)	all ages	2.1	23,587,900	1,147,995,898
LATIN AMERICA				
Mexico (12)	all ages	8.2	9,016,343	109,955,400
WORLDWIDE				
Worldwide (13)	all ages	2.3	154,000,000	6,679,532,264

*Census figures represent the total population or a sub-set population, depending on the age group specified. U.S. Census Bureau, 2008

Incidence & Prevalence Websites

http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm#i_people http://www.diabetes.org/about-diabetes.jsp http://www.cdc.gov/nccdphp/publications/factsheets/Prevention/diabetes.htm



* Growth of Total U.S. Diagnosed Diabetes Population* Individual prevalence of diabetes calculated by dividing diabetes population (16,660,000) by total U.S. civilian non-institutionalized population (297,269,408). Projected diabetes households = 15,616,000. Household prevalence of diabetes = 13.8% (15,616,000 diabetes households ÷ 112,991,446 total U.S. households) Source: Monthly Estimates for the United States – April 1, 2000 to August 1, 2007 Population Division, U.S. Census Bureau



2007 Newly Diagnosed with Diabetes

CDC. National Diabetes Fact Sheet, 2007.Source: 2004–2006 National Health Interview Survey estimates projected to year 2007.

In the US, more Type 2 patients are being diagnosed between the age of 45 and 64

	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Under 45 (Net)	32%	32%	28%	32%	17%	34%
Under 18	2%	3%	3%	-	-	2%
18-24	3%	1%	-	-	-	2%
25-34	6%	8%	11%	1%	5%	2%
35-44	22%	20%	14%	31%	12%*	28%
45-64	46%	44%	46%	39%	68%	42%
65+	22%	24%	26%	29%	14%	24%
MEAN		52 years	54 years	55 years	54 years	53 years

<u>Note</u>: 2006 data for 45-64 age cohort is anomalous. Mean value suggests that responses are clustered around the 45-54 age cohort.

Base = Patients Diagnosed in Past Year - U = 92, W = 1431

Source: 2003-2007 Roper Pre-Diabetes Patient Market Studies

SYMPTOMS

- More than 6 million people in the United States have Type 2 diabetes and do not know it.
- Many people have no signs or symptoms. Symptoms can also be so mild that you might not even notice them. Some people have symptoms but do not suspect diabetes.
- Type 2 diabetes is frequently not diagnosed until complications appear, and approximately one-third of all people with diabetes may be undiagnosed.
- Individuals at high risk should be screened for diabetes and pre-diabetes.

Symptoms can include one or more of the following:

- Increased urination, especially at night
- Excessive or increased thirst
- Increased hunger
- Unusual weight loss

- Increased fatigue
- Irritability
- Blurry vision
- Sores that do not heal

http://diabetes.niddk.nih.gov/dm/pubs/riskfortype2/index.htm#3.

CO-MORBID CONDITIONS

Many people with type 2 diabetes develop more than one other serious health problem associated with the disease. The new report shows that approximately: 1

- 1out of 10 people (10.3 percent) with the disease has **2** other serious health problems
- 1 out of 15 people (6.7 percent) with the disease has **3** other serious health problems
- 1 out of 13 people (7.6 percent) with the disease has **4** or more other serious health problems

Heart Disease and Stroke

- In 2004, heart disease was noted on 68 percent of diabetes-related death certificates among people aged 65 years or older.
- In 2004, stroke was noted on 16 percent of diabetes-related death certificates among people aged 65 years or older.
- Adults with diabetes have heart disease death rates about two to four times higher than adults without diabetes.
- The risk for stroke is two to four times higher among people with diabetes.

Hypertension

- Hypertension (blood pressure ≥140/90 mmHg) is a common comorbidity of diabetes
- Hypertension affects the majority of people with diabetes, depending on type of diabetes, age, obesity, and ethnicity.
- Hypertension is also a major risk factor for CVD and microvascular complications such as retinopathy and nephropathy.
- In type 2 diabetes, hypertension may be present as part of the metabolic syndrome (i.e., obesity, hyperglycemia, and dyslipidemia), which is accompanied by high rates of cardiovascular disease (CVD).
- In 2003 to 2004, 75 percent of adults with self-reported diabetes had blood pressure greater than or equal to 130/80 millimeters of mercury (mm Hg) or used prescription medications for hypertension.



Measurements taken in individuals ages 40-69 years, beginning with a blood pressure of 115/75 mm Hg.

Lewington S. Lancet 2002, v360, pp1903-1913.

Chobanian AV. JAMA 2003, v289, pp 2560-2572.



http://www.hypertensiononline.org/slides2/slide01.cfm?tk=22&pg=1Kidney Disease

- Diabetes is the leading cause of kidney failure, accounting for 44 percent of new cases in 2005.
- In 2005, 46,739 people with diabetes began treatment for end-stage kidney disease in the United States and Puerto Rico.
- In 2005, a total of 178,689 people with end-stage kidney disease due to diabetes were living on chronic dialysis or with a kidney transplant in the United States and Puerto Rico.

Blindness

- Diabetes is the leading cause of new cases of blindness among adults aged 20 to 74 years.
- Diabetic retinopathy causes 12,000 to 24,000 new cases of blindness each year.

Nervous System Disease

- About 60 to 70 percent of people with diabetes have mild to severe forms of nervous system damage. The results of such damage include impaired sensation or pain in the feet or hands, slowed digestion of food in the stomach, carpal tunnel syndrome, erectile dysfunction, or other nerve problems.
- Almost 30 percent of people with diabetes aged 40 years or older have impaired sensation in the feet—for example, at least one area that lacks feeling.
- Severe forms of diabetic nerve disease are a major contributing cause of lowerextremity amputations.

Amputations

- More than 60 percent of non-traumatic lower-limb amputations occur in people with diabetes.
- In 2004, about 71,000 non-traumatic lower-limb amputations were performed in people with diabetes.

Dental Problems

- Periodontal, or gum, disease is more common in people with diabetes. Among young adults, those with diabetes have about twice the risk of those without diabetes.
- Persons with poorly controlled diabetes (A1C > 9 percent) were nearly three times more likely to have severe periodontitis than those without diabetes.
- Almost one-third of people with diabetes have severe periodontal disease with loss of attachment of the gums to the teeth measuring 5 millimeters or more.

Pregnancy Complications

- Poorly controlled diabetes before conception and during the first trimester of pregnancy among women with type 1 diabetes can cause major birth defects in 5 to 10 percent of pregnancies and spontaneous abortions in 15 to 20 percent of pregnancies.
- Poorly controlled diabetes during the second and third trimesters of pregnancy can result in excessively large babies, posing a risk to both mother and child.

Other Complications

- Uncontrolled diabetes often leads to biochemical imbalances that can cause acute life-threatening events, such as diabetic ketoacidosis and hyperosmolar, or nonketotic, coma.
- People with diabetes are more susceptible to many other illnesses and, once they acquire these illnesses, often have worse prognoses. For example, they are more likely to die with pneumonia or influenza than people who do not have diabetes.
- Persons with diabetes aged 60 years or older are two to three times more likely to report an inability to walk a quarter of a mile, climb stairs, do housework, or use a mobility aid compared with persons without diabetes in the same age group.

ASSOCIATED RISK FACTORS

- Family history, having a parent, brother, or sister with diabetes
- Race: My family background is Alaska Native, American Indian, African American, Hispanic/Latino, Asian American, or Pacific Islander.
- Previous diagnosis of gestational diabetes, or having given birth to at least one baby weighing more than 9 pounds
- Increased blood pressure reading of 140/90 mm Hg or higher, or having a diagnosis of hypertension (high blood pressure)
- Cholesterol levels are not normal. HDL cholesterol—"good" cholesterol—is below 35 mg/dL, or triglyceride level is above 250 mg/dL
- Inactivity, exercising fewer than three times a week.
- Diagnosis of polycystic ovary syndrome, also called PCOS—women only
- Diagnosis of impaired glucose tolerance (IGT) or impaired fasting glucose (IFG) on previous test
- Presence of clinical conditions associated with insulin resistance, such as acanthosis nigricans
- History of cardiovascular disease
- Diabetes is the sixth leading cause of death. Over 200,000 people die each year of diabetes-related complications.
- Diabetes is a leading cause of kidney failure, new blindness in adults, and leg and foot amputations unrelated to injury.
- Diabetes is a major cause of heart disease and stroke, which are responsible for about 65% of deaths among people with diabetes

http://diabetes.niddk.nih.gov/dm/pubs/riskfortype2/index.htm#3 http://www.hypertensiononline.org/slides2/slide01.cfm?tk=22&dpg=6

TREATMENT CONSIDERATIONS & BENEFITS OF THERAPY



Algorithm for the metabolic management of type 2 diabetes

http://care.diabetesjournals.org/cgi/content/full/30/suppl_1/S4/F1

- Patients with hypertension (systolic blood pressure ≥140 or diastolic blood pressure ≥ 90 mmHg) should receive drug therapy in addition to lifestyle and behavioral therapy.
- Multiple drug therapy (two or more agents at proper doses) is generally required to achieve blood pressure targets.
- Patients with a systolic blood pressure of 130–139 mmHg or a diastolic blood pressure of 80–89 mmHg should be given lifestyle and behavioral therapy alone for a maximum of 3 months and then, if targets are not achieved, in addition, be treated with pharmacological agents that block the renin-angiotensin system.
- Initial drug therapy for those with a blood pressure >140/90 mmHg should be with a drug class demonstrated to reduce CVD events in patients with diabetes (ACE inhibitors, angiotensin receptor blockers [ARBs], ß-blockers, diuretics, and calcium channel blockers).
- Initial drug therapy for those with a blood pressure >140/90 mmHg should be with a drug class demonstrated to reduce CVD events in patients with diabetes (ACE inhibitors, angiotensin receptor blockers [ARBs], ß-blockers, diuretics, and calcium channel blockers).

• All patients with diabetes and hypertension should be treated with a regimen that includes either an ACE inhibitor or an ARB. If one class is not tolerated, the other should be substituted. If needed to achieve blood pressure targets, a thiazide diuretic should be added.

http://www.hypertensiononline.org/slides2/slide01.cfm?tk=22&pg=1

Hansson, L, et al, for the HOT Study Group. Effects of intensive blood-pressure lowering and lowdose aspirin in patients with hypertension: principal results of the hypertension optimal treatment randomized trial. Lancet 1998; 351:1755.

Treatment Goals

- Patients with diabetes should be treated to a systolic blood pressure <130 mmHg.
- Patients with diabetes should be treated to a diastolic blood pressure <80 mmHg.

Treatment can make a difference:

- Intensified blood pressure control can cut health care costs by \$900 (2000 US dollars) over the lifetime of a person with type 2 diabetes. It can also extend life by 6 months.
- In just 5 years, a foot care program can save \$900 (2000 U.S. dollars) in health care costs for a person with diabetes who has had foot ulcers. Such care prevents amputations.
- Outpatient training to help people self-manage their diabetes prevents hospitalizations. Every \$1 invested in such training can cut health care costs by up to \$8.76.
- Preconception care for women with diabetes leads to healthier mothers and babies. Every \$1 invested in such care can reduce health costs by up to \$5.19 by preventing costly complications.

ECONOMIC IMPACT

Direct and Indirect Costs of Diabetes in the United States

- The total annual economic cost of diabetes in 2007 was estimated to be \$174 billion.
- Medical expenses totaled \$116 billion
 - o \$27 billion for diabetes care
 - o \$58 billion for chronic diabetes-related complications
 - \$31 billion for excess general medical costs
- Indirect costs resulting from increased absenteeism, reduced productivity, diseaserelated unemployment disability, and loss of productive capacity due to early mortality totaled \$58 billion.

- This is an increase of \$42 billion since 2002. This increase by 32% means that the dollar amount has risen over \$8 billion more each year.
- The 2007 per capita annual costs of health care for people with diabetes is \$11,744 a year, of which \$6,649 (57%) is attributed to diabetes.
- One out of every five health care dollars is spent caring for someone with diagnosed diabetes, while one in ten health care dollars is attributed to diabetes.

Medical Expenditures Attributed to Diabetes:

- Estimated at \$116 billion, including \$27 billion for care to directly treat diabetes,
- \$58 billion to treat diabetes-related chronic complications
- \$31 billion in excess general medical costs
- People with diagnosed diabetes, on average, have medical expenditures that are approximately 2.3 times higher than those without diabetes.
- Diagnosed diabetes patients account for 5.8 percent of the total U.S. population.
- \$58.3 billion was spent on inpatient hospital care and \$9.9 billion on physician's office visits directly attributed to diabetes.
- Diabetes-related hospitalizations totaled 24.3 million days in 2007, an increase of 7.4 million from the 16.9 million days in 2002.
- The average cost for a hospital inpatient day due to diabetes is \$1,853 and \$2,281 due to diabetes-related chronic complications, including neurological, peripheral vascular, cardiovascular, renal, metabolic, and ophthalmic complications.

Indirect Cost of Diabetes:

- Estimated to be \$58 billion in 2007
- In 2007, diabetes accounted for
 - o 15 million work days absent
 - o 120 million work days with reduced performance
 - o 6 million reduced productivity days for those not in the workforce
 - o 107 million work days lost due to unemployment disability
- Diabetes caused 445,000 cases of unemployment disability in 2007
- The value of lost productivity due to premature death related to diabetes is \$26.9 billion

http://www.diabetes.org/diabetes-statistics/cost-of-diabetes-in-us.jsp ADA, Economic Costs of Diabetes in the U.S. in 2007, Diabetes Care 2008, v31 pp1-20. http://www.cdc.gov/diabetes/projects/business.htmS Frazão, E. (n.d.). High costs of poor eating patterns in the United States
10 Things You Might Not Know About Diabetes

- About one third of all people with diabetes do not know they have the disease.
- Type 2 diabetes often does not have any symptoms.
- Only about ten percent of all people with diabetes have type 1 diabetes.
- Type 2 diabetes can be prevented with moderate weight loss (10-15 pounds) and 30 minutes of moderate physical activity (such as brisk walking) each day.
- The meal plan for a patient with diabetes isn't very different than what is recommended for healthy people.
- Diabetes is the leading cause of blindness in working-age adults.
- People with diabetes are twice as likely to develop heart disease than someone without diabetes
- Good control of diabetes significantly reduces the risk of developing complications and prevents complications from getting worse.
- Bariatric surgery can reduce the symptoms of diabetes in obese people.
- The indirect national cost of diabetes in 2007 was 174 billion dollars.

http://www.joslin.org/managing_your_diabetes_4360.asp ADA, Economic Costs of Diabetes in the U.S. in 2007, Diabetes Care 2008, v31 pp1-20.

GLOSSARY

A1_C: A test that measures how much glucose has been sticking during the past 3–4 months to hemoglobin, the substance in the red blood cells that carries oxygen to the cells of the body. The A1C test is important in diabetes as a long-term measure of control over blood glucose. Even outside of diabetes, an elevated A1C level may be a cardiovascular risk factor.

acetone: A ketone formed in greater abundance in the liver from fatty acids when glucose is not available to the cells for energy. Acetone, one of three ketones, is found in the blood and urine of people with uncontrolled diabetes and causes the breath to have a fruity odor.

acidosis: An acid condition of the body resulting from abnormal amounts of acid, such as acetoacetic and beta hydroxybutyric acids. Acidosis occurs in people who are not producing insulin or who do not receive enough insulin.

ADA: American Diabetes Association, Incorporated, is a national voluntary health organization of professional and lay people interested in research, service, and education in the field of diabetes.

adrenal glands: Two tent-shaped organs that secrete epinephrine (see epinephrine) and glucocorticoids (see glucocorticoids) and aldosterone.

adult diabetes: Now called Type 2 or non-insulin-dependent diabetes mellitus. (See Type 2 diabetes.)

alpha cells: Cells that produce glucagon; found in the islets of Langerhans of the pancreas.

angiopathy: Blood-vessel disease (see microangiopathy and macroangiopathy).

atrophy: The shrinking of a body part due to lack of nutrition. In diabetes, this may mean a decrease in the amount of fat under the skin. This sometimes occurs at the sites of insulin injection and results in hollowed-out areas that are cosmetically undesirable.

beta cells: Cells that produce insulin; found in the islet of Langerhans of the pancreas.

biguanides: Drugs, such as phenformin (DBI and DBI-TD), have also been used in treating diabetes. They do not stimulate the pancreas to produce more insulin but prevent glucose uptake from the intestine, prevent gluconeogenesis, and promote the breakdown of glucose, among other actions. Although these drugs are not now available in the United States, a new phenformin called metformin is being tested. It is found to be less of a cause of lactic acidosis, a side effect seen in the use of the earlier drugs.

blood-glucose level: The concentration of glucose in the blood. It is commonly called blood sugar and is usually measured in milligrams per deciliter (mg/dl) or in millimoles (mmol).

blood-glucose meter: A hand-held machine that tests blood-glucose levels. A drop of blood, obtained by pricking a finger, is placed on a small strip that is inserted in the meter which calculates and displays the blood-glucose level.

brittle diabetes: A type of Type 1 diabetes in which the blood-glucose level fluctuates widely from high to low. Brittle diabetes can be caused by the complete loss of ability to produce any insulin, by too high an insulin dose, or by other factors. It can often be improved through a good treatment program. Also called unstable diabetes.

calorie: A unit for the measurement of heat. The heat-producing, or energy-producing, value of foods is measured in calories. A true calorie is such a small unit that 1,000 calories—a kilocalorie—is usually referred to as a calorie when discussing caloric values of food.

calorie content: The amount of heat released on the burning of one gram of food, most correctly called a kilocalorie (k).

carbohydrate: One of the three main constituents of foods. Carbohydrates are composed mainly of sugars and starches.

cardiovascular disease: Disease of the heart and large blood vessels; tends to occur more often and at a younger age in people with diabetes and may be related to how well the diabetes is controlled.

cell membrane: The material that surrounds all cells and acts to retain helpful substances, exclude harmful substances, and allow glucose to pass into the cells (with the help of insulin).

cholesterol: A mixture of lipoproteins found in blood, consisting of HDL (high-density lipoproteins), LDL (low-density lipoproteins), and VLDL (very-low-density lipoproteins). Present recommendations are to keep cholesterol levels below 200 mg/dl.

closed-loop system: A self-controlled blood-glucose control system (artificial pancreas or artificial beta cell).

conventional control: One or two doses of insulin with blood sugars higher than normal 50 percent or more of the time.

dawn phenomenon: An early-morning rise in blood-glucose levels, believed to be due to a delayed response in growth-hormone release.

diabetes mellitus: A disease in which the body is unable to use and store glucose normally because of a decrease or lack of insulin production. Diabetes mellitus is usually inherited, but

it may be caused by any process that destroys the pancreas (usually the beta cells) or alters the effectiveness of the receptor site on the cell membrane.

diabetic coma: Unconsciousness occurring during ketoacidosis. Associated symptoms include dry skin and mouth, fruity odor of the breath, very deep and rapid respirations, rapid pulse, and low blood pressure. Diabetic coma is caused by a deficiency of insulin.

diabetic ketoacidosis (DKA): The most severe state of diabetes, in which there are markedly elevated glucose levels in blood and urine, elevated ketones in blood and urine, dehydration, and electrolyte imbalance. (*See ketoacidosis*.)

diabetic ketosis: A serious state of diabetes in which there is glucose in blood and urine, ketones in blood and urine, and possibly some dehydration. (See ketosis.)

dialysis: A method of washing the toxins out of the blood. Peritoneal dialysis is done at home (usually 4 hours in, 4 hours out); hemodialysis is done at home (usually 12 hours in, 12 hours out) or at a center.

double-void technique: The procedure of collecting a urine specimen 30 minutes after first voiding of all the urine. The double-voiding technique is often used in collecting urine to test for glucose and acetone levels. It is a rough measure of diabetes control at that particular time.

epinephrine: A hormone released from the adrenal glands. Its main function in diabetes is to release glucose from the liver, increase the circulation rate, and prevent release of secreted insulin.

fasting blood glucose: Blood-glucose concentration in the morning before breakfast. Commonly called fasting blood sugar (FBS).

fat: One of the three main constituents of foods. Fats occur in nearly pure form as liquids or solids, such as oils and margarines, or they may be a component of other foods. Fats may be of animal or vegetable origin. They have a higher energy content than any other food (9 calories per gram).

fatty acids: Constituents of fat. When there is an insulin deficiency, as in diabetes, fatty acids increase in the blood and are used by the liver to produce ketones.

fiber: Aids in the normal functioning of the digestive system, specifically the intestinal tract.

gangrene: The death of tissue caused by a very poor blood supply, as sometimes occurs in the feet and legs of persons with diabetes. Infection may be a contributing cause.

genes: Basic units of hereditary characteristics passed on through reproduction (part of chromosomes).

gestational diabetes: A period of abnormal glucose tolerance that occurs during pregnancy, usually controlled by diet and possibly insulin.

globin insulin: Modified form of insulin produced by attaching a globin molecule to Regular insulin, slowing absorption and extending the peak and duration of action. Globin insulin is a clear insulin with acidic pH and intermediate action. It is no longer on the market.

glucagon: A hormone produced by the alpha cells in the islet of Langerhans of the pancreas. Glucagon causes a rise in the blood—glucose level by releasing glucose from liver and muscle cells. It is used by injection for the treatment of severe insulin reactions at home, school, or work.

glucocorticoids: Hormones released from the cortex of the adrenal gland; in relation to diabetes, they cause amino acids to be changed into new glucose (gluconeogenesis).

gluconeogenesis: The process of converting amino acids and glycerol to new glucose. This process takes place in the liver and muscle cells of the body.

glucose: The simple sugar, also known as dextrose, that is found in the blood and is used by the body for energy.

glucose tolerance: The ability of the body to use and store glucose. Glucose tolerance is zero in persons with diabetes mellitus.

glucose-tolerance test: A test for diabetes mellitus. The person being tested is given a measured amount of glucose to drink; blood—glucose levels are measured before ingestion and 1/2, 1 1/2, 2, 3, and sometimes 4 to 6 hours after ingestion. Also called oral glucose tolerance test (OGTT).

glucose toxicity: A state in which the lack of insulin, due to a decreased availability and/or function of the cell receptor site to receive insulin, results in an increase of glucose in the body, which is toxic to the beta cells in the islet of Langerhans. This toxicity is such that it may even lead to beta cell death.

glycogen: Glycogen is glucose in storage form in the liver. It may be broken down to form blood glucose during an insulin reaction or during a fast.

glycogenesis: The process whereby the liver converts a portion of glucose to glycogen.

glycogenolysis: The breakdown of glycogen to glucose.

glycohemoglobin: A test that reflects average blood-glucose control for about 3 to 4 months before the test. One test is the hemoglobin A1c.

glycolysis: The breakdown of glucose to carbon dioxide and water.

glycosuria: The presence of glucose in the urine (glyco refers to sugar, uria to urine).

gram: A small unit of weight in the metric system. Used in weighing food to determine a specific amount to eat or to burn in calories (1 pound [16 ounces] equals 453 grams).

health-care team: The group of professionals who help manage diabetes and which may include a physician, registered dietitian, and certified diabetes educator, ophthalmologist, podiatrist, or other specialists.

heart disease: A cardiovascular condition in which the heart does not efficiently pump blood. People with diabetes are at greater risk for developing heart disease than is the general population.

heredity: The transmission of a trait, such as blue eyes, from parents to offspring.

hormone: A chemical substance produced by one gland or tissue and carried by the blood to other tissues or organs, where it stimulates action and causes a specific effect. Insulin and glucagon are hormones.

hyperbilirubinemia: Condition in which a person has greater-than-normal value (+12.50 mg/dl in the infant) of bilirubin in the blood. Signs: jaundiced look to skin and whites of eyes.

hyperglycemia: A greater-than-normal level of glucose in the blood (high blood glucose). Fasting blood-glucose values greater than 105 mg/dl (5.8 mmol) are suspect; greater than 140 mg/dl (7.8 mmol) are diagnostic.

hyperinsulinism: An excessive amount of insulin, which may be caused by overproduction of insulin by the beta cells of the islets of Langerhans in the pancreas or by an excessive dose of insulin. Hyperinsulinism may cause hypoglycemia (low blood-glucose levels).

hypertension: High blood pressure. Found to aggravate diabetes control or the complications already developed.

hypocalcemia: Less-than-normal value (10-12 mg/dl in the infant) of calcium in the blood. Signs: convulsive seizure and irritability of the neuromuscular system.

hypoglycemia: A less-than-normal level of glucose in the blood (low blood-glucose level). Fasting blood-glucose value less than 60 mg/dl (3.3 mmol).

hypoglycemic agent: A drug or substance, such as sulfonylureas (e.g., Tolbutamide) and glipizide, used to reduce blood-glucose levels.

impaired glucose tolerance: Condition that exists when blood-glucose values are elevated above normal but are inconclusive for diabetes. Sometimes mistakenly called borderline diabetes.

insulin: A hormone secreted by the beta cells of the islets of Langerhans in the pancreas. Promotes the utilization of glucose.

insulin-dependent diabetes mellitus (IDDM): Also called Type 1 diabetes or juvenile diabetes.

insulin reaction: A condition with rapidly occurring onset that is the result of low bloodglucose levels. It may be caused by too much insulin, too little food, or an increase in exercise without a corresponding increase in food or decrease in insulin. Symptoms may vary from nervousness, shakiness, headaches, and drowsiness to confusion and convulsions, and even to coma.

insulin resistance: A condition in which the body does not properly respond to insulin. It is the most common cause of Type 2 diabetes.

intensive control: Three or more doses of insulin per day or use of the insulin infusion pump with blood sugars in the normal or near normal range 80 percent or more of the time.

islets of Langerhans: The small groups of cells in the pancreas that contain alpha, beta, and delta cells and produce glucagon, insulin, and somatostatin.

isophane insulin: NPH (neutral protamine Hagedorn) insulin, a neutral pH, intermediateacting insulin.

juvenile diabetes: Now called Type 1 or insulin-dependent diabetes mellitus (IDDM).

ketoacidosis: A condition of the body in which there is not enough insulin. Free fatty acids are released from fat cells and produce ketones in the liver. These ketones or acids result in an imbalance of the blood (acidosis). In the more acute state, the result is ketoacidosis. Large amounts of sugar and ketones are found in urine, electrolytes are imbalanced, and dehydration is present. The onset is usually slow. The condition leads to loss of appetite, abdominal pain, nausea and vomiting, rapid and deep respiration, and coma. Death may occur.

ketone bodies: A name given by some to a mixture of ketones and other metabolism products that may break down into ketones. These other metabolism products are usually acetoacetic acid (which has a ketone group within the molecule) and beta hydroxybutyric acid (a molecule very similar to acetoacetic acid).

ketonemia: The presence of ketones in the blood.

ketones: Substances formed in the blood when a fat is broken down because of insufficient insulin. Fats are broken down into fatty acids, which are then chemically changed into ketones. Ketones (usually acetone) are often found in the blood and urine of persons with

uncontrolled diabetes. Ketones may produce a fruity odor in the breath and urine of a person.

ketonuria: The presence of ketones in the urine.

ketosis: The presence of large amounts of ketones in the body, secondary to excessive breakdown of fat caused by insufficient insulin in a person with diabetes mellitus. Acidosis precedes and causes ketosis; the combination (ketosis and acidosis) is called ketoacidosis. Ketosis can also result from starvation or illness in nondiabetic individuals.

kidney threshold: The level of a substance (such as glucose) in the blood in the kidney, above which it will be spilled into the urine. Also called renal threshold.

Kimmelstiel-Wilson syndrome: Lesions of the filtered tubules of the kidney, caused by blood-vessel degeneration related to poorly controlled diabetes, as described by doctors Kimmelstiel and Wilson.

Kussmaul's inspiration: The rapid, deep, and labored respiration observed in patients with diabetic ketoacidosis; an involuntary mechanism to excrete carbon dioxide in order to reduce carbonic-acid level.

labile diabetes: A term used for unstable diabetes control. (See brittle diabetes.)

lente insulin: An intermediate-acting insulin that is a mixture of 30 percent Semilente and 70 percent Ultralente insulin.

lipolysis: The increased fat breakdown in the body tissues that occurs in ketosis (lysis of fat).

liver activation treatment: (Pulsatile IntraVenous Insulin Treatment) insulin given by vein in a pulselike fashion (insulin based on total body needs given in short spurts every few seconds while the person sips a high glucose-loaded drink).

macroangiopathy: Disease related to the large blood vessels of the body.

maturity-onset diabetes: Another name for Type 2 diabetes (also called adult diabetes, non-insulin-dependent diabetes, mild diabetes, ketone-resistant diabetes).

Mauriac syndrome: A condition observed before puberty in children with prolonged, poorly controlled diabetes. It involves an enlarged, fatty liver, pitting edema, and short stature. The Mauriac syndrome is seldom seen today due to proper treatment, with adequate food and insulin provided for growth.

meal plan: An arrangement whereby the total food allowed daily is expressed in terms of a certain number of points or exchanges, with the foods to be eaten at specific times.

metabolism: All the chemical processes in the body, including those by which foods are broken down and used for tissue or energy production.

mg/dl (milligrams per deciliter): The unit of measure used to describe blood-glucose levels.

microaneurysms: Small ballooned-out areas on the capillary blood vessels, such as might be found on the retina of the eye. They may burst and bleed.

microangiopathy: Disease related to the small blood vessels of the body.

monounsaturated fat: Has effect similar to that of polyunsaturated fat but does not lower HDL cholesterol. Found in olive oil and other oils.

nephropathy: Disease of the kidneys which can be life-threatening.

neuritis: Inflammation of the nerves.

neuropathy: Any disease of the nervous system. Neuropathy may occur in persons with diabetes and be related to poor control. Symptoms such as pain, loss of sensation, loss of reflexes, and/or weakness may occur.

non-insulin-dependent diabetes (NIDDM): Also called Type 2 diabetes.

obesity: An abnormal and excessive amount of body fat. Obesity is a risk factor for Type 2 diabetes.

open-loop system: A mechanical system of insulin injection that is not self-controlled but must be controlled or programmed externally.

oral agents (oral hypoglycemic agents): Medications taken orally to lower blood glucose. They are used by people with Type 2 diabetes and should not be confused with insulin.

oral glucose-tolerance test (OGGT): See glucose-tolerance test.

oral hypoglycemia agent: Another name for a blood-glucose-lowering agent. (*See hypoglycemic agent*.)

pancreas: A gland that is positioned near the stomach and that secretes at least two hormones—insulin and glucagon—and many digestive enzymes.

pancreas, artificial: A mechanical device that stimulates the functions of the beta cells. It withdraws blood continuously, measures the glucose level, and injects an appropriate dose of insulin or glucose to reestablish a normal blood-glucose level.

polydipsia: Excessive thirst, with increased drinking of water.

polyphagia: Excessive hunger or appetite, resulting in increased food intake.

polyunsaturated fat: The type of fat that is liquid at room temperature, unless hydrogenated. Includes corn and certain other vegetable oils.

polyuria: Excessive output of urine.

postprandial: Occurring after a meal.

potential abnormality of glucose tolerance: The time during the life of a diabetic person before any abnormality in glucose tolerance can be demonstrated. The identical twin of a person with diabetes is thought to have potential abnormality of glucose tolerance.

protamine zinc insulin (PZI): A long-acting insulin, prepared with large amounts of protamine combined with Regular insulin in the presence of zinc.

protein: One of the three main constituents of foods. Proteins are made up of amino acids and are found in foods such as milk, meat, fish, and eggs. Proteins are essential constituents of all living cells and are the nitrogen-containing nutrient. The calorie content of protein is four calories per gram.

regular insulin: Short-acting insulin crystallized from the pancreas of animals or synthetically made. This insulin is neutralized and can be premixed with NPH insulin. Also known as clear insulin or crystalline insulin.

renal: Pertaining to the kidneys.

renal threshold: Another name for kidney threshold.

retina: The light-sensitive layer at the back of the inner surface of the eyeball.

retinopathy: Disease of the retina. Retinopathy occurs in persons with prolonged, poorly controlled diabetes and involves abnormal growth of and bleeding from the capillary blood vessels in the eye.

saturated fat: The type of fat, such as butter, that is usually solid at room temperature. Saturated fats are usually derived from animal sources.

self-monitoring of blood glucose (SMBG): A technique of testing a person's blood-glucose level in order to determine the body response to activity, food, and medication.

serum glucose: The concentration of glucose in the liquid part of the blood after the cells have been removed (clotted blood).

single-void technique: The procedure of collecting a urine specimen four times a day, before meals and at bedtime. The bladder is not emptied for 30 minutes before the specimen is collected.

spot test: A urine test performed on a sample collected using the single-void technique.

sugar: A form of carbohydrate that provides calories and raises blood glucose levels.

sugar substitutes: Sweeteners, such as saccharin, acesulfame K, and aspartame, that are used as a substitute for sugar.

sulfonylureas: Chemical compounds that stimulate production or release of insulin by the beta cells in the pancreas and/or prevent release of glucose from the liver. They are used in the treatment of Type 2 diabetes.

twenty-four-hour urine: Used to measure quantitative glucose levels in urine from a pooled, twenty-four-hour specimen.

type I diabetes: Results from inability to make insulin due to a combination of genetics or inheritance and environmental stressors. Insulin-dependent diabetes mellitus is associated with insulin's lack of availability, its action on the receptor sites, and/or its function with the glycolytic pathway. Also called insulin-dependent diabetes or juvenile diabetes.

type 2 diabetes: A type of diabetes that is usually found in adults over 30 years of age. The onset is gradual, and the symptoms are often minimal. Patients are often overweight. Those with Type 2 are less prone to acute complications, such as acidosis and coma, than are patients with Type 1. Type 2 diabetes is treated through diet alone or through diet plus oral hypoglycemic agents. Insulin injections may or may not be required. Also called non-insulin-dependent diabetes, non-ketosis-prone diabetes, or maturity-onset diabetes. (Previously called adult diabetes or maturity-onset diabetes in the young [MODY].)

unsaturated fats: The type of fat, such as vegetable oil, that is usually liquid at room temperature. (*See monounsaturated fat and polyunsaturated fat.*)

unstable diabetes: Another name for brittle diabetes.

urine tests: Tests that measure substances in the urine. They provide a general idea of a patient's blood-glucose level several hours before the test. Urine tests for ketones are important for preventing ketoacidosis.

http://www.webmd.com/content/pages/1/1667_50207

EMPLOYER INTERVENTIONS

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ADDITIONAL RESOURCES

An Unhealthy America: The Economic Burden of Chronic Disease:

http://www.milkeninstitute.org/publications/publications.taf?function=detail&ID=38801018&ca t=ResRep

The American Association of Diabetes Educators (AADE):

http://www.diabeteseducator.org/

The American Diabetes Association:

http://www.diabetes.org/for-parents-and-kids/resources.jsp

The American Dietetic Organization: http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/index.html

Joslin Diabetes Center:

http://www.joslin.org/

National Diabetes Education Initiative:

http://www.slideshare.net/david7s/ndei-cardiovascular-disease-in-diabetes-epidemiology/

The State of Diabetes Complications in America:

http://www.stateofdiabetes.com/

TOOLS FOR EMPLOYEES / PATIENTS

The American Association of Clinical Endocrinologists (AACE):

http://www.aace.com/public/awareness/mangdiab/index.php

The American Association of Clinical Endocrinologists (AACE) – Diabetes Backgrounder: Understanding the Disease and Its Impact:

http://www.aace.com/public/awareness/emerging/Diabetes_Backgrounder.pdf

The State of Diabetes:

http://www.stateofdiabetes.com/tools_resources.html

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Dyslipidemia



DEFINITION

When you have high cholesterol, you may develop fatty deposits in your blood vessels. Eventually, these deposits make it difficult for enough blood to flow through your arteries. Your heart may not get as much oxygen-rich blood as it needs, which increases the risk of a heart attack. Decreased blood flow to your brain can cause a stroke.

Dyslipidemia is elevation of plasma cholesterol and/or Triglycerides (TGs) or a low HDL level that contributes to the development of atherosclerosis (plaque formation in arteries). Causes may be primary (genetic) or secondary. Diagnosis is done by measuring plasma levels of total cholesterol, TGs, and individual lipoproteins.

Cholesterol is found in every cell in your body. Cholesterol is used by your body to build healthy cells, as well as some vital hormones.

High cholesterol (hypercholesterolemia or hyperlipidemia) is largely preventable and treatable. A healthy diet, regular exercise and sometimes medication can go a long way toward reducing high cholesterol.

SIGNS & SYMPTOMS

High cholesterol has no symptoms. A blood test is the only way to detect high cholesterol. A blood test to check cholesterol levels — called a lipid panel or lipid profile — typically reports:

- Total cholesterol
- LDL cholesterol
- HDL cholesterol
- Triglycerides a type of fat in the blood

For the most accurate measurements, don't eat or drink anything (other than water) for nine to 12 hours before the blood sample is taken.

Cholesterol Testing

Types Of Cholesterol Are Measured?

A complete cholesterol test, referred to as a lipid panel or lipid profile, includes the measurement of four types of fats (lipids) in your blood:

- Low-density lipoprotein (LDL) cholesterol. This is sometimes called the "bad" cholesterol. Too much of it in your blood causes the accumulation of fatty deposits (plaques) in your arteries (atherosclerosis), which reduces blood flow. These plaques sometimes rupture and lead to major heart and vascular problems. In addition, in people with diabetes and in people who are at high risk of heart disease, LDL cholesterol particles tend to be smaller and denser. These smaller, denser particles can cause greater damage to blood vessels than can the cholesterol particles found in people at lower risk of heart disease and in those without diabetes.
- **High-density lipoprotein (HDL) cholesterol.** This is sometimes called the "good" cholesterol because it helps carry away LDL cholesterol, thus keeping arteries open and your blood flowing more freely.
- **Triglycerides.** Triglycerides are another type of fat in the blood. When you eat, your body converts any calories it doesn't need to use right away into triglycerides, which are stored in fat cells and released later for energy. High triglyceride levels usually mean you regularly eat more calories than you burn. High levels are also seen in overweight people, in those consuming too many sweets or too much alcohol, and in people with diabetes who have elevated blood sugar levels.
- Total cholesterol. This is a sum of your blood's cholesterol content.

Together, the four numbers can provide clues about your risk of heart attack, stroke or other blood vessel damage (vascular disease). Results of a lipid panel cholesterol test are listed as a set of numbers in milligrams per deciliter (mg/dL).

It's possible to measure only total cholesterol. However, this single test isn't used as much anymore, because knowing only your total cholesterol level doesn't provide your doctor with as much useful information as the more complete lipid panel.

In 2001, a group of national experts known as the National Cholesterol Education Program Expert Panel recommended that the ideal cholesterol test measure the four types of fats (lipids) in your blood that are included in a lipid panel or lipid profile.

Who Should Get A Cholesterol Test?

- All adults age 20 or older should have a cholesterol test once every five years. Cholesterol testing is very important if you have a family history of high cholesterol or heart disease, are overweight, are physically inactive, have diabetes or eat a high-fat diet. These factors put you at increased risk of developing high cholesterol and heart disease.
- If you have elevated cholesterol levels, your doctor may want you to get tested more often. Discuss with your doctor how often you should have a cholesterol test if your cholesterol levels are abnormal.

It's likely your doctor will want to retest you in several weeks or months if your cholesterol test is abnormal. Before starting any treatment based only on an abnormal cholesterol test, it's common to get several tests done over a period of time to ensure an accurate diagnosis.

You should have your cholesterol measured when you're relatively healthy. An acute illness, a heart attack or severe stress can affect cholesterol levels. Cholesterol is often high during pregnancy, so pregnant women should wait at least six weeks after giving birth to have their cholesterol measured.

Results of a Cholesterol Test

Cholesterol levels are measured in milligrams (mg) of cholesterol per deciliter (dL) of blood. To interpret your test results, use these general guidelines.

	Total Cholesterol			
Below 200 mg/dL	Desirable			
200 to 239 mg/dL	Borderline high			
240 mg/dL and above	High			
LDL Cholesterol				
Below 70 mg/dL	Optimal for people with or at very high risk of heart disease			
Below 100 mg/dL	Optimal for people at risk of heart disease			
100 to 129 mg/dL	Near optimal			
130 to 159 mg/dL	Borderline high			
160 to 189 mg/dL	High			
190 mg/dL and above	Very high			
HDL Cholesterol				
Below 40 mg/dL	Poor			
40 to 59 mg/dL	Better			
60 mg/dL and above	Best			
	Triglyceride			
Below 150 mg/dL	Desirable			
150 to 199 mg/dL	Borderline high			
200 to 499 mg/dL	High			
500 or above	Very high			

http://www.mayoclinic.com/health/cholesterol-test/CL00033 http://www.mayoclinic.com/health/high-blood-cholesterol/DS00178/DSECTION=symptoms

INCIDENCE & PREVALENCE

	Age Group	Cholesterol	Prevalence	Prevalence	
	(Years)	Level	Rate (%)	Number	Population*
NORTH AMERICA					
U.S. (1a)	20+	200+ mg/dL	48.4	106,700,000	220,948,915
U.S. (1b)	20+	240+ mg/dL	16.8	37,200,000	220,948,915
Canada (2)	unspecified	240+ mg/dL	16.5		33,679,263
EUROPE					
UK					
Men (3a)	adults	5.0+ mmol/L	66	15,074,464	22,840,097
Women (3b)	adults	5.0+ mmol/L	67	15,932,095	23,779,246
Germany (4a)	18+	unspecified	29.1	19,319,956	66,391,601
Germany (4b)	18+	unspecified	35.0	23,237,060	66,391,601
ASIA					
Japan (5)	unspecified	220+ mg/dL		23,000,000	127,288,419
China (6)	adults	unspecified	18.6	160,000,000	948,478,746
China (7a)	35 to 74	200-239 mg/dL	18.8	112,500,000	599,640,949
China (7b)	35 to 74	240+ mg/dL	7.1	42,540,000	599,640,949
India (8)	10 to 69	unspecified	37.5	325,652,901	868,407,736
India					
Men (9a)	adults	200+ mg/dL	37.4	129,347,822	345,849,792
Women (9b)	adults	200+ mg/dL	43.1	143,131,802	332,092,349
OTHER					
Mexico (10)	25 to 64	240+ mg/dL	16.4	8,209,922	50,060,499

*Census figures represent the total population or a sub-set population, depending on the age group specified.

*U.S. Census Bureau, 2008

ASSOCIATED RISK FACTORS

You're more likely to have high cholesterol that can lead to heart disease if you have any of these risk factors:

- Smoking. Cigarette smoking damages the walls of your blood vessels, making them likely to accumulate fatty deposits. Smoking may also lower your level of HDL, or "good," cholesterol.
- **Obesity.** Having a body mass index (BMI) of 30 or greater puts you at risk of high cholesterol.
- **Poor diet.** Foods that are high in cholesterol, such as red meat and full-fat dairy products, will increase your total cholesterol. Eating saturated fat, found in animal products, and trans fats, found in some commercially baked cookies and crackers, also can raise your numbers.

- Lack of exercise. Exercise helps boost your body's HDL "good" cholesterol while lowering your LDL "bad"cholesterol. Not getting enough exercise puts you at risk of high cholesterol.
- **High blood pressure.** Increased pressure on your artery walls damages your arteries, which can speed the accumulation of fatty deposits.
- **Diabetes.** High blood sugar contributes to higher LDL cholesterol and lower HDL cholesterol. High blood sugar also damages the lining of your arteries.
- Family history of heart disease. If a parent or sibling developed heart disease before age 55, high cholesterol levels place you at a greater than average risk of developing heart disease.

http://www.mayoclinic.com/health/high-blood-cholesterol/DS00178/DSECTION=risk%2Dfactors

TREATMENT CONSIDERATIONS & BENEFITS OF THERAPY

Lifestyle changes such as exercising and eating a healthy diet are the first line of defense against high cholesterol. But, these important lifestyle changes have been made and ones total cholesterol — and particularly your LDL cholesterol — remains high, then medication may be recommended.

The specific choice of medication or combination of medications depends on various factors, including individual risk factors, age, current health and possible side effects. Common choices include:

- **Statins:** among the most commonly prescribed medications for lowering cholesterol — block a substance that the liver needs to make cholesterol. This depletes cholesterol in the liver cells, which causes the liver to remove cholesterol from the blood. Statins may also help the body reabsorb cholesterol from accumulated deposits on the artery walls, potentially reversing coronary artery disease. Choices include atorvastatin (Lipitor), fluvastatin (Lescol), lovastatin (Altoprev, Mevacor), pravastatin (Pravachol), rosuvastatin (Crestor) and simvastatin (Zocor).
- **Bile-acid-binding resins.** The liver uses cholesterol to make bile acids, a substance needed for digestion. The medications cholestyramine (Prevalite, Questran), colesevelam (Welchol) and colestipol (Colestid) lower cholesterol indirectly by binding to bile acids. This prompts the liver to use excess cholesterol to make more bile acids, which reduces the level of cholesterol in the blood.
- **Cholesterol absorption inhibitors.** The small intestine absorbs the cholesterol from ones diet and releases it into the bloodstream. The drug ezetimibe (Zetia) helps reduce blood cholesterol by limiting the absorption of dietary cholesterol. Zetia can be used in combination with any of the statin drugs.
- **Combination cholesterol absorption inhibitor and statin.** The combination drug ezetimibe-simvastatin (Vytorin) decreases both absorption of dietary cholesterol in the small intestine and production of cholesterol in the liver. You may have heard

reports that this combination medication is no more effective than taking simvastatin by itself. But, this small study didn't find any differences in death, hospitalization or heart attacks between the two medications. If taking this combination medication, you should continue to take it unless your doctor tells you otherwise.

If a patient also has high triglycerides, a doctor may prescribe:

- **Fibrates.** The medications fenofibrate (Lofibra, TriCor) and gemfibrozil (Lopid) decrease triglycerides by reducing the liver's production of very-low-density lipoprotein (VLDL) cholesterol and by speeding up the removal of triglycerides from the blood. VLDL cholesterol contains mostly triglycerides.
- Niacin. Niacin (Niaspan) decreases triglycerides by limiting the liver's ability to produce LDL and VLDL cholesterol. Various prescription and over-the-counter preparations are available, but prescription niacin is preferred as it has the least side effects. Dietary supplements containing niacin that are available over-the-counter are not effective for lowering triglycerides, and may damage the liver.
- **Combination niacin and statin.** If a doctor recommends niacin in addition to a statin, one might want to discuss taking a medication that combines both niacin and a statin, such as Simcor or Advicor. These medications can reduce the number of pills one has to take, although no research studies have yet shown that the combination drugs lower cholesterol more than taking niacin and a statin separately.

Most of these medications are well tolerated, but effectiveness varies from person to person. The common side effects are muscle pains, stomach pain, constipation, nausea and diarrhea. If one decides to take cholesterol medication, their doctor may recommend periodic liver function tests to monitor the medication's effect on their liver.

http://www.mayoclinic.com/health/high-bloodcholesterol/DS00178/DSECTION=treatments%2Dand%2Ddrugs http://americanheart.org/presenter.jhtml?identifier=163

ECONOMIC IMPACT

• Song, X -JOEM 2006 v48(10) p1014 Proj of impact of lipid Tx on High-Risk Employ

GLOSSARY

angina: Chest pains due to lack of oxygen to the heart muscle.

angiogenesis: The spontaneous or drug-induced growth of new blood vessels. The growth of these vessels may help to alleviate coronary artery disease by rerouting blood flow around clogged arteries.

angioplasty: An invasive procedure, during which a specially designed balloon catheter with a small balloon tip is guided to the point of narrowing in the artery. Once in place, the balloon is inflated to compress the fatty matter into the artery wall and stretch the artery open to increase blood flow to the heart.

angiotensin-converting enzyme inhibitors (ACE inhibitors): A group of drugs used to treat high blood pressure and heart failure. ACE inhibitors block a specific enzyme (ACE or angiotensin-converting enzyme) that retains salt in the kidney and can cause heart and blood pressure problems. ACE inhibitors have been shown to decrease the risk of dying from a heart attack.

angiotensin II receptor blockers (ARBs): A group of drugs used to treat high blood pressure.

aorta: Large artery leaving the heart. All blood pumped out of the left ventricle travels through the aorta on its way to other parts of the body.

arterial Grafting: In patients who require coronary artery bypass graft surgery, it is sometimes desirable to use arteries from other parts of the body to provide the bypass grafts. This is known as arterial grafting. The alternative is to use vein grafts for coronary bypass surgery.

arteries: Blood vessels that carry blood away from the heart.

atherosclerosis ("hardening of the arteries"): The process whereby abnormal deposits of lipids, cholesterol, and plaque build up, leading to coronary artery disease and other cardiovascular problems.

atria: The upper chambers of the heart. (Atrium refers to one chamber of the heart).

balloon angioplasty (Percutaneous Transluminal Coronary Angioplasty or PTCA): A procedure used to clean out clogged heart arteries. A specially designed balloon catheter with a small balloon tip is guided to the point of narrowing in the artery. Once in place, the balloon is inflated to compress the fatty matter into the artery wall and stretch the artery open to increase blood flow to the heart.

blood pressure: The force exerted in the arteries by blood as it circulates. It is divided into systolic (when the heart contracts) and diastolic (when the heart is filling) pressures.

body mass index (BMI): A number that reflects body weight adjusted for height.

bradycardia: A slow heart rate.

bundle branch: Part of the electrical pathway of the heart that delivers electrical impulses to the ventricles of the heart. The bundle divides or branches into a right bundle and the left bundle. The bundles take the impulse through the ventricles (bottom chambers) to cause them to contract.

capillaries: Tiny blood vessels connecting arteries to veins. These blood vessels carry oxygen and nutrients to individual cells throughout the body.

cardiac arrest: When the heart stops beating suddenly and respiration (breathing) and other body functions stop as a result.

cardiac catheterization: A heart procedure used to diagnose heart disease. During the procedure, a catheter (inserted into an artery in your arm or leg) is guided to your heart, contrast dye is injected, and X-rays of the coronary arteries, heart chambers, and valves are taken. This procedure also measures the blood pressure in the heart chambers to help diagnose the causes of heart failure.

cardiac output: The amount of blood pumped by the heart each minute.

cardiovascular: Relates to the heart and blood vessels.

cholesterol: A waxy, fat-like substance that occurs naturally in all parts of the body and is found in many types of food.

coronary arteries: Network of blood vessels that branch off the aorta to supply the heart muscle with oxygen-rich blood. There are two main coronary arteries: the right and the left. The left splits into two arteries called the circumflex and the left anterior descending (LAD) arteries, thus, the heart is often considered to have three major coronary arteries.

coronary artery disease (atherosclerosis): A build-up of fatty material in the wall of the coronary artery that causes narrowing of the artery.

diastolic blood pressure: The pressure of the blood in the arteries when the heart is filling. It is the lower of two blood pressure measurements (for example, 120/80, where 80 is the diastolic pressure).

echocardiogram (echo): An imaging procedure that creates a moving picture outline of the heart's valves and chambers using high-frequency sound waves that come from a hand held wand placed on your chest or passed down your throat. Echo is often combined with Doppler ultrasound and color Doppler to evaluate blood flow across the heart's valves. Doppler senses the speed of sound and can pick up abnormal leakage or blockage of valves.

HDL (high density lipoprotein) cholesterol: Good cholesterol; HDL takes the bad cholesterol out of your blood and keeps it from building up in your arteries.

hypercholesterolemia: Presence of high cholesterol in the blood.

hypertension: High blood pressure. Blood pressure is the force of blood against the walls of arteries. High blood pressure is dangerous because it makes the heart work harder to pump blood to the body and it is linked to clogging of the arteries.

LDL (low density lipoprotein) cholesterol: Bad cholesterol; LDL can build up on the walls of your arteries and increase your chances of getting heart disease.

lipoprotein profile: A test that measures cholesterol levels.

peripheral vascular disease: Refers to diseases of blood vessels outside the heart and brain.

plaque: A thick material that builds up on the walls of the arteries making blood flow to the heart difficult.

stenosis: Narrowing or restriction of a blood vessel or valve that reduces blood flow.

stent: A small stainless steel mesh tube, inserted after angioplasty, that acts as a scaffold to provide support inside the coronary artery.

stroke: Condition that occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts.

syncope: Fainting.

systole: The portion of the cardiac cycle in which the heart muscle contracts, forcing the blood into the main blood vessels.

systolic pressure: The pressure of the blood in the arteries when the heart pumps. It is the higher of two blood pressure measurements (for example, 120/80, where 120 is the systolic pressure).

tachycardia: Rapid heartbeat. A heart rate above 90 beats per minute.

thallium exercise stress test (Stress thallium test, Perfusion scan): A type of nuclear scanning technique that uses the radioactive substance thallium. A thallium stress test combines nuclear scanning with exercise on a treadmill or stationary bicycle to assess heart function and determine if there is adequate blood flow to the myocardium.

thrombolytic medication (clot-buster drug): Medication used to dissolve any clots that may be blocking blood flow in arteries and veins.

thrombus: A blood clot.

total cholesterol: The total amount of cholesterol in the blood.

transient ischemic attack (TIA): A stroke-like event lasting minutes, or hours, that occurs when the brain is deprived of oxygen-rich blood but in which the effects wear off completely after resumption of blood flow.

triglycerides: The chemical form in which most fat exists in food and the body.

vasodilator: A type of medication that relaxes and dilates the blood vessels, allowing increased blood flow.

veins: Blood vessels that carry blood toward the heart.

ventricles: The lower, pumping chambers of the heart. The heart has two ventricles - the right and left ventricle.

ventricular fibrillation: An erratic, disorganized firing of impulses from the ventricles. The ventricles quiver and are unable to contract or pump blood to the body. This is a medical emergency that must be treated with cardiopulmonary resuscitation (CPR) and defibrillation as soon as possible.

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ADDITIONAL RESOURCES

The National Lipid Association (NLA): http://www.lipid.org/

The National Cholesterol Education Program (NCEP): New Cholesterol Treatment Guidelines, ATP III Guideline Summary of Updates: http://www.lipid.org/clinical/patients/1000006.php

The Metabolic Syndrome Institute:

http://www.metabolic-syndrome-institute.org/

EMPLOYEE - PATIENT RESOURCES

The National Lipid Association (NLA)

http://www.lipid.org/clinical/patients/1000005.php

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Hypertension



DEFINITION

Blood pressure is the force in the arteries when the heart beats (systolic pressure) and when the heart is at rest (diastolic pressure). Blood pressure rises and falls during the day. When blood pressure stays elevated over time, it is called *high blood pressure*.

Blood pressure is measured in millimeters of mercury (mm Hg). High blood pressure (or hypertension) is defined in an adult as a blood pressure greater than or equal to 140 mm Hg systolic pressure or greater than or equal to 90 mm Hg diastolic pressure.

High blood pressure is dangerous because it makes the heart work too hard and contributes to atherosclerosis (hardening of the arteries). It increases the risk of heart disease and stroke, which are the first- and third-leading causes of death among Americans. High blood pressure also can result in other conditions, such as congestive heart failure, kidney disease, and blindness. About two-thirds of people over age 65 have high blood pressure. If your blood pressure is between 120/80 mmHg and 139/89 mmHg, then you have prehypertension.

http://www.americanheart.org/presenter.jhtml?identifier=2112 (http://www.nhlbi.nih.gov/hbp/hbp/whathbp.htm)

Who Does High Blood Pressure Impact?

- More than 72 million American adults 1 in 3 have high blood pressure
- Nearly 60 million Americans are over age 55 which means they have a 90 percent likelihood of developing high blood pressure in their lifetimes.
- African Americans are more likely to develop high blood pressure than any other racial or ethnic group and tend to develop it earlier and more severely than others.
- 20 million Americans have diabetes which increases their chances of developing high blood pressure.
- 142 million American adults are overweight or obese which increases their chances of developing high blood pressure.

http://hp2010.nhlbihin.net/mission/abouthbp/abouthbp.htm

SIGNS & SYMPTOMS

In the U.S., one in three adults has high blood pressure. About 30 percent of them don't know they have it.

There are usually no symptoms or signs of hypertension. In fact, nearly one-third of those who have it don't know it. The only way to know if you have hypertension definitely is to have your blood pressure checked.

If your blood pressure is extremely high, there may be certain symptoms to look out for, including:

- Severe headache
- Fatigue or confusion
- Vision problems
- Chest pain
- Difficulty breathing
- Irregular heartbeat
- Blood in the urine

If either systolic or diastolic blood pressure (BP) is in the High or Very High range, you have high blood pressure.

The blood pressure categories are:

Very High Range = Stage 2 Hypertension

• Systolic blood pressure 160 mm Hg or higher OR diastolic blood pressure 100 mm Hg or higher

High Range = Stage 1 Hypertension

 Systolic blood pressure 140 - 159 mm Hg OR diastolic blood pressure 90 - 99 mm Hg

Caution Range = Prehypertension

 Systolic blood pressure 120 - 139 mm Hg OR diastolic blood pressure 80 - 89 mm Hg

Normal Range = Normal

 Systolic blood pressure below 120 mm Hg AND diastolic blood pressure below 80 mm Hg

Blood Pressure Ranges



http://www.webmd.com/hypertension-high-blood-pressure/guide/blood-pressure-basics http://www.americanheart.org/presenter.jhtml?identifier=2142

INCIDENCE & PREVALENCE

	Age group	Prevalence	Prevalence	
	(years)	rate (%)	number	Population*
NORTH AMERICA				
U.S. (1)	18+	23.3	51,562,000	220,948,915
U.S. (2)	18+	29.3	64,738,032	220,948,915
U.S. (3)	20+	33.6	73,000,000	220,948,915
Canada (4)	12+	10.9	3,257,198	29,988,703
EUROPE				
UK				
Men (5a)	16+	41.5	10,327,360	24,885,206
Women (5b)	16+	33.3	8,569,500	25,734,235
England				
Men (6a)	16+	35		not available
Women (6b)	16+	28		not available
Germany (7a)	18+	36.3	24,100,151	66,391,601
Germany (7b)	18+	40.9	27,154,165	66,391,601
Germany (8)	35 to 64	55.3	19,659,773	35,551,127
Italy (9)	35 to 64	37.7	9,478,157	25,141,000
Italy (10)	all ages	11.9	6,919,293	58,145,321
Spain (11)	35 to 64	46.8	7,873,827	16,824,417
ASIA				
Japan (12)	unspecified		13,200,000	127,288,419
China (13)	35 to 74	41.2	247,052,071	599,640,949
China (14)	adults	18.8	160,000,000	948,478,746
China (15)	20+	19.1	181,600,000	948,478,746
India (16)	10 to 69	26	225,786,011	868,407,736
India (17)	20+	17.4	118,200,000	677,942,141
India (18)	adults	9.7	65,500,000	677,942,141
OTHER				
Mexico (19)	25 to 64	11.7	5,857,078	50,060,499
Mexico (20)	all ages	23.6	26,000,000	109,955,400
WORLDWIDE				
Worldwide (21)	adults	26.4	1,126,625,494	4,267,520,812
Worldwide (22)	adults	15 37	600,000,000	4,267,520,812

*Census figures represent the total population or a sub-set population, depending on the age group specified.

*U.S. Census Bureau, 2008

Ambulatory care

- Number of visits to office-based physicians with hypertension as primary diagnosis: 44.7 million
- Number of visits to hospital outpatient departments with hypertension as primary diagnosis: 3.9 million

Home health care

- Number of current patients with hypertension as primary diagnosis: 41,900
- Percent of current patients with hypertension as primary diagnosis: 3.1

Mortality

- Number of deaths from hypertension: 24,902
- Hypertension deaths per 100,000 population: 8.4

http://www.cdc.gov/nchs/fastats/hyprtens.htm

CO-MORBID CONDITIONS

Cormorbidity	Relationship to Hypertension
Coronary artery disease	50% of patients with coronary artery disease have hypertension
Left ventricular hypertrophy	15 – 20% of hypertensive adults have an increased left ventricular mass
lschemic stroke	77% of patients who have a first stroke have a blood pressure >140/90 mm Hg
Chronic kidney disease	8 – 15% of hypertensive adults have decreased renal function.
Diabetes	75% of added cardiovascular rish in diabetic patients is attributable to hypertension
Peripheral artery diseaes	74% of patients with peripheral artery disease have hypertension

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ASSOCIATED RISK FACTORS

In the United States, about 72 million people have high blood pressure (HBP). This is about 1 in 3 adults. Certain traits, conditions, or habits are known to raise the risk for HBP. These conditions are called risk factors. This section describes the major risk factors for HBP.

Older Age

Blood pressure tends to rise with age. If you're a male older than 45 or a female older than 55, your risk for HBP is higher. Over half of all Americans aged 60 and older have HBP. Isolated systolic hypertension (ISH) is the most common form of HBP in older adults.

ISH occurs when only systolic blood pressure (the top number) is high. About 2 out of 3 people over age 60 who have HBP have ISH. HBP doesn't have to be a routine part of aging. You can take steps to keep your blood pressure at a normal level.

Race/Ethnicity

HBP can affect anyone. However, it occurs more often in African American adults than in Caucasian or Hispanic American adults. In relation to these groups, African Americans:

- Tend to get HBP earlier in life
- Often have more severe HBP
- Are more likely to be aware that they have HBP and to get treatment
- Are less likely than Caucasians and about as likely as Hispanic Americans to achieve target control levels with HBP treatment
- Have higher rates than Caucasians of premature death from HBP-related complications, such as coronary heart disease, stroke, and kidney failure

HBP risks vary among different groups of Hispanic American adults. For instance, Puerto Rican American adults have higher rates of HBP-related death than all other Hispanic groups and Caucasians. But, Cuban Americans have lower rates than Caucasians.

Overweight or Obesity

You're more likely to develop pre-hypertension or HBP if you're overweight or obese. Overweight is having extra body weight from muscle, bone, fat, and/or water. Obesity is having a high amount of extra body fat.

Gender

Fewer adult women than men have HBP. But, younger women (aged 18–59) are more likely than men to be aware of and get treatment for HBP. Women aged 60 and older are as likely as men to be aware of and treated for HBP. However, among treated women aged 60 and older, blood pressure control is lower than it is in men in the same age group.

Unhealthy Lifestyle Habits

A number of lifestyle habits can raise your risk for HBP, including:

- Eating too much sodium (salt)
- Drinking too much alcohol
- Not getting enough potassium in your diet
- Not doing enough physical activity
- Smoking

Other Risk Factors

A family history of HBP raises your risk for the condition. Long-lasting stress also can put you at risk for HBP. You're also more likely to develop HBP if you have pre-hypertension. Pre-hypertension means that your blood pressure is in the 120–139/80–89 mmHg range.



http://www.hypertensiononline.org/slides2/slide01.cfm?tk=22&pg=1 http://www.nhlbi.nih.gov/health/dci/Diseases/Hbp/HBP_WhoIsAtRisk.html

TREATMENT CONSIDERATIONS & BENEFITS OF THERAPY

High blood pressure (HBP) is treated with lifestyle changes and medicines. Most people who have HBP will need lifelong treatment. Sticking to your treatment plan is important. It can prevent or delay the problems linked to HBP and help you live and stay active longer.

Goals of Treatment

The treatment goal for most adults is to get and keep blood pressure below 140/90 mmHg. For adults who have diabetes or chronic kidney disease, the goal is to get and keep blood pressure below 130/80 mmHg.

Lifestyle Changes

Healthy habits can help you control HBP. Healthy habits include:

- Following a healthy eating plan
- Doing enough physical activity
- Maintaining a healthy weight
- Quitting smoking
- Managing your stress and learning to cope with stress

If you combine these measures, you can achieve even better results than taking single steps. Making lifestyle changes can be hard. Start by making one healthy lifestyle change and then adopt others.

Some people can control their blood pressures with lifestyle changes alone, but many people can't. Keep in mind that the main goal is blood pressure control. If your doctor prescribes medicines as a part of your treatment plan, keep up your healthy habits. This will help you better control your blood pressure.

Follow a Healthy Eating Plan

Your doctor may recommend the Dietary Approaches to Stop Hypertension (DASH) eating plan if you have HBP. The DASH eating plan focuses on fruits, vegetables, whole grains, and other foods that are heart healthy and lower in sodium (salt). This eating plan is low in fat and cholesterol. It also features fat-free or low-fat milk and dairy products, fish, poultry, and nuts. The DASH eating plan suggests less red meat (even lean red meat), sweets, added sugars, and sugar-containing beverages. The plan is rich in nutrients, protein, and fiber.

To help control HBP, you should limit the amount of salt that you eat. This means choosing low-salt and "no added salt" foods and seasonings at the table or when cooking. The Nutrition Facts label on food packaging shows the amount of sodium in the item. You should eat no more than about 1 teaspoon of salt a day.

You also should try to limit alcoholic drinks. Too much alcohol will raise your blood pressure. Men should have no more than two alcoholic drinks a day. Women should have no more than one alcoholic drink a day.

Do Enough Physical Activity

Regular physical activity can lower HBP and also reduce your risk for other health problems.

Check with your doctor about how much and what kinds of activity are safe for you. Unless your doctor tells you otherwise, try to get at least 30 minutes of moderate-intensity activity on most or all days of the week. You can do it all at once or break it up into shorter periods of at least 10 minutes each.

Moderate-intensity activities include brisk walking, dancing, bowling, riding a bike, working in a garden, and cleaning the house. If your doctor agrees, you also may want to do more intense activities, such as jogging, swimming, and playing sports.

Maintain a Healthy Weight

Staying at a healthy weight can help control blood pressure and also reduce your risk for other health problems.

If you're overweight or obese, aim to reduce your weight by 7 to 10 percent during your first year of treatment. This amount of weight loss can lower your risk for health problems related to HBP.

After the first year, you may have to continue to lose weight so you can lower your body mass index (BMI) to less than 25. BMI measures your weight in relation to your height and gives an estimate of your total body fat. A BMI between 25 and 29 is considered overweight. A BMI of 30 or more is considered obese. A BMI of less than 25 is the goal for keeping blood pressure under control.

Quit Smoking

Smoking can damage your blood vessels and raise your risk for HBP. It also can worsen health problems related to HBP. Smoking is bad for everyone, especially those who have HBP.

If you smoke or use tobacco, quit. Talk to your doctor about programs and products that can help you quit. Also, take steps to protect yourself from secondhand smoke.

Managing Stress

Learning how to manage stress, relax, and cope with problems can improve your emotional and physical health. Physical activity helps some people cope with stress. Other people listen to music or focus on something calm or peaceful to reduce stress. Some people learn yoga, tai chi, or how to meditate.

Medicines

Today's blood pressure medicines can safely help most people control their blood pressures. These medicines are easy to take. The side effects, if any, tend to be minor. If you have side effects from your medicines, talk to your doctor. He or she may be able to adjust the doses or prescribe other medicines. You shouldn't decide on your own to stop taking your medicines. **Blood pressure medicines** work in different ways to lower blood pressure. Some remove extra fluid and salt from the body to lower blood pressure. Others slow down the heartbeat or relax and widen blood vessels. Often, two or more medicines work better than one.

Types of Blood Pressure Medicines

Diuretics

Diuretics are sometimes called water pills. They help your kidneys flush excess water and salt from your body. This lessens the amount of fluid in your blood, and your blood pressure goes down. Diuretics often are used with other HBP medicines and sometimes combined into one pill.

Beta-Blockers

Beta-blockers help your heart beat slower and with less force. Your heart pumps less blood through your blood vessels, and your blood pressure goes down.

ACE Inhibitors

ACE inhibitors keep your body from making a hormone called angiotensin II. This hormone normally causes blood vessels to narrow. ACE inhibitors prevent this, so your blood pressure goes down.

Angiotensin II Receptor Blockers

Angiotensin II receptor blockers (ARBs) are newer blood pressure medicines that protect your blood vessels from angiotensin II. As a result, blood vessels relax and widen, and your blood pressure goes down.

Calcium Channel Blockers

Calcium channel blockers (CCBs) keep calcium from entering the muscle cells of your heart and blood vessels. This allows blood vessels to relax, and your blood pressure goes down.

Alpha Blockers

Alpha blockers reduce nerve impulses that tighten blood vessels. This allows blood to flow more freely, causing blood pressure to go down.

Alpha-Beta Blockers

Alpha-beta blockers reduce nerve impulses the same way alpha blockers do. However, they also slow the heartbeat like beta-blockers. As a result, blood pressure goes down.
Nervous System Inhibitors

Nervous system inhibitors increase nerve impulses from the brain to relax and widen blood vessels. This causes blood pressure to go down.

Vasodilators

Vasodilators relax the muscles in blood vessel walls. This causes blood pressure to go down.

http://www.nhlbi.nih.gov/health/dci/Diseases/Hbp/HBP_Treatments.html

ECONOMIC IMPACT

The Economic Burden of hypertension in United States is higher than that of other diseases.

The overall economic burden of hypertension in the United States may be seriously underappreciated. Indeed, it may be greater than for other high prevalence conditions, such as heart disease, depression/mental illness, arthritis, allergy, migraine/headache, or diabetes, according to the results of an analysis published in the April issue of the *Journal of Occupational and Environmental Medicine*. As a subtext to this overall conclusion, the analysis also showed that treatment of hypertension incurred the highest drug expenditures.

Ron Z Goetzel, PhD (Cornell University, Ithaca, New York), and researchers from the health information company Medstat (Ann Arbor, Michigan) used a large health and productivity database compiled from the records of 374,799 employees at 6 large corporations in 43 US states. Data from the records covering the period 1997 to 1999 were used to identify the top 10-20 high-prevalence, high-cost physical and mental health conditions affecting these employees. These included asthma, respiratory disorders, and any type of cancer. Medical, pharmaceutical, absence, and disability expenses associated with each condition were calculated. Five large-scale, self-report surveys of employee populations were also included in the analysis. These surveys were used to identify absenteeism and "presenteeism" (on-the-job productivity) losses resulting from poor health.

http://www.medscape.com/viewarticle/477503_3

Flach JM - *Am J Hypertens* (2000) **13**, 17A–19A; doi: S0895-7061(00)00344-7. Hodgson TA. Medical Expenditures for hypertension and comorbidities. Med Care v39 (6) p599. Kiiskinen U. Lont-T cost and life expectancy of hypertension. J Hypertension 1998 v16 p1103. Paramore LC. Cost of poorly controlled hypertension. Am J Managed Care 2001 v7 (4) p389.

angina: chest pain

angiotensin converting enzyme (ACE) inhibitors: one kind of medication used to treat hypertension by preventing the body from making the chemical angiotensin II. This chemical causes blood vessels to narrow, which can raise blood pressure. ACE inhibitors allow the vessels to expand, allowing more blood to flow to the heart, which, in turn, lowers blood pressure. These medications are also used to treat congestive heart failure, to protect the kidneys in people with diabetes, and to treat people who have had a heart attack.

atherosclerosis: the build-up of fatty deposits within the arteries, eventually may cause a blockage of blood flow or stiffening of the artery walls.

balloon angioplasty: a procedure in which a small balloon at the tip of the catheter (see cardiac catheterization) is inflated while in an artery to stretch a narrowed artery opening and allow for increase blood flow.

beta-blockers: one kind of medication used to treat hypertension, chest pain, and irregular heartbeat, and to help protect a person from heart disease. Beta-blockers work by blocking the effects of adrenaline in various parts of the body. Beta-blockers relieve stress to the heart so that it requires less blood and oxygen. As a result, the heart doesn't have to work as hard and blood pressure is lowered.

calcium channel blockers (CCBs): one kind of hypertension medication that slows the movement of calcium into the cells of the heart and the walls of the arteries (blood vessels that carry blood from the heart to the tissues). This relaxes the arteries and reduces the pressure in the blood vessels and makes it easier for the heart to pump blood. cardiac catheterization: a procedure in which a catheter (a small flexible tube) is inserted into a large artery and guided to the coronary arteries in the heart to determine pressure and blood flow in the heart.

carotid artery: an artery on the neck that supplies blood to the brain. They are located on both the right and left sides of the neck.

carotid endarterectomy: the surgical removal of plaque within the carotid artery.Computed Tomography (CT) Scan: a test that uses X-rays to create a cross-sectional image of selected body sections of a person. Congestive Heart Failure: the inability of the heart to adequately pump blood. This can be caused by a number of problems, including untreated hypertension, heart attacks or infections.

corticosteroids: natural hormones, or a group of drugs that are similar to the natural hormones, produced by the adrenal glands. There are two main types: glucocorticoids, which have anti-inflammatory effects, and mineralocorticoids, which are necessary for salt and water balance.

cyclosporine: a drug that organ transplant patients take to suppress the immune system in order to prevent their bodies from rejecting the transplant.

DASH diet: The DASH diet, which stands for the Dietary Approaches to Stop Hypertension diet, calls for a certain number of servings daily from various food groups, including more daily servings of fruits, vegetables and whole grain foods.

diastolic blood pressure: the pressure of blood against the walls of the arteries when the heart relaxes between beats. It is the "bottom" number when referring to a specific blood pressure. For example, if your blood pressure is 120 over 80 or 120/80, the diastolic measurement is 80.

diuretics: Diuretics act on the kidneys to remove excess salt and fluid from the blood. This increases the flow of urine and the need to urinate, which reduces the amount of water in the body. This can help lower blood pressure and can be used to treat hypertension and heart failure.

echocardiogram: a test that uses a device to bounce sound waves off the heart to create an image of the heart. The image details the blood flow in the heart's chambers and evaluates heart chamber size and how the heart valves are functioning.

electrocardiogram (EKG or ECG): a diagnostic test that measures the electrical activity, rate and rhythm of the heartbeat via electrodes attached to the arms, legs, and chest

essential hypertension: high blood pressure that does not have an apparent defect or cause, but is associated with such conditions such as obesity, smoking, diet.. The vast majority (95%) of people with high blood pressure have essential hypertension. (also known as primary hypertension)

exercise stress test: a test in which electrocardiogram readings are taken while the patient exercises (on a treadmill or stationary bicycle) to increase heart rate to a predetermined point.

erythropoietin: a hormone that stimulates production of red blood cells and is used to treat anemia caused by chronic diseases.

heart attack: damage to the heart muscle caused by lack of blood flow to the heart muscle resulting in heart muscle death.

hypertension: high blood pressure

hypertensive emergency: a severe elevation in blood pressure that can lead to organ damage, including encephalopathy (brain damage), heart attack, heart failure, hemorrhagic stroke (bleeding into the brain), eclampsia (a condition in which pregnant women have water retention, hypertension, protein in the urine, and seizures), kidney damage and arterial bleeding.

hypertensive retinopathy: damage to the blood vessels in the retina (the area at the back of the eye) caused by hypertension.

hypertensive urgency: a form of hypertensive crisis, a spectrum of situations that includes high blood pressure and progressive or impending organ damage caused by high blood pressure.

hypertrophic cardiomyopathy: a condition in which the heart muscle becomes enlarged and is unable to function properly.

ischemic heart disease: a condition caused by a decrease in blood flow to the heart. This decrease is usually the result of narrowed coronary arteries, which impede the blood flow.

kidney failure (end-stage renal disease): a condition in which the kidney cannot filter and excrete waste products.

magnetic resonance imaging (MRI): a medical test that uses magnetic energy to create images of the body. This test is particularly useful to study soft tissues (such as organs in the body).

magnetic resonance arteriography (MRA): one type of MRI test that provides detailed pictures of blood vessels and can reveal where arteries may be narrowed or where blood flow is blocked.

potassium: an electrolyte that is vital in ensuring that cells can function properly. It is used to make energy for all muscles, including heart muscles.

proteinuria: the presence of protein in the urine. This may indicate kidney disease or damage.

secondary hypertension: high blood pressure that is secondary to problem in another part of the body, such as the adrenals or kidneys or aorta.

sphygmomanometer: a device that is used to measure blood pressure. The sphygmomanometer consists of an arm cuff, dial, pump, and valve.

stent: a metal device that can keep blood vessels open after a surgical procedure or heart catheterization.

stroke: an interruption of the blood supply in the brain, resulting in damaged brain tissue. An interruption can be caused by clots that block blood flow, or by bleeding in the brain from a ruptured blood vessel or a significant injury.

systolic blood pressure: the highest force of blood against the walls of the artery when the heart contracts or squeezes blood into the blood vessels. It is the "top" number when referring to a specific blood pressure. For example, if your blood pressure is 120 over 80 or 120/80, the systolic measurement is 120.

TIA (transient ischemic attack): a "mini-stroke," or a warning of an impending stroke. A TIA takes place when blood flow to part of the brain is briefly interrupted.

TPA: a thrombolytic agent, or "clot buster" medication. TPA may be used as treatment for acute ischemic stroke (stroke of sudden onset, caused by a clot blocking blood flow to part of the brain).

ultrasound: a test that uses high-frequency sound waves to create images of body organs and systems.

http://www.webmd.com/hypertension-high-blood-pressure/hypertension-glossary-terms?page=1

HYPERTENSION GUIDELINES

American Diabetes Association (ADA):

http://www.diabetes.org/main/uedocuments/ADACardioReview_2.pdf http://care.diabetesjournals.org/cgi/content/full/25/suppl_1/s71

European Society of Hypertension (ESH):

http://www.eshonline.org/education/index.php

The International Society on Hypertension in Blacks (ISHIB):

http://www.ishib.org/HI_ishgui.asp

National Heart, Lung, and Blood Institute (NHLBI):

http://www.nhlbi.nih.gov/guidelines/hypertension/index.htm

National Kidney Foundation (NKF):

http://www.kidney.org/professionals/KDOQI/guidelines.cfm

EMPLOYEE – PATIENT TOOLS

American Heart Association:

http://www.americanheart.org/presenter.jhtml?identifier=578

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ADDITIONAL RESOURCES

American College of Cardiology (ACC): http://www.acc.org/

American Diabetes Association (ADA): http://www.diabetes.org/home.jsp

American Heart Association (AHA):

http://www.americanheart.org/presenter.jhtml?identifier=1200000

American Society of Hypertension (ASH): http://www.ash-us.org/

Baker Heart Research Institute: http://www.ausbiotech.org/

European Association for the Study of Diabetes (EASD): www.easd.org/

European Society of Cardiology (ESC): www.escardio.org/

International Atherosclerosis Society (IAS): www.athero.org/

International Diabetes Federation (IDF): www.idf.org/

International Diabetes Institute (IDI): https://www.diabetes.com

National Heart, Lung, and Blood Institute (NHLBI): www.nhlbi.nih.gov/

World Health Organization (WHO): www.who.int/

Hyperthyroidism



DEFNITION

The thyroid gland located in the neck is very important for many body functions. This gland produces thyroid hormone, which is used by or controls virtually every cell in the body. An abnormal functioning thyroid gland can cause a variety of symptoms and medical conditions. Some symptoms are mild, unpleasant or serious conditions like heart disease or cancer, and in extreme cases, coma or death.

Hyperthyroidism is a condition when your thyroid is over active or producing too much thyroid hormone to maintain good body function. This condition is less common than hypothyroidism (production of too little thyroid hormone).

- Graves' disease is the most common cause of **hyperthyroidism**. The symptoms can be subtle but may have serious consequences if not treated properly. Too much thyroid hormone can stress the heart and make skeletal bones weak.
- Toxic nodular goiter is a common cause of hyperthyroidism in people over 60 years. The thyroid gland is enlarged with nodules that over produce thyroid hormone. The condition often occurs gradually becoming more and more overactive over time.
- A "hot nodule" is a growth on the thyroid gland that produces excessive thyroid hormone.

There are medical situations, such as thyroiditis, where the thyroid is temporarily hyperfunctioning, and it may lead to a decline of thyroid function.

SIGNS & SYMPTOMS

Hyperthyroidism can mimic other health problems, which may make it difficult for your doctor to diagnose. It can also cause a wide variety of signs and symptoms. Hyperthyroidism symptoms may include:

- Enlarged thyroid gland or goiter
- Sudden, unexplained weight loss
- Heat intolerance
- Exhaustion / Fatigue

- Mood or emotional changes (irritability, anxiety sometimes mixed with depression)
- Excessive perspiration
- Excessive thirst
- Constant hunger, insatiable appetite
- Racing heart (tachycardia)
- Heart palpitations (pounding of your heart)
- Irregular Heart Beat (Arrhythmia)
- Hand tremors
- Difficulty sleeping (Insomnia)
- Muscle weakness
- Diarrhea
- Eye problems, people with Graves may have bulging eyes
- Menstrual changes and infertility in women and men
- Hives or rash
- Increased blood pressure, hypertension

Older adults are more likely to have either no signs or symptoms or subtle ones, such as an increased heart rate, heat intolerance and a tendency to become tired during ordinary activities. Medications called beta-blockers, which are used to treat high blood pressure and other conditions, can mask many of the signs of hyperthyroidism.

http://www.mayoclinic.com/health/hypothyroidism/DS00353 Special Health Report from Harvard Medical School: Thyroid Disease J Garber

INCIDENCE & PREVALENCE

Thyroid disease is more common than diabetes or heart disease; as many as 27 million Americans may have a thyroid disorder.

- 13 million Americans may not know they have thyroid dysfunction or disease.
- 15-20% of people with diabetes and family history may develop thyroid disease compared to 4.5% of the general population.
- As you age so can your thyroid gland deteriorate; 20% of American population over 65 may have thyroid dysfunction.
- Greatest in Caucasian and Mexican American population and lowest in African Americans

AACE thyroidawareness.com/patient_resources

CO- MORBID CONDITIONS

Signs and symptoms of hyperthyroidism are non-specific or are confused with other medical conditions. Some older people may not experience as many symptoms as someone younger, making it even harder to accurately diagnosis hyperthyroidism as the underlying cause of their condition.

- Congestive heart failure can be a prominent sign of hyperthyroidism in older persons. The stress of too much thyroid hormone on the heart may lead to ineffective pumping and inefficient blood flow.
- Atrial fibrillation (irregular heart beat) may occur in people who may or may not have a pre-existing heart condition when there is excessive thyroxine, thyroid hormone, circulating in the body.
- Arrhythmia (irregular heart beat) may be accompanied by stroke or rate related congestive heart failure in hyperthyroid conditions.
- Excessive thyroid hormone can cause bone mineral loss that may lead to bone fractures and increase osteoporosis.
- Patients with pre-existing atherosclerosis may be at increased risk for myocardial infarction (heart attack) and morbidity (death).

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ASSOCIATED RISK FACTORS

Risks associated with developing hyperthyroidism are:

- Age between 20 and 40 years of age
- Delivery of baby less than 6 months ago
- Past history or being treated for hypothyroidism
- Other autoimmune disease (Addison's disease, type 1 diabetes, rheumatoid arthritis, and lupus)
- Have vitiligo (pigmentation loss)
- Family history (other family members with thyroid disease)

Complete Thyroid Book, K Aim and MS Rosenthal 2005.

TREATMENT CONSIDERATIONS & BENEFITS OF THERAPY

During a physical examination a doctor may examine your neck, ask about family history of thyroid disease and request a simple blood test to determine if your TSH (a thyroid test) is normal.

A doctor may want to perform a radioactive iodine uptake test to determine if the thyroid gland has taken in an abnormal amount of iodine as an indicator of hyper-functioning or being overactive. Another test a doctor may use is a radioactive thyroid scan, an imaging test to see if there are any structural abnormalities of the thyroid.

Treatment to reduce or slow down the thyroid activity may include:

- Medications like beta-blockers to slow the effects on the heart or antithyroid drugs (methimazole or propylthiouracil) block the gland's ability to make hormone.
- Radioactive iodine to destroy a portion of the thyroid gland tissue to reduce the amount of thyroid hormone being produced
- Surgery, thyroidectomy, to remove all or part of the thyroid gland.

Optimal treatment proves many benefits, less damage on cardiac (heart) function, bones and mental function.

Replacement thyroid hormone (LT4) and regular monitoring may be required after some corrective treatments. It is necessary for the body to have just the right amount, not too much or too little. This is the reason why physicians are careful about adjusting to the right dose and for patients to be diligent about taking the prescribed medication daily and refilling their prescription as the doctor has prescribed.

ECONOMIC IMPACT

Negative effects of excessive thyroid hormone on cardiac muscle, changes in mood, and tremor may adversely affect productivity in the workplace and quality of life.

- Inability to conduct physical activities and coordination with required dexterity impacts job safety. The National Safety Council estimates that job injuries cost \$131 billion in 2000.
- Poor mental acuity adversely impacts work place productivity, psychological well being and home life. A study found anxiety and depression were associated with workplace limitation, illness management, and absence among employees. Another study reported rates as high as 70% absenteeism from work in employees with depression not treated with antidepressants.
- Organ damage to heart and bones may require medical care and significant absenteeism at work and increase demands on the family.

Munir F, et al - J Occup Rehabil 2007. Wright DW, et al - J Occup and Environ Med 2002. Burton WN, et al - J Occup Environ Med 2003.

Top 10 Things Peoples Should Know About Thyroid Disorders

- As many as 27 million Americans may be affected by thyroid disorders, although more than half remain undiagnosed.
- Thyroid disorders are more common amongst women.
- Thyroid disorders tends to run in families.
- Fatigue is a common complaint for under and over active thyroid conditions.
- TSH testing is the most useful test for thyroid screening.
- Regular check-ups are the key to successfully managing a malfunctioning thyroid gland.
- Changing formulations and dosage that affect thyroid hormone levels should be followed by retesting.
- Do not change your dose of thyroid medication without guidance from your physician.
- Thyroid conditions in pregnancy warrant close attention.
- Thyroid cancer is one of the fastest growing cancers in America and one of the most curable.

http://www.thyroidawareness.com/top10.php

GLOSSARY

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diffuse goiter: Generalized enlargement of the entire thyroid gland with a smooth surface.

exophthalmos: Protrusion of the eyes in Graves' Disease.

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thyroiditis: Inflammation of the thyroid gland.

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trachea: The windpipe. It should me in the middle of the neck but can be pushed to the side by a large goiter, especially a substernal goiter.

TRH test: A very sensitive test for abnormal thyroid function.

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tumor: A mass of tissue. It may be benign or malignant.

ultrasound: A type of scan which uses sound waves which pass into the body, reflecting back to produce pictures.

http://www.medterms.com/script/main/art.asp?articlekey=5791 http://www.endocrineweb.com/define.html

TOOLS FOR EMPLOYEES / PATIENTS

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The American Thyroid Association (ATA):

http://www.thyroid.org/patients/index.html

The Hormone Foundation:

http://www.hormone.org/thyroid/

ADDITIONAL RESOURCES

	American Association of	
AACE	Clinical Endocrinologists	www.aace.com
	American Thyroid	
ATA	Association	www.thyroid.org
ENS	Endocrine Nurses Society	www.endo-nurses.org
	Food and Drug	
FDA	Administration	www.fda.gov/cder/consumerinfo
Johns Hopkins		
Medical Center	Thyroid Tumor Center	www.thyroid-cancer.net
Kelly Ripken		
Foundation	Educational website	http://thyroid-ripken.med.jhu.edu
LOL	Light of Life Foundation	www.checkyourneck.com
	Lawson Wilkins Pediatric	
LWPES	Endocrine Society	www.lwpes.org
	National Academy of Clinical	
NACB	Biochemistry Guidelines	www.nacb.org/Impg/thyroid_LMPG_PDF.stm
National Cancer	Information on I-131	
Institute	Treatment	http://ntsi131.nci.nih.gov/
	National Graves' Disease	
NGDF	Foundation	http://www.ngdf.org
	Pediatric Endocrine Nurses	
PENS	Society	http://www.pens.org
TES	The Endocrine Society	www.endo-society.org
	Thyroid, Head and Neck	
THANC	Cancer Foundation	www.thancfoundation.org
The Hormone	Foundation affiliated with the	
Foundation	Endocrine Society	www.hormone.org
	Thyroid Cancer Survivors'	
ThyCa	Association	http://www.thyca.net
Thyroid Disease		
Manager	On-line Thyroid Resource	www.thyroidmanager.org
Thyroid Today	Educational website	www.thyroidtoday.com

Hypothyroidism



DEFINITION

The thyroid gland located in the neck is very important for many body functions. This gland produces thyroid hormone, which is used by or controls virtually every cell in the body.

Hypothyroidism is a condition when your thyroid is not producing enough thyroid hormone to maintain good body function. Too little hormone in the system can affect fertility, fetal IQ development, or can lead to increases in cholesterol levels for example. Some people develop the condition quickly, for others it may develop over years or as they age. This condition may be temporary or require life long treatment.

Hashimoto's thyroiditis (also called autoimmune or chronic lymphocytic thyroiditis) is the most common thyroid disease in the United States. It is an inherited condition that affects approximately 14 million Americans and is about 7 times more common in women than in men. Hashimoto's thyroiditis is characterized by the production of immune cells and autoantibodies by the body's immune system, which can damage thyroid cells and compromise their ability to make thyroid hormone. Hypothyroidism occurs if the amount of thyroid hormone that can be produced is not enough for the body's needs. The thyroid gland may also enlarge, forming a goiter.

http://www.mayoclinic.com/health/hypothyroidism/DS00353/DSECTION=symptoms http://www.thyroidawareness.com/hashimotos.php

Causes of Hypothyroidism

Most common cause of hypothyroidism is when the body's immune system attacks the thyroid causing it not to produce enough thyroid hormone, autoimmune thyroiditis or Hashimoto's thyroiditis. Autoimmune causes can be a familial risk, family history.

Medications

Drugs like lithium, amiodarone (heart medication), or high doses of iodine may temporarily cause hypothyroidism

Other conditions

• Sub-acute thyroiditis is caused by a viral infection. Large amounts of thyroid hormone are released. The thyroid usually heals itself.

- Postpartum thyroidistis may occur in 10% of mothers after giving birth. Most women recover normal thyroid function however a few may require lifelong thyroid hormone replacement treatment.
- Congenital hypothyroidism occurs in infants. It is important that this condition is treated promptly to prevent physical stunting and/or mental damage (cretinism) from developing.
- Pituitary hypothyroidism is a disease of the pituitary gland.

SIGNS & SYMPTOMS

- Fatigue that persists
- Drowsiness
- Forgetfulness
- Difficulty with learning
- Dry, brittle hair and nails
- Dry, itchy skin
- Puffy face
- Constipation
- Increased sensitivity to cold (feeling colder than normal)
- Hoarse voice
- Feeling depressed
- Muscle aches, tenderness or stiffness
- Weight gain and fluid retention
- Heavy and/or irregular menstrual flow
- Increased frequency of miscarriages
- Elevated blood cholesterol
- Increased sensitivity to many medications

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INCIDENCE & PREVALENCE

Thyroid disease is more common than diabetes or heart disease, as many as 27 million Americans may have a thyroid disorder.

Prevalence in general population is 3.7%.

- 13 million Americans may not know they have thyroid dysfunction or disease.
- Women are 5 times more likely than men to have hypothyroidism, a low function thyroid gland.
- As you age, so can your thyroid gland; 20% of American population over 65 may have thyroid dysfunction.
- Greatest in Caucasian and Mexican American population and lowest in African Americans

AACE www.thyroidawareness.com/patient_resources. NHANES 1999-2002. Aoki, Y et al, Thyroid 2007.





Thyroid Disease: Relative to Other Diseases in the United States



CO - MORBID CONDITIONS

Common conditions have the same symptoms as hypothyroidism often making diagnoses confusing or not recognized. Primary Care physicians may refer to an endocrinologists (doctors specializing in treating glands and hormones in the body) trained to accurately make differential diagnoses of complex medical conditions.

- Fatigue is a common symptom both in healthy individuals and those with medical conditions.
- Depression is often misdiagnosed. The underlying cause of hypothyroidism may be missed in some patients treated for depression.
- Hyperlipidemia or high cholesterol levels can be caused by a poorly functioning thyroid
- Low levels of thyroid hormone can cause infertility, make conception difficult or cause miscarriage
- Poor pregnancy outcomes, early delivery or low infant birth weight can be a result of insufficient levels of thyroid hormone in the mother's body.
- Mental impairment or low cognitive function at any age is a symptom of too little thyroid hormone. Frequently hypothyroidism can masquerade as dementia in people over 60 or can impair fetal brain or intellectual development during gestation.
- Myalgias or muscle pain are signs of an under-acting thyroid gland.
- During early stages of pregnancy some mothers may become hypothyroid. It should be detected quickly and the woman treated to avoid adverse effects on the developing baby and to provide an optimal pregnancy.





http://www.thyroidawareness.com/hashimotos.php American Psychiatric Association DSM IV, Washington DC.

ASSOCIATED RISK FACTORS

- Family History:
 - o Thyroid disease or dysfunction often runs in families
 - o Premature gray hair
 - o Other autoimmune disease like rheumatoid arthritis
 - o Diabetes
- Pregnancy or have given birth within the last six months
- Women over 55
- Exposure to large amounts of radiation
- Smoke tobacco
- Take medicines that contain high levels of iodine or live in iodine-deficient country
- Other medications that can increase risk are lithium and interferon alpha





TREATMENT CONSIDERATIONS & BENEFITS OF THERAPY

Hypothyroidism is easy to diagnose and treat. A simple blood test, TSH (thyroid stimulating hormone) can tell the physician how the thyroid is functioning.

A once-a-day pill of a synthetic thyroid hormone (levothyroxine sodium) is prescribed. The body recognizes this product as identical to the thyroid hormone it produces. This condition is easily monitored at appropriate intervals with a TSH test.

For optimal treatment results patients should take their thyroid medications as their physician instructs. It is important to stay on the exact dose and brand of medicine prescribed. Patients should continue to take their medicine even when they start to feel better. Patients should talk to their doctor about when is the best time to take their medicine and if there are on other medications, including over the counter drugs.

Treating hypothyroidism can prevent and/or improve other conditions

- Hypercholesterolemia- too much cholesterol or lipids
- Atherosclerosis hardening of coronary arteries or myocardial infarction
- Cardiac function
- Improves pregnancy outcomes, normal infant weight and brain development.

Allan WC. Timing and magnitude of increases in levothyroxine during pregnancy. J Med Screening 2000; v351 (3) p24.

Auer J. Thyroid function is associated with presence and severity of coronary artery disease. Clin Cardiol 2003; v26 p 569.

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Negro R – Levothyroxine in euthyroid pregnant women with positive TPO antibodies. JCEM 2006 v91 (7) p 2587.

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Smallridge, RC Thyroid function inside and outside of pregnancy. Thyroid 2005; v15 (1) p54. Smallridge, RC Hypothyroidism in pregnancy. JCEM 2001; v86 (6) p2349.

Wartofsky, L. Overt and Mild Hypothyroidism in Women. Obstet Gyn Sur 2006; v61 (8) p535.

ECONOMIC IMPACT

Negative effects of too little thyroid hormone available for body function can adversely affect health, productivity in the workplace, pregnancy outcomes with associated costs in terms of quality of life, employment, and health care.

• Employment requiring mental alertness can lead to poor safety and economic losses. Forgetfulness and poor cognitive function can affect a wide range of workplace activities from administration to manufacturing.

- The National Safety Council estimates that job injuries cost \$131 billion in 2000.
- Cognition and affective status improves with treatment. (Bono G, et al. Acta Neurol Scand 2004; v110 p59-66)
- Associated depression and mixed mood adversely impacts work place productivity, psychological well being, and home life.
 - A study found anxiety and depression were associated with workplace limitation, illness management, and absence among employees.
 - Another study reported rates as high as 70% absenteeism from work in employees with depression not treated with antidepressants.
- Treatment improves mood and cognitive performance. (Sigmund W, et al. Clin Endocrinol 2004; v60 p750-757)
- Neonatal ICU has one of the highest hospital rates per day. Depressed women are at increased risk for preterm deliveries and smaller weight birth babies requiring more hospital services.
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Top 10 Things Peoples Should Know About Thyroid Disorders

- As many as 27 million Americans may be affected by thyroid disorders, although more than half remain undiagnosed.
- Thyroid disorders are more common amongst women.
- Thyroid disorders tends to run in families.
- Fatigue is a common complaint for under and over active thyroid conditions.
- TSH testing is the most useful test for thyroid screening.
- Regular check-ups are the key to successfully managing a malfunctioning thyroid gland.
- Changing formulations and dosage that affect thyroid hormone levels should be followed by retesting.
- Do not change your dose of thyroid medication without guidance from your physician.
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http://www.medterms.com/script/main/art.asp?articlekey=5791 http://www.endocrineweb.com/define.html

EMPLOYER STUDIES

- Ricci JA. Fatigue in the U.S. workforce. JOEM 2007:49 (1);1-10.
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FDA	Administration	www.fda.gov/cder/consumerinfo
lahaa Llaakina		
Johns Hopkins	Thursdal Tursdan Constan	
Medical Center	Inyrold Tumor Center	www.tnyroid-cancer.net
Kelly Ripken	Educational website	
Foundation	Educational website	nttp://tnyroid-ripken.med.jnu.edu
LOL	Light of Life Foundation	www.checkyourneck.com
	Lawson Wilkins Pediatric	
LWPES	Endocrine Society	www.lwpes.org
	National Academy of	
	Clinical Biochemistry	
NACB	Guidelines	www.nacb.org/Impg/thyroid_LMPG_PDF.stm
National Cancer	Information on I-131	
Institute	Treatment	http://ntsi131.nci.nih.gov/
	National Graves' Disease	
NGDF	Foundation	http://www.ngdf.org
	Pediatric Endocrine Nurses	
PENS	Society	http://www.pens.org
TES	The Endocrine Society	www.endo-society.org
	Thyroid, Head and Neck	
THANC	Cancer Foundation	www.thancfoundation.org
The Hormone	Foundation affiliated with	
Foundation	the Endocrine Society	www.hormone.org
	Thyroid Cancer Survivors'	
ThyCa	Assoc	http://www.thyca.net
Thyroid Disease		Z
Manager	On-line Thyroid Resource	www.thyroidmanager.org
Thyroid Today	Educational website	www.thyroidtoday.com

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Obesity



DEFINITION

Obesity has generally been defined as an excessive amount of body fat in relation to lean body mass.¹ In more scientific terms, it refers to a body weight that is at last 30 % over the ideal body weight for a specific height. For adults, overweight and obesity ranges are determined by using weight and height to calculate a number called the "body mass index" (BMI). BMI is used because, for most people, it correlates with their amount of body fat. An adult who has a BMI between 25 and 29.9 is considered overweight. An adult who has a BMI of 30 or higher is considered obese.

SIGNS & SYMPTOMS

Body mass index: A key index for relating a person's body weight to their height. The body mass index (BMI) is a person's weight in kilograms (kg) divided by their height in meters (m) squared. The National Institutes of Health (NIH) now defines normal weight, overweight, and obesity according to the BMI rather than the traditional height/weight charts. Since the BMI describes the body weight relative to height, it correlates strongly (in adults) with the total body fat content.

Most practitioners use the following BMI ranges as indications that a person is overweight or obese:

- BMI 25 to 29.9 (overweight)
- BMI 30 to 39.9 (moderately obese)
- BMI 40 or above (extremely obese

A high waist to hip ratio (indicating that fat is centered around the waist—also known as central obesity) increases the risk for developing serious, even life-threatening conditions associated with obesity. Physicians consider a very high waist circumference to be greater than 102 cm for men and greater than 88 cm for women.

Obesity is associated with many serious preventable diseases including heart disease, diabetes, high blood pressure, stroke, gallbladder disease, osteoarthritis, and respiratory disorders.² The risk of developing these diseases is even higher when weight is concentrated near the waist.

According to the National Institutes of Health, 60% of American adults are overweight and 25% are considered obese. For both men and women, the prevalence of obesity increases with age, but this problem is growing in children and adolescents—approximately 25% of American children are overweight or obese, and the numbers are rising.

Conditions that may accompany obesity include:

- High cholesterol (including high triglyceride levels)
- Diabetes
- High blood pressure
- Sleep apnea (episodes when a person stops breathing while asleep)
- Osteoarthritis
- Gallstones

While there is no single underlying cause of obesity, the bottom line is that excessive weight reflects an imbalance between energy input and energy output. Both genetic and behavioral factors play a role in the development of excessive weight. For example, an individual's total number of fat cells (which may predispose an individual to weight gain) is determined genetically, but behavioral factors, such as a high-calorie, high-fat diet and lack of physical activity, must be present in order for weight gain to occur.

Other causes of obesity include:

- Rare congenital disorders (conditions present at birth), such as Prader-Willi syndrome and Laurence-Moon-Biedl syndrome
- Hormonal disorders such as Cushing's Syndrome and polycystic ovary syndrome
- Insulinoma (tumors of the pancreas)
- Hypothyroidism (diminished production of hormones from the thyroid gland)
- Certain prescription medicines, including steroids, tricyclic antidepressants, antiepilepsy drugs, or drugs used for high blood pressure

Specialists Involved:

A primary care doctor will assess BMI, waist measurement, and overall health risk. If the person is overweight or obese, or have a large waist size, the doctor should explain the health risks and find out whether the patient is interested and willing to lose weight and work together to create a treatment plan. The plan should include weight loss goals and treatment options that are realistic. The doctor may send the patient to other health care specialists.

These specialists may include:

• An endocrinologist if the patient needs to be treated for type 2 diabetes or a hormone problem such as an underactive thyroid.

- A registered dietitian or nutritionist to work with the patient on ways to change eating habits.
- An exercise physiologist or trainer to figure out level of fitness and show how to start physical activities suitable for the patient.
- A bariatric surgeon if weight loss surgery is an option for the patient.
- A psychiatrist, psychologist, or clinical social worker to help treat depression or stress.

INCIDENCE & PREVALENCE



http://www.cdc.gov/nccdphp/publications/aag/dnpa.htm

	BMI	Age group	Prevalence	Prevalence				
	level	(years)	rate (%)	number	Population*			
NORTH AMERICA								
U.S. (1)	30+	18+	23.9	52,806,791	220,948,915			
U.S. (2)	30+	adults	31.4	66,000,000	220,948,915			
Canada (3)	nada (3) 30+		36	8,770,220	24,361,723			
EUROPE								
UK								
Men (4a)	30+	15+	21.6	5,375,204	24,885,206			
Women (4b)	30+	15+	24.2	6,227,685	25,734,235			
France				· · · ·				
Men (5a)	30+	15+	7.8	1,968,278	25,234,337			
Women (5b)	30+	15+	6.6	1,779,112	26,956,249			
Germany								
Men (6a)	30+	15+	20.9	7,243,242	34,656,660			
Women (6b)	30+	15+	20.4	7,417,900	36,362,254			
Italy				· · · ·				
Men (7a)	30+	15+	12.9	3,147,398	24,398,436			
Women (7b)	30+	15+	12.6	3,252,963	25,817,169			
Spain				· · · ·				
Men (8a)	30+	15+	15.6	2,616,602	16,773,090			
Women (8b)	30+	15+	15.8	2,823,991	17,873,358			
ASIA								
Japan								
Men (9a)	30+	15 to 84	1.81	962,140	53,156,906			
Women (9b)	30+	15 to 84	2.62	1,486,704	56,744,445			
China				· · · · ·				
Men (10a)	30+	15+	1.6	8,674,654	542,165,858			
Women (10b)	30+	15+	1.9	9,889,361	520,492,691			
China (11a)	30+	unspecified	2.6		1,330,044,605			
China (11b)	28+	unspecified	5.6		1,330,044,605			
China (12)	n/a	adults	7.1	60,000,000	948,478,746			
India								
Men (13a)	30+	15+	1.1	4,426,877	402,443,377			
Women (13b)	30+	15+	1.4	5,378,040	384,145,728			
OTHER								
Mexico (14)	30+	25 to 64	31.0	15,518,755	50,060,499			
Mexico			~	, -,	, -,			
Men (15a)	30+	20 to 69	14.9	4,445,181	29,833,431			
Women (15b)	30+	20 to 69	25.1	8,153.622	32,484,548			
WORLDWIDE				, -, -	, , ,			
Worldwide (16)	n/a	15+	8.2	400,000.000	4,866,736.385			
Worldwide (17)	n/a	adults	7.3	312,000,000	4,267,520,812			

*Census figures represent the total population or a sub-set population, depending on the age group specified. *U.S. Census Bureau, 2008

2007 State Obesity Rates											
State	96	State	96	State	96	State	96				
Alabama	30.3	Illinois	24.9	Montana	21.8	Rhode Island	21,4				
Alaska	27.5	Indiana	26.8	Nebraska	26.0	South Carolina	28.4				
Arizona	25.4	Iowa	26.9	Nevada	24,1	South Dakota	26.2				
Arkansas	28.7	Kansas	26.9	New Hampshire	24,4	Tennessee	30.1				
California	22.6	Kentucky	27.4	New Jersey	23.5	Texas	28.1				
Colorado	18.7	Louisiana	29.8	New Mexico	24.0	Utah	21.8				
Connecticut	21.2	Maine	24.8	New York	25.0	Vermont	21.3				
Delaware	27.4	Maryland	25,4	North Carolina	28.0	Virginia	24.3				
Washington DC	21.8	Massachusetts	21.3	North Dakota	26.5	Washington	25.3				
Florida	23.6	Michigan	27.7	Ohio	27.5	West Virginia	29.5				
Georgia	28.2	Minnesota	25.6	Oklahoma	28.1	Wisconsin	24.7				
Hawaii	21.4	Mississippi	32.0	Oregon	25.5	Wyoming	23,7				
Idaho	24.5	Missouri	27.5	Pennsylvania	27.1						

http://www.obesity.org/statistics/

CO-MORBID CONDITIONS

Obesity contributes to numerous and varied co-morbid conditions. Complications can occur in many organ systems, ranging from cardiovascular to respiratory to orthopedic and even ophthalmologic.

Overweight and obesity are known risk factors for:

- heart disease
- diabetes
- hypertension
- gallbladder disease
- osteoarthritis
- sleep apnea and other breathing problems
- some cancers (uterine, breast, colorectal, kidney, and gallbladder).



Neaton et al. Arch Intern Med. 1992

In addition, obesity is associated with pregnancy complications, high blood cholesterol, menstrual irregularities, hirsutism (excessive hair growth), stress incontinence, psychological disorders, and increased surgical risk. Social discrimination against obese persons has a strong negative effect on their quality of life.

ASSOCIATED RISK FACTORS

Being overweight or obese isn't a cosmetic problem. It greatly raises the risk in adults for many diseases and conditions.

Overweight and Obesity-Related Health Problems in Adults

Heart Disease

This condition occurs when a fatty material called plaque builds up on the inside walls of the coronary arteries (the arteries that supply blood and oxygen to your heart). Plaque narrows the coronary arteries, which reduces blood flow to your heart. Your chances for having heart disease and a heart attack get higher as your body mass index (BMI) increases. Obesity also can lead to congestive heart failure, a serious condition in which the heart can't pump enough blood to meet your body's needs.

High Blood Pressure (Hypertension)

This condition occurs when the force of the blood pushing against the walls of the arteries is too high. Your chances for having high blood pressure are greater if you're overweight or obese.

Stroke

Being overweight or obese can lead to a buildup of fatty deposits in your arteries that form a blood clot. If the clot is close to your brain, it can block the flow of blood and oxygen and cause a stroke. The risk of having a stroke rises as BMI increases.

Type 2 Diabetes

This is a disease in which blood sugar (glucose) levels are too high. Normally, the body makes insulin to move the blood sugar into cells where it's used. In type 2 diabetes, the cells don't respond enough to the insulin that's made. Diabetes is a leading cause of early death, heart disease, stroke, kidney disease, and blindness. More than 80 percent of people with type 2 diabetes are overweight.

Abnormal Blood Fats

If you're overweight or obese, you have a greater chance of having abnormal levels of blood fats. These include high amounts of triglycerides and low-density lipoprotein (LDL) cholesterol (a fat-like substance often called "bad" cholesterol), and low high-density lipoprotein (HDL) cholesterol (often called "good" cholesterol). Abnormal levels of these blood fats are a risk for heart disease.

Metabolic Syndrome

This is the name for a group of risk factors linked to overweight and obesity that raise your chance for heart disease and other health problems such as diabetes and stroke. Metabolic syndrome occurs when a person has at least three of these heart disease risk factors:

- A large waistline. This is also called abdominal obesity or "having an apple shape." Having extra fat in the waist area is a greater risk factor for heart disease than having extra fat in other parts of the body, such as on the hips.
- Abnormal blood fat levels, including high triglycerides and low HDL cholesterol.
- Higher than normal blood pressure.
- Higher than normal fasting blood sugar levels.

Cancer

Being overweight or obese raises the risk for colon, breast, endometrial, and gallbladder cancers.

Osteoarthritis

This is a common joint problem of the knees, hips, and lower back. It occurs when the tissue that protects the joints wears away. Extra weight can put more pressure and wear on joints, causing pain.

Sleep Apnea

This condition causes a person to stop breathing for short periods during sleep. A person with sleep apnea may have more fat stored around the neck. This can make the breathing airway smaller so that it's hard to breathe.

Reproductive Problems

Obesity can cause menstrual irregularity and infertility in women.

Gallstones

These are hard pieces of stone-like material that form in the gallbladder. They're mostly made of cholesterol and can cause abdominal or back pain. People who are overweight or obese have a greater chance of having gallstones. Also, being overweight may result in an enlarged gallbladder that may not work properly.

The following factors may increase an individual's risk for becoming obese:

- Being older than 18 years of age in an industrialized country, especially the United States
- Having family members who are overweight or obese
- Lack of physical activity
- Overeating
- Consuming a high-fat diet
- Taking certain prescription medications that may increase the risk for obesity (see Causes section)
- Having a hormone disorder, such as Cushing's syndrome or hypothyroidism (underactive thyroid)
- Being emotionally stressed (from the death of a loved one, for example), which may
 cause a person to overeat
- Being born with rare disorders associated with obesity (as mentioned in the Causes section)

http://www.nhlbi.nih.gov/health/dci/Diseases/obe/obe_whatare.html http://www.medterms.com/script/main/art.asp?articlekey=16125

TREATMENT CONSIDERATIONS & BENEFITS OF THERAPY

The best way to prevent obesity and maintain a normal weight is to eat a healthy diet and exercise often. Maintaining daily records of both fat and calorie intake as well as exercise habits is an excellent way to get started in this endeavor.

Organizations such as the American Diabetes Association, the American Heart Association, and the American Dietetic Association have developed guidelines that promote weight loss

and assure appropriate, balanced nutrition. These guidelines recommend that no more than 30% of a person's total calorie intake should come from fats.

In addition to overeating, a sedentary lifestyle is a key factor in weight gain. Studies show that exercise—from moderate to rigorous—helps prevent obesity. While most proponents of exercise regimens (including those advocated by the Centers for Disease Control and Prevention) recommend at least 30 minutes of moderately intense aerobic activity (such as a brisk walk) at least 5 days a week, all physical activity is of value—from taking the stairs to cleaning the house or working in the garden. Strength training is also important for maintaining lean body mass.

Lifestyle Changes

For long-term weight loss success, it's important for you and your family to make lifestyle changes:

- Focus on energy IN (calories from food and drinks) and energy OUT (physical activity)
- Follow a healthy eating plan
- Learn how to adopt more healthful lifestyle habits
- Calories
- Cutting back on calories (energy IN) will help you lose weight. To lose 1 to 2 pounds a week, adults should cut back their calorie intake by 500 to 1,000 calories a day.
- In general, 1,000 to 1,200 calories a day will help most women lose weight safely.
- In general, 1,200 to 1,600 calories a day will help most men lose weight safely. This calorie range is also suitable for women who weigh 165 pounds or more or who exercise routinely.

Healthy Eating Plan

A healthy eating plan gives your body the nutrients it needs every day. It has enough calories for good health, but not so many that you gain weight. A healthy eating plan also will lower your risk for heart disease and other conditions. A plan low in total, saturated, and *trans* fat; cholesterol; and sodium (salt) will help to lower your risk for heart disease. Cutting down on fats and added sugars also can help you eat fewer calories and lose weight. Healthful foods include:

- Fat-free and low-fat milk and milk products such as low-fat yogurt, cheese, and milk.
- Lean meat, fish, poultry, cooked beans, and peas.
- Whole grain foods such as whole wheat bread, oatmeal, and brown rice. Other grain foods like pasta, cereal, bagels, bread, tortillas, couscous, and crackers.
- Fruits, which can be canned (in juice or water), fresh, frozen, or dried.
- Vegetables, which can be canned (without salt), fresh, frozen, or dried

Physical Activity

Staying active and eating fewer calories will help you lose weight and keep the weight off over time. Physical activity also will benefit you in other ways. It will:

- Lower the risk of heart disease, diabetes, and cancers (such as breast, uterus, and colon)
- Strengthen your lungs and help them to work better
- Strengthen your muscles and keep your joints in good condition
- Slow bone loss
- Give you more energy
- Help you to relax and cope better with stress

In general, adults should follow these guidelines in relation to physical activity.

- For overall health and to lower the risk of disease, aim for at least 30 minutes of moderate-intensity physical activity most days of the week.
- To help manage body weight and prevent gradual weight gain, aim for 60 minutes of moderate-to-vigorous intensity physical activity most days of the week.
- To maintain weight loss, aim for at least 60 to 90 minutes of daily moderateintensity physical activity.

Weight Loss Medicines

Weight loss medicines approved by the Food and Drug Administration (FDA) may be an option for some people. If you're not successful at losing 1 pound a week after 6 months of using lifestyle changes, medicines may help.

These medicines should be used only as part of a program that includes diet, physical activity, and behavioral changes.

Weight loss medicines may be suitable for adults who are obese (a BMI of 30 or greater). People who have BMIs of 27 or greater and a risk for heart disease and other health conditions also may benefit from medicines.

The FDA has approved two prescription weight loss medicines for long-term use:

- sibutramine (Meridia®)
- orlistat (Xenical®).

These medicines cause a weight loss between 4 and 22 pounds, although some people lose more weight. Most of the weight loss occurs within the first 6 months of taking the medicine.

Sibutramine (Meridia) - This medicine sends signals to your brain to curb your appetite. Sibutramine raises blood pressure and pulse. You shouldn't take it if you have high blood pressure or a history of heart disease or stroke. Orlistat (Xenical) - This medicine reduces the absorption of fats, fat calories, and vitamins A, D, E, and K by the body. Orlistat can result in mild side effects such as oily and loose stools. The FDA also has approved Alli[™], an over-the-counter weight loss aid for adults. Alli is the lower dose form of orlistat. It's meant to be used along with a reduced-calorie, low-fat diet and physical activity. In studies, most people taking Alli lost 5 to 10 pounds over 6 months.

Weight Loss Surgery

Weight loss surgery may be an option for people with extreme obesity (BMI of 40 or greater) when other treatments have failed. It's also an option for people with a BMI of 35 or greater who have life-threatening conditions.

Two common weight loss surgeries include:

- Banded gastroplasty. For this surgery, a band or staples are used to create a small pouch at the top of your stomach. This surgery limits the amount of food and liquids the stomach can hold.
- Roux-en-Y gastric bypass. For this surgery, a small stomach pouch is created with a bypass around part of the small intestine where most of the calories you eat are absorbed. This surgery limits food intake and reduces the calories your body absorbs.

http://www.nhlbi.nih.gov/health/dci/Diseases/obe/obe_whatare.html

ECONOMIC IMPACT

Overweight and obesity and their associated health problems have a significant economic impact on the U.S. health care system (USDHHS, 2001). Medical costs associated with overweight and obesity may involve direct and indirect costs (Wolf and Colditz, 1998; Wolf, 1998).

Direct medical costs may include preventive, diagnostic, and treatment services related to obesity. Indirect costs relate to morbidity and mortality costs.

Morbidity costs are defined as the value of income lost from decreased productivity, restricted activity, absenteeism, and bed days. Mortality costs are the value of future income lost by premature death.

National Estimated Cost of Obesity

According to a study of national costs attributed to both overweight (BMI 25–29.9) and obesity (BMI greater than 30), medical expenses accounted for:

- 9.1 % of total U.S. medical expenditures in 1998
- As high as \$78.5 billion (\$92.6 billion in 2002 dollars) (Finkelstein, Fiebelkorn, and Wang, 2003).
- Approximately 50% of these costs were paid by Medicaid and Medicare.

 The primary data sets used to develop the spending estimates for this study included the 1998 Medical Expenditure Panel Survey (MEPS) and the 1996 and 1997 National Health Interview Surveys (NHIS). The data also included information about each person's health insurance status and sociodemographic characteristics.

Insurance Category	Overweight	and Obesity	Obesity					
	MEPS (1998)	NHA (1998)	MEPS (1998)	NHA (1998)				
Out-of-pocket	\$7.1	\$12.8	\$3.8	\$6.9				
Private	\$19.8	\$28.1	\$9.5	\$16.1				
Medicaid	\$3.7	\$14.1	\$2.7	\$10.7				
Medicare	\$20.9	\$23.5	\$10.8	\$13.8				
Total	\$51.5	\$78.5	\$26.8	\$47.5				

Aggregate Medical Spending, in Billions of Dollars, Attributable to Overweight and Obesity, by Insurance Status and Data Source, 1996–1998

Note: Calculations based on data from the 1998 Medical Expenditure Panel Survey merged with the 1996 and 1997 National Health Interview Surveys, and health care expenditures data from National Health Accounts (NHA). MEPS estimates do not include spending for institutionalized populations, including nursing home residents.

Source: Finkelstein, Fiebelkorn, and Wang, 2003

As shown in Table 1, in 1998 aggregate adult medical expenditures attributable to overweight and obesity is estimated to be \$51.5 billion using MEPS data and \$78.5 billion using 1998 National Health Accounts (NHA) data. For obesity alone, the estimated costs are \$26.8 billion and \$47.5 billion, respectively. The inclusion of nursing home expenditures in the NHA estimates causes most of the difference between the MEPS and NHA results.

State-Level Estimated Costs of Obesity

A more recent study focused on state-level estimates of total, Medicare and Medicaid obesity attributable medical expenditures (Finkelstein, Fiebelkorn, and Wang, 2004). Researchers used the 1998 MEPS linked to the 1996 and 1997 NHIS, and three years of data (1998–2000) from the Behavioral Risk Factor Surveillance System (BRFSS) to predict annual state-level estimates of medical expenditures attributable to obesity (BMI greater than 30). State-level estimates range from \$87 million (Wyoming) to \$7.7 billion (California). Obesity-attributable Medicare estimates range from \$15 million (Wyoming) to \$1.7 billion (California), and obesity-attributable Medicaid expenditures range from \$23 million (Wyoming) to \$3.5 billion (New York). The state differences in obesity-attributable expenditures are partly driven by the differences in the size of each state's population.

(NHANES) National Health and Nutrition Examination Survey 1999–2000 Finkelstein, EA, Fiebelkorn, IC, Wang, G. National medical spending attributable to overweight and obesity: How much, and who's paying? Health Affairs 2003;W3;219–226. Finkelstein, EA, Fiebelkorn, IC, Wang, G. State-level estimates of annual medical expenditures attributable to obesity. Obesity Research 2004;12(1):18–24. U.S. Department of Health and Human Services. The Surgeon General's call to action to prevent and decrease overweight and obesity. [Rockville, MD]: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General; [2001]. Available from: US GPO, Washington. Wolf AM, Colditz GA. Current estimates of the economic cost of obesity in the United States. Obesity Research.1998;6(2):97–106.

Wolf, A. What is the economic case for treating obesity? Obesity Research. 1998;6(suppl)2S-7S.

GLOSSARY

abdominal obesity: Excessive fat in the abdomen indicated by a waist circumference greater than 40 inches in men and 35 inches in women.

atherosclerosis: An accumulation of deposits of fat and fibrous tissue, called plaques, within the walls of arteries that can narrow the arteries and reduce blood flow.

bariatric surgery: An operation designed to cause weight loss, often by reducing the size of the stomach.

BMI (Body Mass Index): A key index for relating a person's body weight to their height. The body mass index (BMI) is a person's weight in kilograms (kg) divided by their height in meters (m) squared. (See chart under additional resource section.)

calorie: The amount of energy in a food. Carbohydrates and protein contain four calories per gram; fat contains nine calories per gram; alcohol contains seven calories per gram.

carbohydrates: Foods made up of sugars or starches. minerals. and vitamins, fiber, contain also may that carbohydrates complex are starches

cardiovascular disease: Disease affecting the heart or arteries of the body.

cholesterol: A soft, waxy substance present in cells throughout the body. Deposition of cholesterol in blood vessels initiates the formation of plaques.

diabetes: A disorder characterized by abnormally high levels of glucose (sugar) in the blood.

dietary cholesterol: The cholesterol present in and obtained from animal foods meats, poultry, fish, shellfish, eggs, and dairy products. Plant foods contain no cholesterol.

gastric bypass: A type of obesity surgery that reduces the amount of food that can be eaten and absorbed by the body. Gastric bypass involves sealing off a portion of the stomach and bypassing part of the small intestine.

high-density lipoprotein (HDL): A particle in the blood that can protect against coronary heart disease by removing cholesterol from the walls of arteries.

homocysteine: An amino acid. High blood levels of homocysteine may promote atherosclerosis.

insulin: A hormone that controls the manufacture of glucose by the liver and permits muscle and fat cells to remove glucose from the blood. Also a medication taken by people with diabetes whose pancreas does not make enough insulin.

laparoscopic adjustable gastric banding: A minimally invasive, reversible form of obesity surgery that places an adjustable silicone band around the top of the stomach to reduce its size and decrease food intake.

leptin: A protein secreted by human fat cells that informs the brain about the body's level of fat stores.

low-density lipoprotein (LDL): A particle that transports cholesterol in the bloodstream. Its deposition in artery walls initiates plaque formation. A major contributor to coronary heart disease.

metabolic syndrome: The presence of at least three of five risk factors (abdominal obesity, elevated triglycerides levels, low HDL cholesterol levels, elevated blood pressure, and elevated blood sugar) that increases the risk of diabetes, coronary heart disease, and stroke.

metabolism: The chemical process by which the body converts food into energy for various functions, such as digestion, nutrient absorption, waste elimination, respiration, circulation, and temperature regulation.

protein: Compounds made up of amino acids.

resting metabolic rate: The amount of energy spent on basic functions, such as breathing, digestion, heartbeat, and brain activity, while a person is at rest.

stroke: A sudden reduction in or loss of brain function that occurs when an artery supplying blood to a portion of the brain becomes blocked or ruptures.

triglyceride: A fat that serves as the body's major storage form of energy. High blood triglyceride levels are associated with an increased risk of coronary heart disease.

vertical banded gastroplasty: A type of obesity surgery that partitions off a portion of the stomach, leaving room for only about 1 oz of food at a time.

waist circumference (WC): An indicator of abdominal fat. A healthy waist circumference is 40 inches or less for men and 35 inches or less for women. An increased waist circumference confers a health risk.

http://www.johnshopkinshealthalerts.com/reports/nutrition_weight_control/929-1.html?type=pf

ADDITIONAL RESOURCES

BMI CHART 1

BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)]	Body	v We	ight	(pou	nds)						
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

BMI CHART 2

BMI	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
Height (inches)]	Body	y We	ight	(pou	inds))					
58	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253
59	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262
60	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271
61	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280
62	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289
63	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299
64	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308
65	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318
66	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328
67	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338
68	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348
69	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358
70	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369
71	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379
72	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390
73	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401
74	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412
75	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423
76	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435

http://www.nhlbi.nih.gov/guidelines/obesity/bmi_tbl.htm

BMI Calculator: http://www.nhlbisupport.com/bmi/

Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight & Obesity in Adults:

http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm

Estimated State Level Obesity- Attributable Expenditures:

http://www.obesity.org/statistics/obesity_exp_state.asp

Interactive Menu Planner: http://hp2010.nhlbihin.net/menuplanner/menu.cgi

Patient Tip Sheets:

http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/ob_tips.htm

Portion Distortion Slides: http://hp2010.nhlbihin.net/portion/

OBESITY RESEARCH CENTERS

- Aberdeen Centre for Energy Regulation and Obesity (ACERO)
- The Donald B. Brown Research Chair on Obesity
- Mayo Clinic & Foundation for Medical Education and Research
- Medical University of South Carolina Weight Management Center
- The Minnesota Obesity Center
- Monell Chemical Senses Center
- The National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health
- The New York Obesity Research Center
- Obesity Research Center, Boston Medical Center
- Pennington Biomedical Research Center
- University of Alabama at Birmingham Department of Nutrition Sciences (and Obesity Research Center)
- University of Colorado Center for Human Nutrition
- University of North Carolina at Chapel Hill's Interdisciplinary Obesity Center (IDOC)
- University of Pennsylvania Weight and Eating Disorder Program

PROFESSIONAL ORGANIZATIONS

The Academy for Eating Disorders (AED): http://www.aedweb.org/ America on the Move: http://steptember.americaonthemove.org/ American Council for Fitness & Nutrition: http://www.acfn.org/ American Diabetes Association: http://www.diabetes.org/home.jsp American Obesity Association: http://www.obesity.org/AOA/ American Dietetic Association: http://www.aetright.org American Heart Association: http://www.americanheart.org American Society for Metabolic & Bariatric Surgery: http://asbs.org/ Centers for Disease Control (CDC): http://www.cdc.gov/ The Hormone Foundation: http://www.hormone.org/ The International Association for the Study of Obesity (IASO): http://www.iaso.org/ The International Obesity Task Force: http://www.iotf.org/ The Obesity Action Coalition: http://www.obesityaction.org/home/index.php The Obesity Society: http://www.obesity.org/ Partnership for Healthy Weight Management: http://www.consumer.gov/weightloss/

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Productivity, Absenteeism, Presenteeism

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