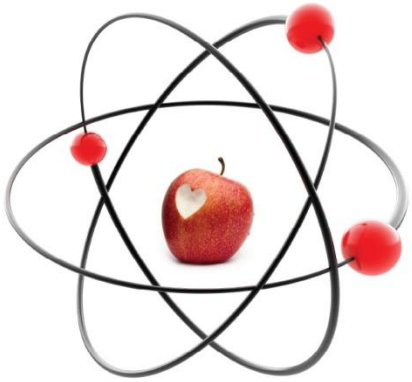


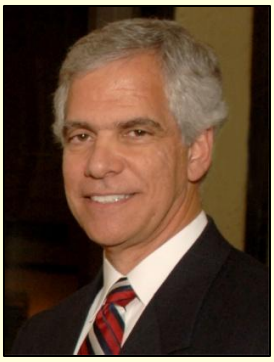
Heart Health

We're Taking It Personally

U.S. DEPARTMENT OF ENERGY

HSS
Office of Health, Safety and Security

A Message From
the Chief Health, Safety and Security Officer



Heart disease is the leading cause of death in the United States and remains the greatest single threat to the Department's greatest asset – you. The disability and death associated with heart disease continue to affect our population and our workforce at a rate that is disturbing, particularly when you consider that many of the risk factors associated with heart disease can be controlled and reduced if you have the right information.

The health of the Department of Energy workforce has been one of the Office of Health, Safety and Security's highest priorities since it was established in 2006. We believe, as the Secretary of Energy has stated, that our people are our greatest asset and that both personal and occupational health are essential to mission success. No matter who you are or what your job is, we want you to know that we value and support your "heart health."

We all know someone who suffers from heart disease. In the past year, we have lost several Department of Energy employees to fatal heart attacks, either at the office or at home. On a more personal level, these employees were also our friends. These tragic losses have prompted us to redouble our efforts to increase awareness among both employees and employers about health issues in general and heart disease in particular.

To this end, we are issuing the following heart health report to increase your understanding and awareness of heart disease, and especially the risk factors that we can all influence to improve our continued heart health. A shorter brochure has also been distributed that summarizes some of the most important information for easy reference. We encourage you to share this report and the associated brochure with your friends and family.

If you have any questions about this report or have suggestions as to how we can better support the heart health of our workers, please contact Dr. Michael Ardaiz, the Department's Chief Medical Officer, at (202) 586-8758.

Glenn Podonsky, Chief Health, Safety and Security Officer
U.S. Department of Energy

This report and the associated brochure are available on the HSS website at:

http://www.hss.energy.gov/cmo/hearthealthy_report.pdf
http://www.hss.energy.gov/cmo/hearthealthy_brochure.pdf

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Introduction

Heart disease is the leading cause of death in the United States and remains the greatest single threat to your life.

The good news is that **YOU** have the power to make a difference in those odds. And you've already taken the first step by searching for more information. This report, *Heart Health – We're Taking It Personally*, was put together to provide you with information that can help you improve your chances of preventing heart attacks and living a long, healthy life. And by adopting heart healthy strategies, you may also save yourself from the consequences of high blood pressure, type 2 diabetes, and high cholesterol.

We encourage you to use this guide however it can help you the most. For example, check out the Heart Disease section if you want to know more about how your heart is working right now or what heart disease really is. Or maybe you already know about heart disease and recognize that you need to make changes in order to improve your health. If so, the Therapeutic Lifestyle Changes section provides practical information that can get you started with tobacco cessation, proper nutrition, and exercise.

Whichever way you use this resource, know that with each positive change you make in your life, you are not only changing your future but the futures of those around you. And what could possibly be worth more than your life and the lives of your loved ones? Please consider sharing this information with your family, friends, and co-workers and encourage them to join you in making heart health a top priority.

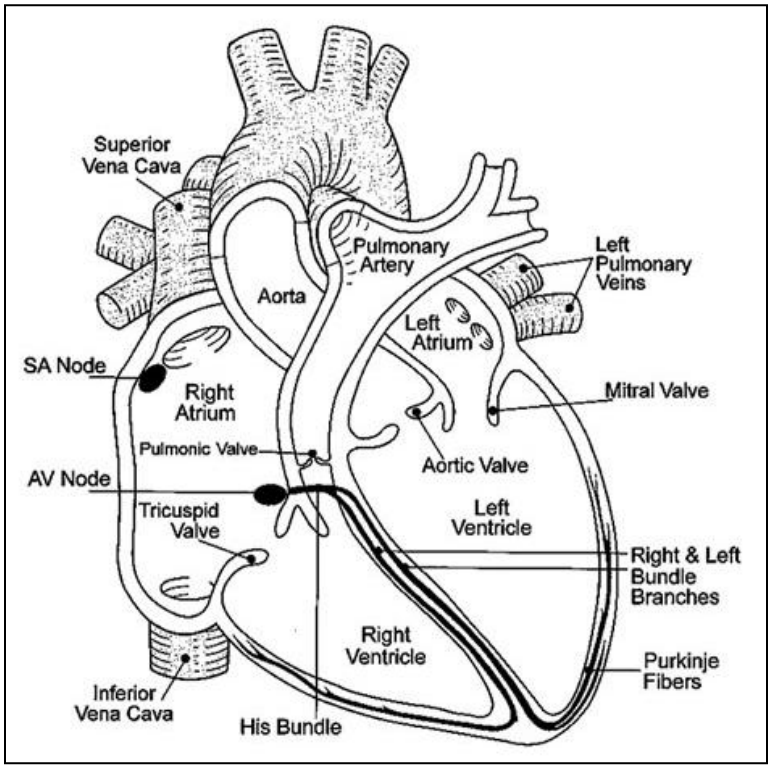
You have absolutely nothing to lose, and years of health to gain. It's time to get started.

Join us, and use your energy to make the Department of Energy a heart healthy workplace.

Heart Disease

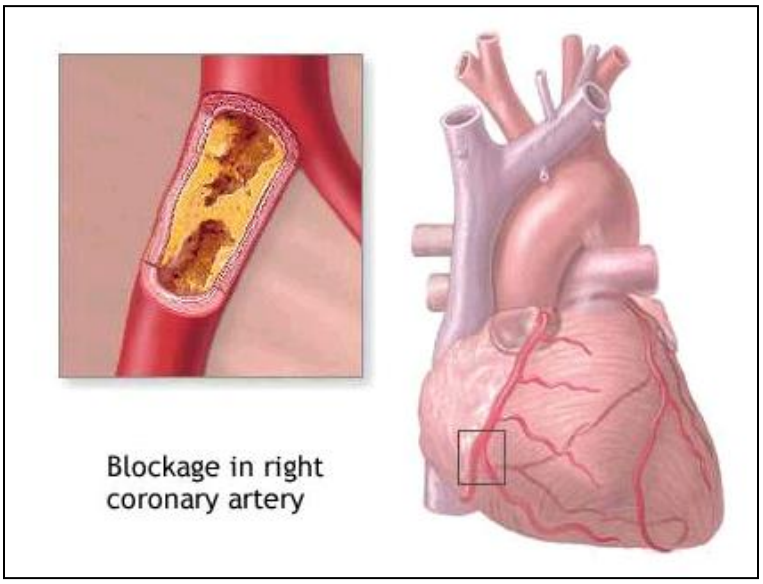
In order to understand how heart disease develops, it is important to understand how the basic parts of a healthy heart work and why they are all so vitally important. Even though your heart is beating in your chest every single day, you may not know what is actually happening in there or what could be building up and threatening your heart's ability to keep beating. In order to help you understand why your heart heath is important, get to know your heart.

Your heart is a muscular organ that acts like a pump to continuously send blood throughout your body. When the walls of the heart contract, blood is pumped into the circulatory system. Your blood carries oxygen and nutrients through a network of blood vessels called arteries, capillaries, and veins (in that order) flowing to and from all areas of your body, *supplying itself first through the heart's own coronary arteries*. Valves in your heart's four chambers work to ensure that blood flows in the right direction. All of this activity is regulated by an electrical system that causes the heart to contract normally. A healthy heart not only supplies blood to the body at rest, but also increases heart rate and force of contractions in order to meet the demands of physical activities, including exercise and work. Below is a picture demonstrating these features in a normal, healthy human heart.



If heart disease weakens your heart, your body's organs won't receive enough blood to work normally. Think of your heart like a car's engine: the coronary arteries are like the fuel injection system; muscles are like the pistons, which move to generate force; the valves are like the engine valves, which direct fuel through the engine; and the electrical system is like the engine's electrical system, which carries electricity from the car's battery. Like a car's engine, each of the components of the heart can degrade over time due to aging and exposure to "the elements." As components fail, the heart's performance begins to decline. It becomes less efficient, less reliable, and it eventually stops. Now think of all of the upkeep and maintenance that you provide *to your car!*

Coronary artery disease (CAD) or the buildup of plaque inside the coronary arteries is the most common form of heart disease. CAD is also more concerning than other forms of heart disease, because it can result in a heart attack *without any warning*. Plaque is made up of cholesterol, fat, calcium, and other substances found in the blood. This condition may only appear when a particular coronary artery is over 70 percent obstructed (i.e., critical stenosis or narrowing) or the arteries are expected to provide increased blood flow during exercise. The figure below demonstrates what a blockage looks like within a coronary artery.



The location of a blockage within the coronary arteries largely determines the symptoms a victim feels, as well as the longer term consequences. For example, a blockage that limits or stops blood flow to the large muscles of the left ventricle, responsible for forcefully sending blood out to the rest of the body along with oxygen, is most likely to cause pain; shortness of breath; and, ultimately, a loss of blood pressure that may cause unconsciousness and even death. A blockage that affects blood flow to the smaller right ventricle, which only generates enough force to send blood into the lungs to pick up oxygen, is less likely to produce such catastrophic results. Also, a blockage affecting blood flow to a heart valve or the electrical system may have a different set of symptoms. Thus, CAD in an otherwise normal heart can result in a range of abnormalities that can in turn leave a victim with potentially disabling symptoms. As heart attack survival rates have improved, more victims are living with the consequences of heart disease than ever before, and they are making the necessary changes to reduce second heart attacks and other consequences.

Below are some of the classic signs that a heart attack may be happening to you or someone nearby. It's critical to consider and respond to the possibility of a heart attack as quickly as possible, because delays mean that the part of the heart affected by the blockage is more likely to experience permanent damage.

Warning Signs of a Heart Attack

1. **Chest discomfort.** Most heart attacks involve discomfort in the center of the chest that lasts more than a few minutes, or that goes away and comes back. It can feel like uncomfortable pressure, squeezing, fullness, or pain.

2. **Discomfort in other areas of the upper body.** Symptoms can include pain or discomfort in one or both arms, the back, neck, jaw, or stomach.
3. **Shortness of breath.** Shortness of breath may occur with or without chest discomfort.
4. **Other signs.** Other signs may include nausea, lightheadedness, or breaking out in a cold sweat.

Special Note for Women:
"As with men, women's most common heart attack symptom is chest pain or discomfort. But women are somewhat more likely than men to experience some of the other common symptoms, particularly shortness of breath, nausea/vomiting, and back or jaw pain." (American Heart Association)

Warning Signs of a Stroke

Although strokes are not strictly related to heart health, knowing the signs could help save your life or the life of someone with you.

1. **Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body**
2. **Sudden confusion, trouble speaking or understanding**
3. **Sudden trouble walking, dizziness, loss of balance or coordination**
4. **Sudden, severe headache with no known cause.**

By immediately calling 9-1-1, a stroke victim has a better chance of not only surviving the stroke but also, through the use of medication, limiting the long-term disability often caused by a stroke.

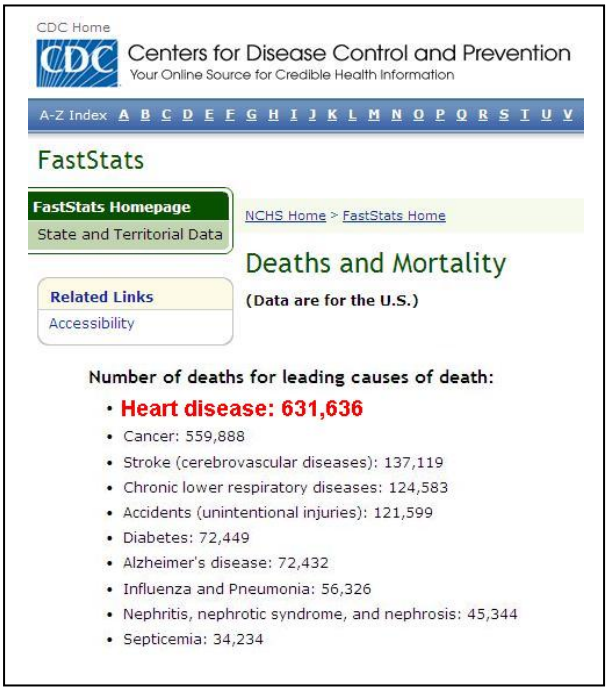
Steps to Save a Life

- Know the signs.
- Call 9-1-1.
- If the heart attack sufferer is unconscious, give cardiopulmonary resuscitation (CPR) until emergency help arrives. For more information on CPR classes, contact the safety and health department at your location.

Although nearly half of the individuals who suffer a first heart attack die as a result, many of those who survive will go on to have another heart attack unless their heart disease is treated aggressively. According to the American Heart Association, about 700,000 Americans will have an initial heart attack and another 500,000 will have a recurrent heart attack (2004). And almost half of the people who have a heart attack will die from it. According to a Centers for Disease

Control (CDC) report, almost half of the cardiac deaths in 1999 occurred *before emergency services and hospital treatment could be administered.*

We have an obligation to consider the terrible burden of heart disease as our first priority. Heart disease results in the greatest number of deaths in the U.S. every year – over 700,000 deaths out of approximately 2.5 million. This number is greater than the number of victims of cancer, unintentional injury, diabetes mellitus, influenza, and Alzheimer's disease. Heart disease can also strike at almost any age, as reported by the National Center for Health Statistics. In recent years, heart disease has accounted for 30 percent of deaths in the 65 years and over age group, but also accounted for 4 percent of deaths in the 5-14 year age group. Overall, 12 percent of adults 18 years of age and over have been told by a doctor or other health professional that they had heart disease and 6 percent have been told that they have CAD, the most common form of heart disease.



To establish heart disease as a priority for personal and occupational health, we must understand and target the "actual causes" of heart disease. In 1993, McGinnis and Foege first used the term "actual causes of death" to indicate that most diseases and injuries have multiple potential causes, factors, or conditions that may contribute to a single death. In a 2004 analysis by the CDC, the three leading "actual causes of death" (excluding specific medical conditions such as high blood pressure and high cholesterol) in 2000 that resulted in a *combined 40 percent of all deaths*, including many of those attributed to heart disease, were largely preventable behaviors and exposures. These factors included tobacco use (435,000 deaths; 18.1% of total U.S. deaths), poor diet and physical inactivity (400,000 deaths; 16.6%), and alcohol consumption (85,000 deaths; 3.5%).

If reducing the burden of heart disease in our general population and our workforce requires us to look at the actual causes of heart disease and the specific medical conditions associated with the development of heart disease, we must think and speak about these causes and conditions in a standardized way. We will refer to the causes and conditions as "risk factors." This will enable us, in both public and occupational health, to provide consistent information to everyone participating in the struggle for heart health. This standardization will also help us to consider the benefits and risks, as well as the cost effectiveness of interventions (such as diets, supplements, and medications) when reviewing the scientific studies and media reports that are generated on a continuous basis.

Risk Factors

Although we are all individuals with unique risks of disease resulting from the combined influences of our genetics and our lifelong environmental exposures, our behavior plays a major role in the development of heart disease. According to the American Heart Association, behavioral risk factors, such as tobacco use, poor diet, and physical inactivity, lead to chronic diseases, including heart disease, that account for a third of all deaths in the U.S. Nine easily measured and potentially modifiable risk factors result in the development of coronary plaques and account for over 90 percent of the risk of an initial acute heart attack. The American Heart Association also stated, "The effect of these risk factors is consistent in men and women across different geographic regions and by ethnic group…"

Risk factors are either non-modifiable or modifiable (meaning, some cannot be changed, while others can). Modifiable risks represent the chance to prevent or reduce the development of heart disease. Modifiable means that the risk factor can be alleviated as a result of behavioral changes such as quitting the use of tobacco products; using prescription or other medications to bring blood cholesterol, blood pressure, or blood sugar into the normal ranges; and regular physical activity. Your risk for heart disease and heart attack increases according to the number of risk factors you have and their severity. Also, some risk factors, such as smoking and diabetes, put you at greater risk for heart disease and heart attack than other people. The following table may help you to recognize those risk factors in your life that represent a threat to your heart health *and* an opportunity to reduce your personal risk.

NON-MODIFIABLE RISK FACTORS	MODIFIABLE RISK FACTORS	MODIFIABLE CONTRIBUTORS
• Increasing Age • Male Sex (Gender) • Heredity (Including Race and Ethnicity)	• Tobacco Products (All) • High Blood Pressure • High Blood Cholesterol • Diabetes Mellitus • Physical Inactivity • Obesity and Overweight	• Sleep Apnea • Stress • Alcohol • Diet and Nutrition

Increasing age and age-associated risk factors, such as high blood pressure, are national as well as personal concerns. Although some studies have shown that heart attacks occurring earlier in life may be more severe, according to the CDC, the vast majority of people who die from coronary heart disease are 65 or older. Also, at older ages, women who have heart attacks are more likely than men to die from them within a few weeks. The U.S. and other nations that have a similarly high proportion of individuals over the age of 40 must work collectively to address modifiable risk factors.

DOE has monitored aging and other risk factors for heart disease in the Department's workforce for many years through the Office of Health, Safety and Security (HSS) Injury and Illness Surveillance Program (IISP). Although the average age varies among different categories of employees, there are clear trends that show that the proportion of employees below the age of 40 years has steadily declined, while the proportion over the age of 40 years has steadily increased. Additional data is available from the IISP regarding the prevalence of other specific and often modifiable risk factors for heart disease, at each of the DOE sites participating in the program, that may assist both employees and employers in developing strategies to reduce the risk of heart disease and the burden of illness at the site. However, *individual behavior remains a key factor in reducing or eliminating those modifiable risk factors.*

The leading risk factors are not equally divided amongst us, and you may be more or less likely to have particular risk factors for heart disease. Such information, of course, should be discussed with your personal or occupational health professionals. However, the inequity in risk factors is reflected in studies of the U.S. population based upon the results of the National Health and Nutrition Examination Survey (NHANES), as presented in the following table.

Note, among other things, that these "health indicators" are risk factors for heart disease, as well as many other diseases such as stroke, cancer, and kidney failure. Tobacco, the greatest single risk factor for heart disease, is also among the most common risk factors among persons as early as 12 years of age, while the remaining risk factors have been assessed in general among persons over the age of 20 years.

Update on Disparities in Selected Health Indicators, by Race or Ethnicity, United States.

	Race or Ethnicity					
Health Indicators	American Indian or Alaska Native	Asian	Black or African American	Hispanic[1]	Native Hawaiian or Pacific Islander	Non-Hispanic White
Tobacco use (cigarettes) during the previous month among persons aged >12 (2006 data)	38.1%	14.6%	24.4%	22.4%	N/A	26.1%
Hypertension[7] among men aged 20-74 (2001-2004 data)	N/A	N/A	37.8%	22.1%	N/A	26.0%
Hypertension[7] among women aged 20-74[8] (2001-2004 data)	N/A	N/A	40.3%	25.1%	N/A	24.1%
Total cholesterol (>240 mg/dL) among men (2001-2004 data)	N/A	N/A	14.4%	17.0%	N/A	16.5%
Total cholesterol (>240 mg/dL) among women (2001-2004 data)	N/A	N/A	14.3%	12.8%	N/A	16.7%
Body mass index >30 kg/m^2 among men aged 20-74 (2001-2004 data)	N/A	N/A	31.2%	30.5%	N/A	31.0%
Body mass index >30 kg/m^2 among women aged 20-74[8] (2001-2004 data)	N/A	N/A	51.6%	40.3%	N/A	31.5%

Modifiable risk factors remain the key targets for any individual or population-based effort to achieve heart health. There is now a wealth of information regarding the harmful effects of each of the risk factors, as presented in the following table.

- **Tobacco Use:** Whether consumed through smoking or through smokeless forms, any tobacco product damages and narrows blood vessels, raises cholesterol levels, and raises blood pressure. These changes are too often overlooked due to the emphasis on the risk of cancer associated with tobacco use, in spite of the fact that the number of individuals dying from heart disease every year remains greater than the number of individuals dying from lung and other tobacco-associated cancers.

- **High blood pressure:** Blood pressure is considered high if it stays at or above 140/90 mmHg over a period of time. At this level, the lining of the arteries becomes damaged and progressively narrowed. Blood pressure increases while performing physical exercise, which is generally beneficial, but constant elevation in blood pressure as a result of disease is very harmful. The damage is also greatest in the arteries on the surface of the heart, which receive blood first and at a higher pressure than those parts of the body farther from the heart.

- **Unhealthy blood cholesterol:** Blood cholesterol includes both LDL cholesterol (sometimes called *bad* cholesterol) and HDL cholesterol (sometimes called *good* cholesterol because it actually reduces your risk of heart disease). Having high blood cholesterol increases heart disease risks. Although it may take 20 or more years to develop critical narrowing (i.e., over 70 percent blockage) of the coronary arteries, individuals with the highest levels may experience heart disease before 40 years of age. Tragically, rupture of relatively small or "immature" plaques contributes to heart attacks at a younger age.

- **Diabetes mellitus:** Diabetes is a disease in which the body's blood sugar level is high because the body doesn't make enough insulin or doesn't use its insulin properly. The narrowing of the arteries that results in heart disease is greatest among individuals affected by diabetes from an early age, but more and more adults are developing and living longer with diabetes.

- **Lack of physical activity:** Lack of activity can worsen other risk factors for heart disease. In fact, in some cases, a sedentary lifestyle may pose a greater risk than the modest use of tobacco products. Generational changes suggest that today's youth are at even greater risk.

- **Overweight or obesity:** Being overweight means having extra body weight from muscle, bone, fat, and/or water. Being obese means having a high amount of extra body fat. The effects on the above risk factors are proportionate to the degree of obesity.

Other factors also may contribute to the development of heart disease. These include:

1. **Sleep apnea:** Sleep apnea is a disorder in which your breathing stops or gets very shallow while you're sleeping, resulting in lower oxygen levels and your body's strenuous efforts to increase the flow of blood. Sleep apnea increases your chances of having high blood pressure and ultimately heart disease.

2. **Stress:** Research shows that the most commonly reported "trigger" for a heart attack is an emotionally upsetting event—particularly one involving anger. Sudden changes in blood flow can either reveal pre-existing heart disease or produce new, but significant, blockages in the arteries.

3. **Alcohol:** Heavy drinking can damage the heart muscle, resulting in abnormal thickening of the heart muscle and congestive heart failure. Fortunately, there is evidence to suggest that such changes may be partially reversible after heavy drinking is discontinued. According to *Finding Your Way to a Healthier You* (issued by the U.S. Department of Agriculture and Health and Human Services), "Moderate drinking means up to 1 drink a day for women and up to 2 drinks for men." Drinking more than these amounts is detrimental to your health.

Scientists continue to study other possible risk factors for heart disease. For example, high levels of a protein called C-reactive protein (CRP) in the blood may raise the risk for heart disease. High levels of CRP are likely to reflect an inflammation in the body as a response to injury or infection. Damage to the arteries' inner walls seems to trigger inflammation and causes plaque growth. Research is under way to find out whether reducing inflammation and lowering CRP levels also can reduce the risk of developing CAD and having heart disease. High levels of fats (called triglycerides) in the blood may also raise the risk of CAD, particularly in women.

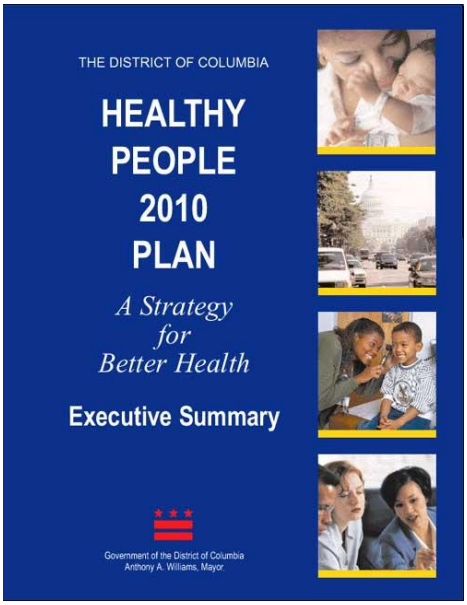
Certain occupational exposures have also been causally linked to the development of heart disease. If you are concerned about your exposure, see the National Institute for Occupational Safety and Health webpage regarding occupational heart disease at: http://www.cdc.gov/niosh/topics/heartdisease/. Both chemical and non-chemical exposures have been examined in scientific literature, with the following general findings:

1. **Among chemical factors,** evidence for a direct causal relationship between carbon-disulfide and CAD was strongest, but associations may also exist between CAD and occupational exposures to nitroglycerin, ethylene-glycol-dinitrate, and other aliphatic nitrates, carbon-monoxide, non-halogenated and halogenated industrial solvents, arsenic, and cobalt.

2. **Among non-chemical factors,** evidence exists for a causal relationship between CAD and shift work, noise, and stressors due to organization, work, or psychosocial factors.

3. **Heart disease secondary to occupational lung disease** results from increased resistance to blood flow through the lungs and increased strain on the right side of the heart (i.e., pulmonary hypertension).

In some cases, it may be appropriate for workers with known heart disease to avoid such exposures. Such concerns are generally addressed through the medical screening of workers entering occupations with potential for occupational exposures, but it is nevertheless important for each worker to be aware of his or her heart health and to communicate potential susceptibilities to occupational health providers in the workplace.



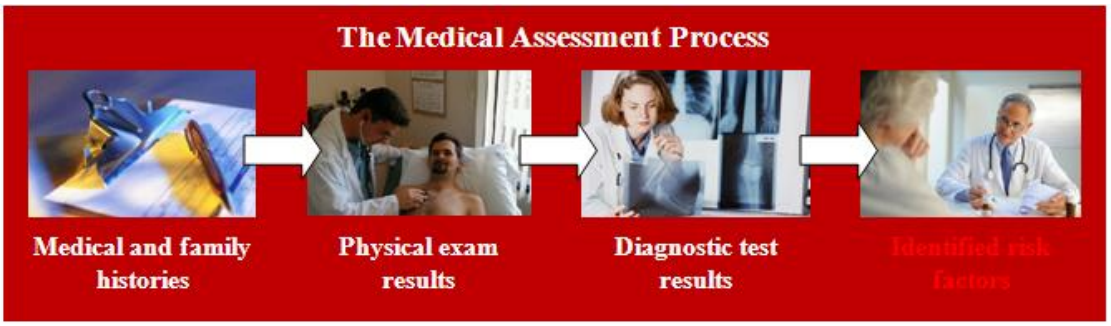
Healthy People 2010 was a set of health objectives for the U.S. to achieve over the first decade of the new century. It was established for the use of many different people, states, communities, professional organizations, and others to assist in the development of programs to improve health by targeting the major causes of illness and death.

Healthy People 2010 built on initiatives pursued over the past two decades. The 1979 Surgeon General's Report, *Healthy People*, and *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* both established national health objectives and served as the basis for the development of state and community plans. However, challenges have been encountered and only limited success in achieving the various goals for heart disease has been met.

Medical Assessments

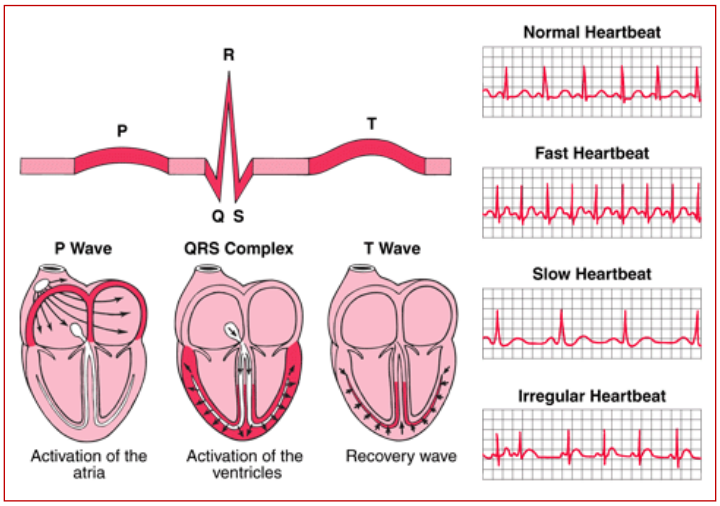
No single test can determine your risk of heart disease or diagnose CAD. Your doctor will most likely begin with a comprehensive medical assessment with the objective of identifying risk factors for heart disease. The four general parts of the medical assessment process include:

1. **Your medical and family medical histories**
2. **The results of a physical examination**
3. **The results of diagnostic tests and procedures**
4. **The assessment of identified risk factors.**

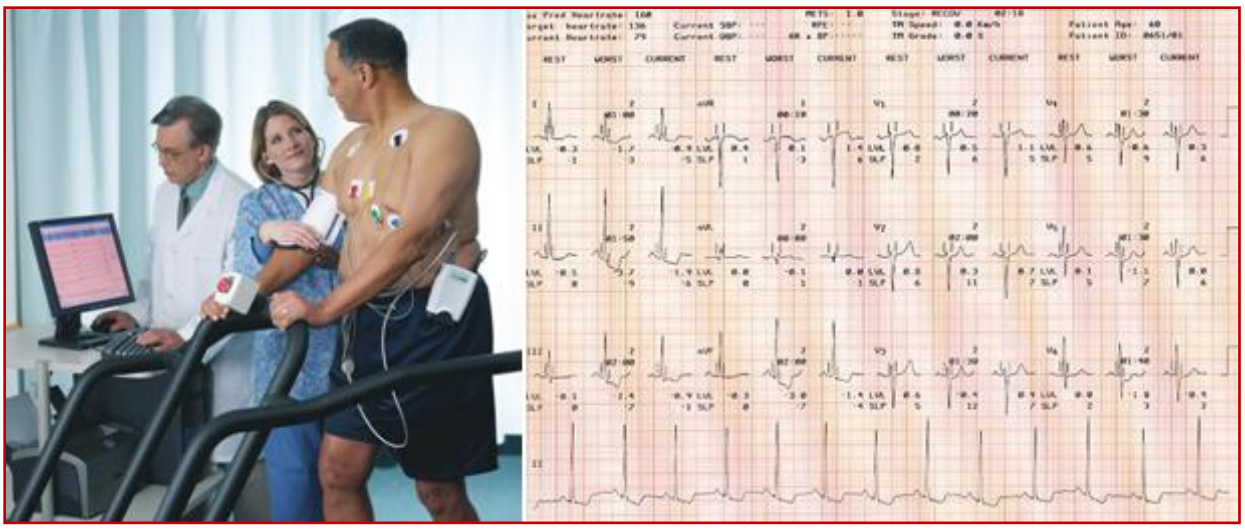


If your doctor thinks you have CAD, he or she will probably do one or more of the following tests, either in the office or with the help of a specialist such as a radiologist or a cardiologist:

- **EKG (Electrocardiogram):** An EKG is a simple test that detects and records the electrical activity of your heart. An EKG shows how fast your heart is beating and whether it has a regular rhythm. Certain electrical patterns due to thickening of the heart muscle and other changes may indicate the chronic effects of high blood pressure and *can show signs of a previous or current heart attack.*



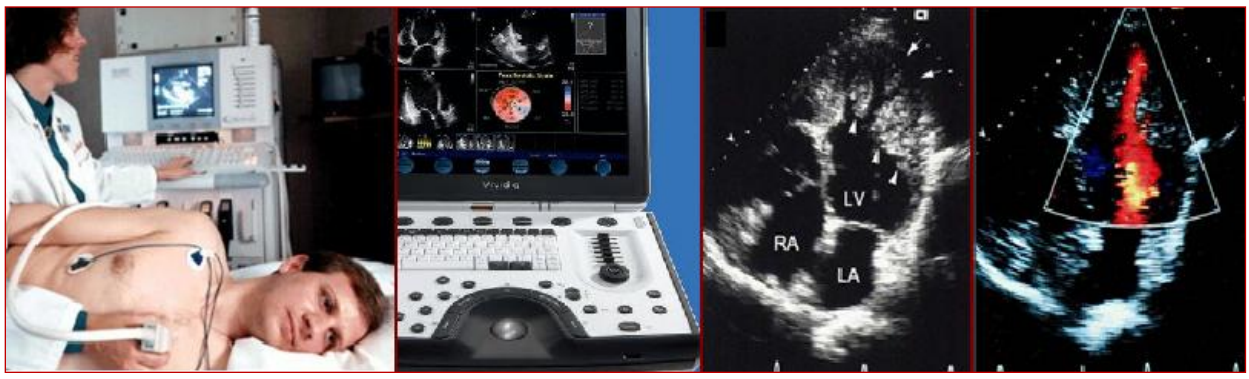
- **Stress Testing:** During stress testing, you exercise to make your heart work hard and beat fast while heart tests are performed. When your heart is beating fast and working hard, it needs more blood and oxygen. Arteries narrowed by plaque cannot supply enough oxygen-rich blood to meet your heart's needs. Some stress tests use a radioactive dye, sound waves, positron emission tomography (PET), or cardiac magnetic resonance imaging (MRI) to take pictures of your heart when it is working hard and when it is at rest. These imaging stress tests can show how well blood is flowing in the different parts of your heart.



A stress test can show possible signs of CAD, such as:

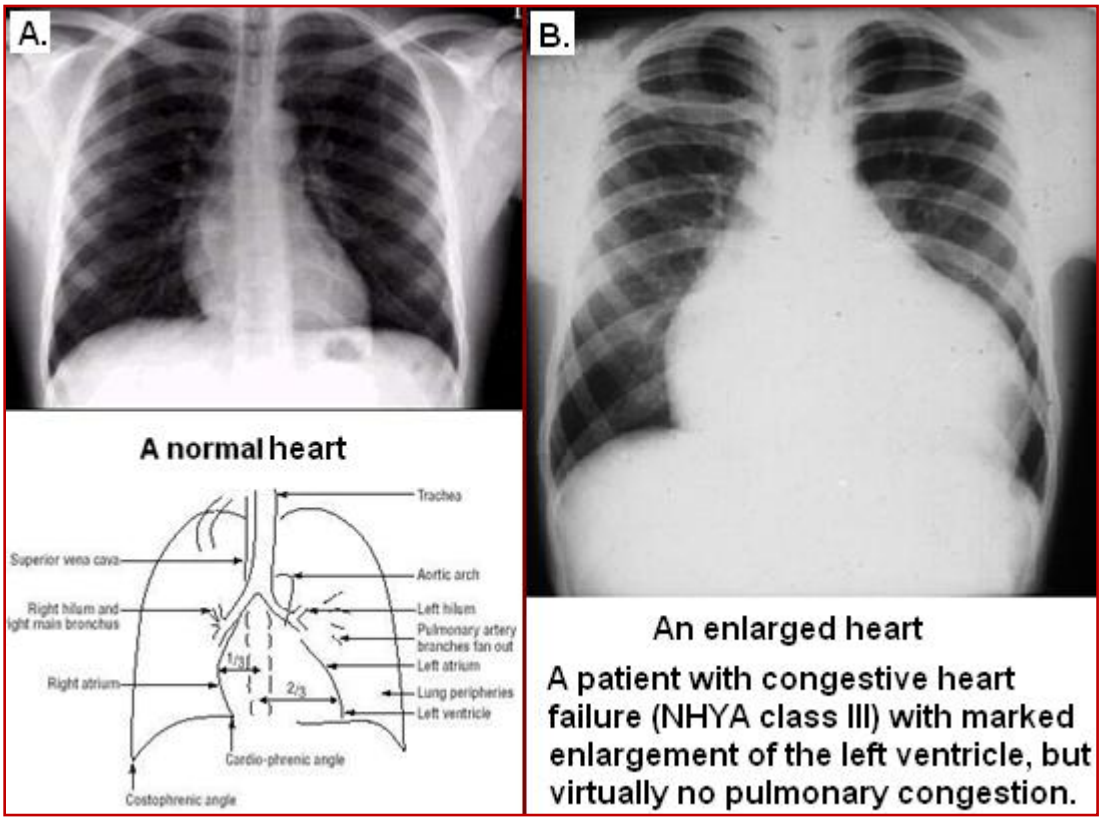
- **Abnormal changes in your heart rate or blood pressure**
- **Symptoms such as shortness of breath or chest pain**
- **Abnormal changes in your heart rhythm or your heart's electrical activity.**

- **Echocardiography:** Echocardiography uses sound waves to create a moving picture and provides information about the size and shape of your heart and how well your heart chambers and valves are working. The test also can identify areas of poor blood flow to the heart, areas of heart muscle that are not contracting normally due to previous injury or heart attack, and the enlargement of heart chambers and heart size characteristic of congestive heart failure.

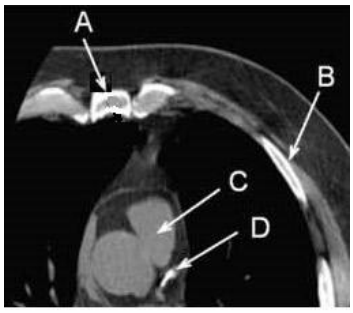


- **Chest X-Ray:** A chest x-ray takes a picture of the organs and structures inside the chest, including your heart, lungs, and blood vessels. A chest x-ray can reveal signs of heart failure, including enlargements of specific chambers of the heart or the backflow of fluid

into the lungs due to the heart's inability to move blood forward. The following images demonstrate a normal heart (A) and an enlarged heart (B) as a result of congestive heart failure.



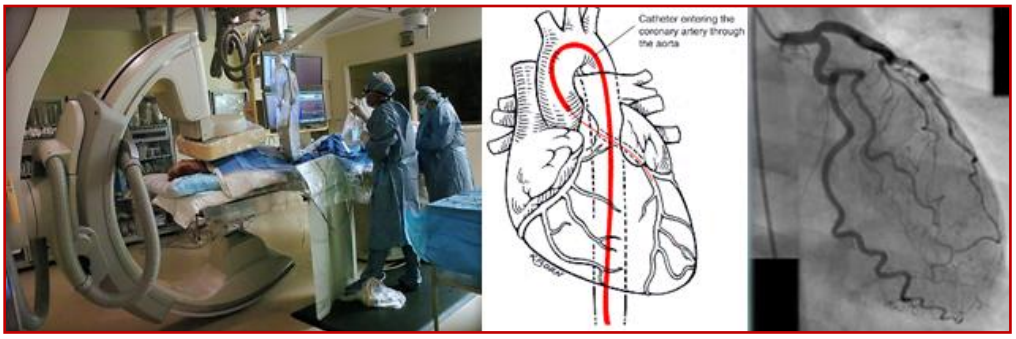
- **Electron-Beam Computed Tomography (EBCT):** EBCT is a form of CT scan (commonly known as a *heart scan*) that shows calcium deposits (called calcifications) in and around the coronary arteries. The more calcium detected, the more likely you are to have CAD, although some individuals have relatively high calcification scores but very little actual narrowing of the coronaries upon further evaluation. However, EBCT is not used routinely to diagnose CAD, because its reliability is not yet known. In addition, the exposure to radiation poses some level of added risk for cancer, increasing the complexity of risk/benefit communications.



CT scan showing calcium of a coronary artery:
A. sternum bone
B. rib bone
C. heart muscle
D. calcified coronary artery

- **Coronary Angiography and Cardiac Catheterization:** This test uses dye and special x-rays to show the insides of your coronary arteries. To get the dye into your coronary arteries, your doctor will use a procedure called cardiac catheterization (KATH-e-ter-i-

ZA-shun). A long, thin, flexible tube called a catheter is put into a blood vessel in your arm, groin (upper thigh), or neck. The tube is then threaded into your coronary arteries, and the dye is released into your bloodstream. Special x-rays are taken while the dye is flowing through your coronary arteries. This test usually causes little to no pain, although you may feel some soreness in the blood vessel where your doctor put the catheter.

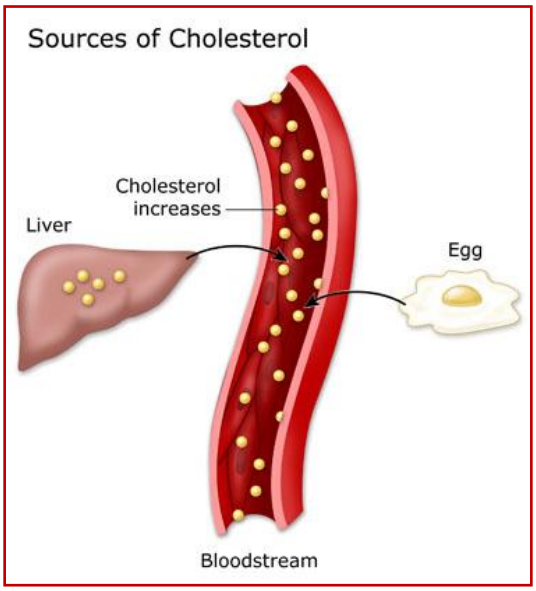


Blood Tests: Blood tests check the levels of certain fats, cholesterol, sugar, and proteins in your blood. Abnormal levels may show that you have risk factors for CAD. The most concerning of these are cholesterol and sugar. Cholesterol is a waxy substance found in the body. Having high "bad" cholesterol means you have too much low-density lipoprotein (LDL) cholesterol in your blood. LDL cholesterol can build up in your arteries and prevent blood from getting to your heart. High-density lipoprotein (HDL) cholesterol is the "good" cholesterol, because it carries LDL cholesterol away from your artery walls. Here is some basic information you should know about cholesterol:

- **Too much cholesterol in the blood, or high cholesterol, can be serious.** People with high cholesterol are at risk of developing heart disease, which in turn can lead to a heart attack or stroke.

- **Only about 25 percent of cholesterol comes from the foods you eat.** The other 75 percent is made by the body. Factors such as age and family history affect how much cholesterol your body makes.

- **People with high cholesterol usually have no symptoms.** However, high cholesterol can be detected with a blood test. These tests can also help your doctor predict what your risk for heart disease may be.



Your doctor knows best when it comes to your cholesterol goals, and he or she will be your partner in reaching them. National guidelines say a person's total cholesterol number should be under 200, while 220–239 is considered borderline high, and above 240 is considered high. National guidelines also provide direction on LDL cholesterol, a part of total cholesterol and the main focus of cholesterol-lowering therapy. Generally, your LDL cholesterol should be below 160, if you have no other risk factors for heart disease as noted in the table below.

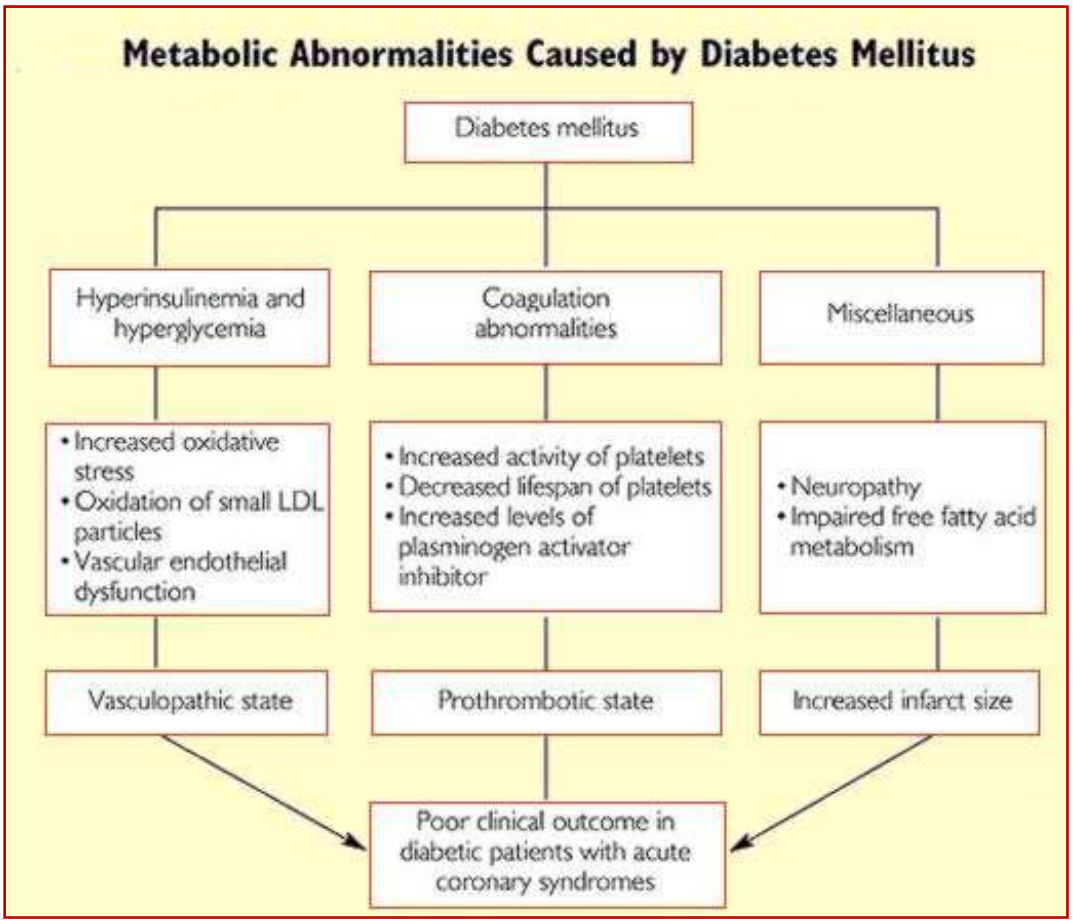
LDL Cholesterol Levels	What It Means
Less than 100	Optimal
100-129	Near optimal
130-159	Borderline high
160-189	High
190 and above	Very high

If you have heart disease or diabetes, or risk factors for heart disease, your nationally recommended LDL cholesterol number may differ as noted in the table below.

LDL Cholesterol Level	Risk Factors
Less than 100	Have heart disease or diabetes
Less than 130	Have 2 or more risk factors for heart disease
Less than 160	Have 1 or no risk factors for heart disease

Cardiologists or heart specialists are particularly concerned with the many ways in which diabetes mellitus increases your risk of heart disease and increases the difficulty of disease management. Diabetes causes CAD in several important ways, such as hyperinsulinemia (an excess of insulin due to increasing resistance of the body tissues), dyslipidemia (any of a number of imbalances of the lipids (i.e., fats and cholesterol) in the bloodstream), hyperglycemia (an increase in the level of sugar in the bloodstream above the normal level), and disorders of the coagulation system (see chart below). Due to the body's inability to effectively remove sugar from the bloodstream, increased levels of insulin are secreted, resulting in abnormal cholesterol levels, including increased levels of LDL and very-low-density lipoproteins (VLDL), as well as decreased levels of the more favorable HDL. In addition, diabetes increases the production of oxygen-free radicals by different cells which damages the lining of blood cells. In addition, coagulation or clotting abnormalities are caused by platelet hyperactivity and increased vasoreactivity (the tendency for an artery to be hypersensitive to substances, causing narrowing beyond the normal responsiveness). Platelet lifespan is also decreased by 50 percent, decreasing

responsiveness to anticoagulation by antiplatelet therapy. Therefore, if you have diabetes, be sure to ask your doctor about your increased heart disease risks.



The table below presents the American Diabetes Association guidelines for treatment of hyperlipidemia. In the recently published Third Report of the National Cholesterol Education Program, the presence of diabetes without CAD is considered a CAD equivalent and the recommended treatment goal is an LDL level not greater than 100 mg/dl.

ADA Guidelines for Treatment of Hyperlipidemia	Nonpharmacologic therapy [diet/weight reduction/exercise/ better glycemic control]		Drug therapy	
	Initiation level		Initiation level	
	LDL	Triglycerides	LDL	Triglycerides
Patients with vascular disease	>100 mg/dl	>150 mg/dl	>100 mg/dl	>200 mg/dl
Patients without vascular disease	>100 mg/dl	>200 mg/dl	>130 mg/dl	>400 mg/dl

Therapeutic Lifestyle Changes

Tobacco Cessation

In order for you to make a commitment to tobacco avoidance or cessation, it is important to understand the history of this public health tragedy. Tobacco use in the Americas dates back several thousand years, and it has been an important part of our nation's economic development and history. Tragically, as the rate of lung cancer in the general population was observed to increase by *almost 10* times as a result of smoking (according to studies performed by the U.S. Public Health Service and the American Medical Association between the 1920s and the 1950s), the effects of tobacco use upon the heart have only recently been documented.

We now know that tobacco use can damage and tighten blood vessels and greatly raises your risk of a heart attack, as well as the overall burden of heart disease as an illness. According to the CDC, each year, an estimated 443,000 people die prematurely from smoking or exposure to secondhand smoke, and another 8.6 million have a serious illness caused by smoking. Despite these risks, approximately 46 million U.S. adults smoke cigarettes. The harmful effects of smoking do not end with the smoker. More than 126 million nonsmoking Americans, including children and adults, are regularly exposed to secondhand smoke. Even brief exposure can be dangerous because nonsmokers inhale many of the same carcinogens and toxins in cigarette smoke as smokers. Coupled with this enormous health toll is the significant economic burden of tobacco use—more than $96 billion per year in medical expenditures and another $97 billion per year resulting from lost productivity.

According to the CDC, the risks associated with tobacco use are clear:

- **Tobacco users are two to four times more likely to develop coronary heart disease than nonsmokers.**
- **People who smoke are up to six times more likely to suffer a heart attack than nonsmokers.** The risk increases with the number of cigarettes smoked.
- **Secondhand smoke exposure increases the heart disease risk by 25 to 30 percent in nonsmoking adults.**

ALL FORMS OF TOBACCO ARE HARMFUL. Although individual tobacco users appear to be swayed in their selection by social trends such as the increased visibility of cigar use among actors and the historical affinity of professional baseball players for smokeless forms of tobacco, the World Health Organization (WHO) in 2007 published *The Scientific Basis of Tobacco Product Regulation* in which it is stated that "**Tobacco continues to be unregulated or underregulated in many WHO Member States, even though, when used as directed by the manufacturers, it remains the only legal consumer product that kills half of its regular users.**"

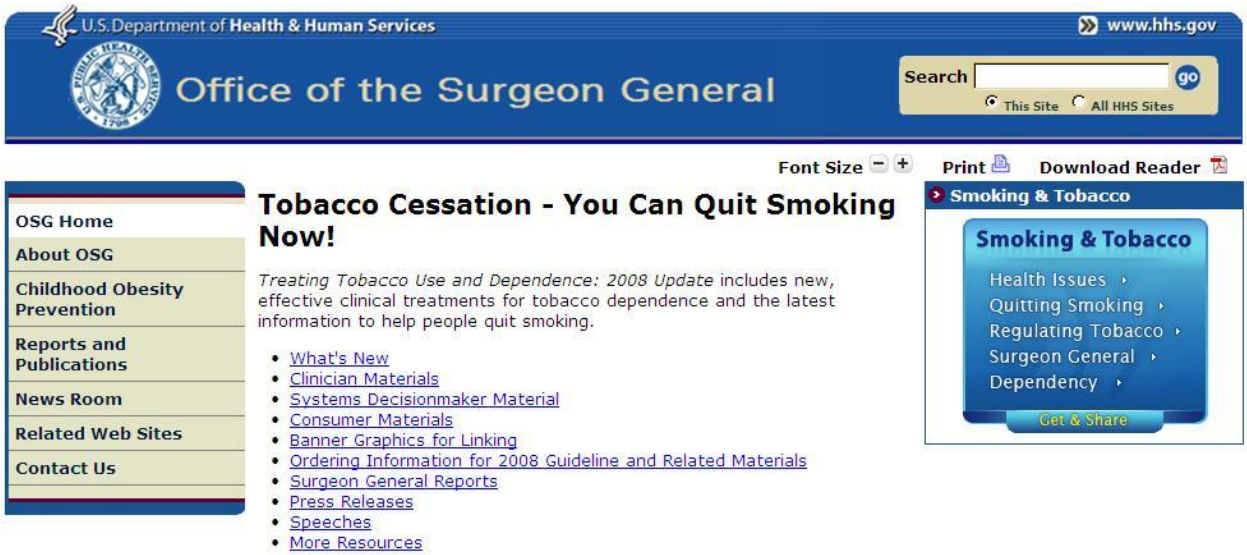
For years, many smokers have chosen "low-tar," "mild," "light," or "ultra-light" cigarettes because they think that these cigarettes are less harmful to their health than "regular" or "full-flavor" cigarettes. The truth is that light cigarettes do **not** reduce the health risks of smoking. The only way to reduce a smoker's risk, and the risk to others, is to stop smoking completely.

The U.S. Food and Drug Administration recently announced the ban of these terms after Congress, "… determined that prohibiting the use of 'light,' 'mild,' and 'low' and similar descriptors is necessary to protect the public health and important to ensure that tobacco product label, labeling, and advertising are truthful and not misleading."

Scientists have proven that tobacco products enter the human bloodstream and cause damage to the blood vessels, resulting in heart disease. The biomarkers, or blood tests, that are currently most useful in incentive-based programs to assist individuals in tobacco cessation include measures of cotinine in blood, saliva, urine, hair, and nails. Cotinine is the most widely used biomarker of exposure to nicotine from tobacco smoke from both active and passive smoking. Most importantly, doctors can actually demonstrate by blood testing that tobacco products **are** causing changes inside the body, changes that can cause heart disease and shorten your life.

According to the WHO, the increase in candy-flavored and exotic-flavored tobacco products is a major public health concern due to their potential to lead to use by young people and other susceptible individuals. Even chocolate and its derivatives are added to increase a tobacco user's development of dependence by contributing flavor and mouth sensations. Certain additives (menthol in manufactured cigarettes) are added specifically to reduce the tobacco's harshness and enable the smoker to take in even more dependence-causing and toxic substances. As a result, legislation under consideration in the U.S. at the Federal level would prohibit the use of candy flavors in tobacco products. Laws to ban candy-flavored cigarettes have already been proposed in a number of states within the U.S.

Treatment of individuals who have begun to use tobacco remains the highest priority of the Surgeon General and the U.S. Public Health Service. The Surgeon General, for example, has gathered together the latest information and recommendations to assist tobacco users and the medical community in the struggle for tobacco cessation. The Surgeon General also leads the efforts of the U.S. Public Health Service, which combats all causes of disease within our population, but particularly tobacco use.



The U.S. Public Health Service's 2008 update of Guideline *Treating Tobacco Use and Dependence* has raised the standard of care for tobacco users even further within the medical community. They concluded that tobacco use and dependence is a chronic disease, that many effective treatments exist, that standardized algorithms should be used, and that delivering such treatments is cost-effective. In summary, the treatment of tobacco use and dependence is the best and most cost-effective opportunity for clinicians to improve the lives of millions of Americans. If you are currently a tobacco user, ask your doctor about options to help you quit using tobacco and to start taking better care of your heart.

Heart Healthy Nutrition

Making lifestyle changes can often help prevent or treat CAD. In ancient times, Hippocrates said that "the function of protecting and developing health must rank even above that of restoring it when it is impaired." Today, we realize that heart healthy nutrition is fundamental to the prevention of heart disease and that the development of certain risk factors for heart disease (such as high blood pressure and diabetes mellitus) presents additional nutritional considerations. In some cases, changes in the way you eat may actually be the only treatment needed! Nevertheless, healthy eating is essential at every stage of human development and provides the foundation for wellness. Nutrition can not only prevent or treat CAD, it also directly affects your health, performance, psychological outlook, and the ability to keep up with everyday events.

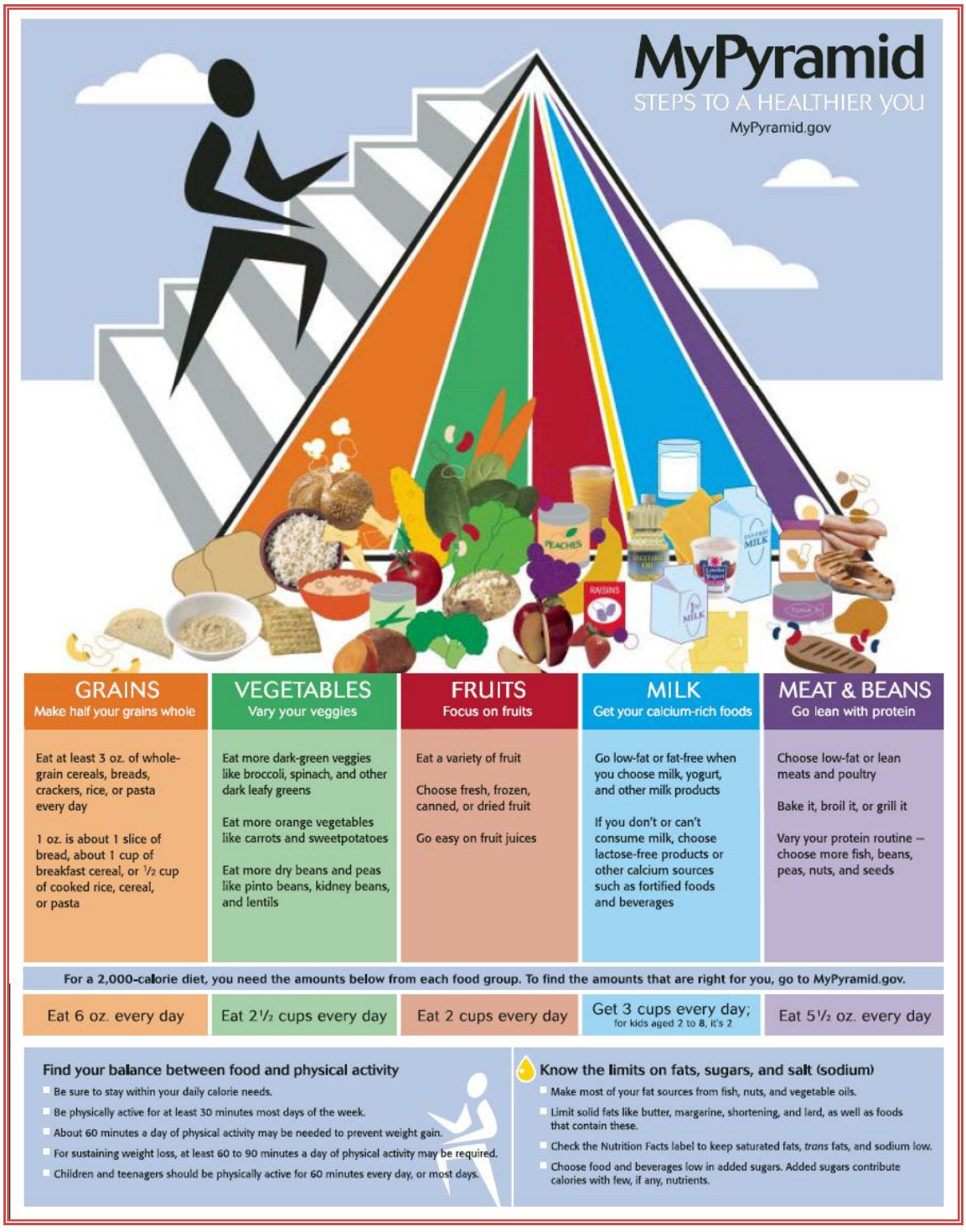
General Recommendations for Heart Healthy Nutrition:

1. Eat a variety of foods. (No one food can give you all you need for optimal health.)
2. Balance food intake with physical activity (energy in versus energy out).
3. Choose a diet with plenty of grain products, vegetables, and fruits.
4. Choose a diet low in fat (less than 30% of total calories).
5. Choose a diet moderate in sugar. (Natural sugars in fruits are good for energy; limit sugars from sweets and soft drinks.)
6. Choose a diet moderate in salt.
7. Drink alcoholic beverages only in moderation.
8. Eat lean meats, poultry, fish, beans, eggs, and nuts.

The present U.S. Department of Agriculture (USDA) Food Guide Pyramid (available at mypyramid.gov) is a change from past recommendations in several important ways relating to your heart and overall health. First, it recommends a more personalized approach to determining the quality as well as the quantity of food we eat. Second, it places great emphasis upon the balance between food and physical activity, the latter helping not only to "burn calories" and reduce body weight, but also significantly raising the level of "good" or HDL cholesterol. Make an effort to eat the recommended servings, and remember to stay within your calorie limit.

There are several additional changes to the general nutritional recommendations from the January 2005, *Dietary Guidelines for Americans.* For example, the recommendation on dietary fats makes a clear break from the past, when all fats were considered bad. The guidelines NOW emphasize that intake of trans fats should be as low as possible and that saturated fat should be limited. There is no longer an artificially low cap on fat intake. The latest advice even recognizes the potential health benefits of monounsaturated and polyunsaturated fats. Instead of emphasizing "complex carbohydrates," a term used in the past that has little biological meaning, the new guidelines urge you to limit sugar intake, and they stress the benefits of whole grains.

If you haven't talked to a doctor or nutritionist about your nutritional goals in a while, you might be surprised to discover that the guidelines have changed. Get current with proper heart healthy nutrition, and make the most of the food you eat.



In order for guidance such as the Food Guide Pyramid or other sources to be of real value, you must be able to interpret the nutritional content of the foods you purchase, prepare, and consume. The "Nutrition Facts" label that is required on most foods is one way to monitor your food intake. The Food and Drug Administration made this label format mandatory on most food

products in 1994. It is a quick way to get information about serving sizes, fat (including saturated fat), cholesterol, sodium, carbohydrates, and protein. By carefully reading nutrition labels, such as the example below, you can make sure you are eating a balanced diet and not getting any surprises! The label is the best way to help uncover the "hidden" fat in many products, because it tells you the total grams of fat and saturated fat, as well as milligrams of cholesterol, in each serving you eat.

Example of a Food Label

Nutrition Facts
Serving Size 1 oz (28g or 1/16 packet)
Servings Per Container 16

Amount Per Serving	
Calories 70 Calories from Fat 45	
	% Daily Value*
Total Fat 5g	8%
Saturated Fat 3g	15%
Cholesterol 15mg	5%

*Percent Daily Values are based on a 2,000 calorie diet.

First, note the serving size on the label. One serving of this 1 lb. package of cheese is actually 1 oz. – *just 1/16 of the entire package*. If you normally eat more than that amount, you are adding more fat and calories to your diet. Based on a 2,000-calorie-a-day diet, the label also identifies the amount of calories a food provides from fat, as well as the percentage of recommended daily fat intake that represents. For example, look at the label for part-skim mozzarella cheese. One serving (which is 1 oz. of a 1 lb. package) is 8 percent of the total fat allowed in a 2,000-calorie diet. If your calorie needs are lower, this percentage will be higher; if you need more than 2,000 calories, this percentage will be lower. Remember, each food does not have to contain less than 30 percent calories from fat. Instead, the combination of the foods you eat over the course of several days should average no more than 30 percent calories from fat. Lastly, "lower in fat" may not mean "low-fat" (containing 3 grams or less of fat per serving). Products labeled lower fat, reduced fat, 1/3 less fat, 50 percent less fat, light, or "lite" may only be reduced from the full-fat products and still contain quite a bit of fat. *Don't be misled!*

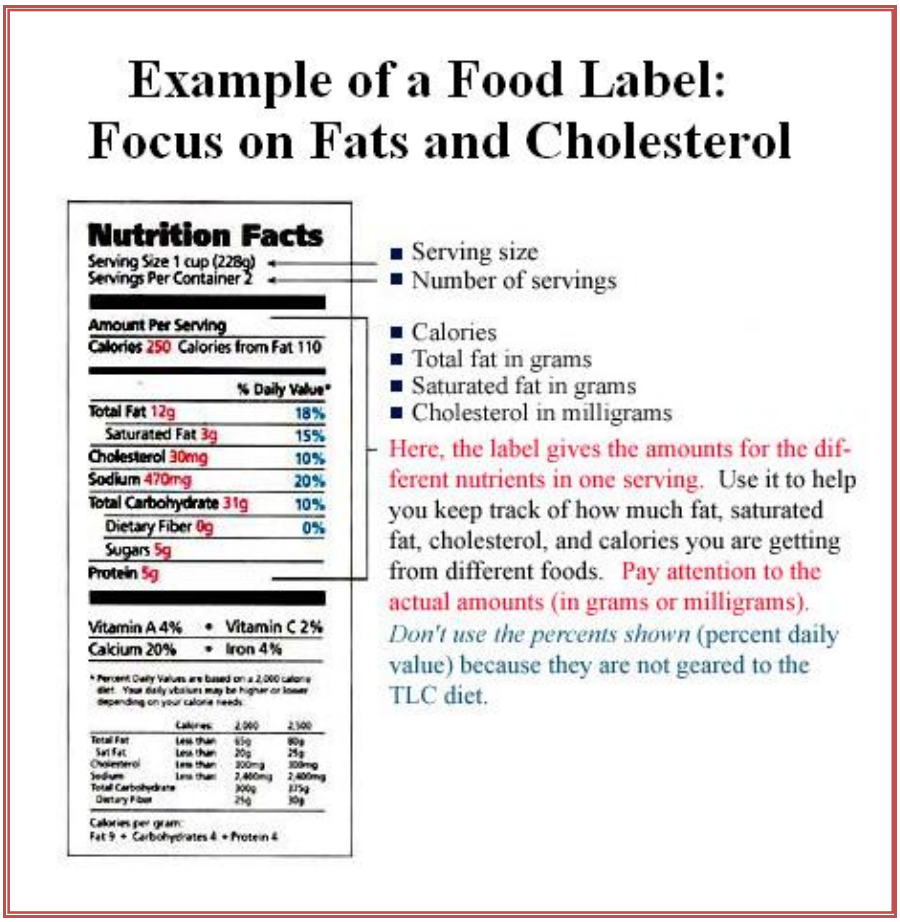
Caution: Dieting could be hazardous to your heart health. What are the potential hazards of a diet very low in carbohydrates and rich in fat, such as the Atkins Diet? According to the American Medical Association, the greatest danger is related to hyperlipidemia, which may be induced by such a regimen. Hypercholesterolemia and hypertriglyceridemia are associated with an increased risk of developing coronary heart disease. A diet rich in cholesterol and saturated fat could be responsible for accelerating artherosclerosis, particularly in susceptible persons. (American Medical Association Council on Foods and Nutrition, 2010)

http://www.atkinsexposed.org/atkins/75/American_Medical_Association.htm

The Therapeutic Lifestyle Changes (TLC) diet was introduced by the National Heart, Lung, and Blood Institute (NHLBI) in May 2001 and accepted by the American Heart Association for individuals needing to make dietary and lifestyle modifications due to high blood cholesterol and high blood pressure. The most significant contributing factor to elevated blood cholesterol levels is saturated fat. Saturated fat is found mainly in meat and dairy products, coconut oil, and palm oil. Again, understanding food labels is the first step to making specific changes in your dietary intake in general and with regard to specific concerns such as cholesterol. To reduce blood cholesterol levels, the American Medical Association recommends that you follow the NHLBI's

National Cholesterol Education Program's TLC diet. See the NHLBI's "Your Guide to Lowering Your Cholesterol with TLC" for more information:

(http://www.nhlbi.nih.gov/health/public/heart/chol/chol_tlc.pdf).



The general recommendations for a TLC diet that is low in saturated fat and cholesterol are as follows:

- Less than 7 percent of the day's total calories from saturated fat.
- 25-35 percent of the day's total calories from fat.
- Less than 200 milligrams of dietary cholesterol a day.
- Limit salt (sodium) intake to 2,400 milligrams a day.
- Just enough calories to achieve or maintain a healthy weight and reduce your blood cholesterol level.

Although the recommendations for dietary cholesterol and sodium are the same for everyone on the TLC diet, regardless of the number of calories they should eat, this is not the case for fats. You should eat less than 200 milligrams of cholesterol a day and no more than 2,400 milligrams of sodium a day. However, the recommendations for saturated fat and total fat are based on the percentage of calories you eat; the actual amount of fat that you eat will vary depending on how

many calories you eat. To get an estimate of the amount of calories, grams of saturated fat, and total fat that will help you lower your blood cholesterol on the TLC diet, please go to the NHLBI webpage for TLC diet and try their easy-to-use automated calculator for recommended levels of total and saturated fats (available at: http://www.nhlbi.nih.gov/cgi-bin/chd/step2intro.cgi).

Because the TLC diet may include changes to your current eating plan, your doctor may refer you to a registered dietitian who can help you make these changes, particularly if you are at increased risk of heart disease. A registered dietitian will teach you about the TLC diet, help you choose foods and plan menus, monitor your progress, encourage you to stay on the TLC diet, and help you to adjust your calorie level accordingly. If your blood cholesterol is not lowered enough on the TLC diet, your doctor may first intensify the TLC diet by increasing the amount of soluble fiber and/or adding cholesterol-lowering food products to your diet. If your LDL is still not lowered enough, your doctor may prescribe cholesterol-lowering medication along with the TLC diet.

Typical Quantities of Food in the TLC Diet

Lean Meat/Fish/alternatives	< 5 oz/day
Eggs	< 2 yolks/wk (whites unlimited)
Low Fat Dairy	2 - 3 servings/day (< 1% fat)
Fats/Oils	< 6 - 8 tsp/day
Grains especially whole grains	> 6 servings
Vegetables	3 - 5 servings/day
Fruits	2 - 4 servings/day

Sometimes it can seem difficult to know which foods we enjoy or regularly consume are either good or bad in terms of ensuring good overall nutrition while avoiding bad forms of fats and cholesterol. The following table includes examples from the three categories of carbohydrates, proteins, and fats to help you make the best choices for your heart health.

Choosing Foods for Heart Health

GOOD	BAD
CARBOHYDRATES	
Whole grain or enriched breads and rolls. Low-fat or homemade muffins, pancakes, waffles, and biscuits. Corn, soft flour tortillas made with unsaturated oils. Noodles, spaghetti, macaroni, brown rice (preferred), white rice, wild rice, unsalted crackers, pretzels, popcorn prepared with air popper or mono/polyunsaturated oil.	Butter or cheese rolls and breads. Commercial biscuits, muffins, pancakes, pastries, sweet rolls, donuts, croissants, popovers. Soft flour tortillas made with lard, shortening, hydrogenated fats, coconut, and palm oils. Canned or boxed noodle and macaroni dishes; canned spaghetti dishes. Salted crackers or snacks; fried snack foods; any snacks or crackers containing saturated fats, coconut or palm oils, hydrogenated or partially hydrogenated fats; cheese crackers or snacks; potato chips; corn chips; tortilla chips; chow mein noodles; commercial buttered popcorn.
PROTEINS	
Beef: round, sirloin, chuck, loin, super lean hamburger/ground beef.	Corned beef, regular pastrami, ribs, luncheon meats.
Lamb: leg, arm, loin.	Mutton: arm, leg, loin.
Pork: tenderloin, fresh leg, shoulder-arm.	Sausage, frankfurters.
Poultry: chicken and turkey with skin removed. Processed poultry products, such as turkey.	Processed poultry products, such as turkey franks, chicken franks, turkey bologna.
Eggs: Egg whites and low cholesterol egg substitutes.	Egg yolks, prepared foods containing egg yolks.
Seafood: Swordfish, mackerel, albacore tuna, salmon, walleye, pollack.	Caviar, roe, anchovy, shrimp, eel, oysters, squid.
Cheese: Mozzarella, ricotta, cottage cheese, special low-fat/low cholesterol cheeses, swiss.	Cream cheese; processed cheese and cheese spreads; all other cheeses.
Wild game: Elk, deer (venison), pheasant, rabbit, wild duck.	Domestic duck and goose.
Fruits and Vegetables: Fresh, frozen, or low-sodium canned; low-sodium tomato and vegetable juices. Fresh, unsweetened dried fruits; canned or frozen packed in water, own juice, or light syrup preferred; all fruit juices (unsweetened preferred).	Regular tomato sauce and puree; spaghetti sauce; creamed, breaded, or deep-fat fried vegetables; vegetables in sauces; regular tomato and vegetable juices. Canned or frozen packed in heavy syrup, sweetened dried fruits, coconut, fried fruit snack chips.
FATS	
Oils: Sunflower, safflower, corn, soybean, cottonseed, sesame oils, canola, olive, peanut oils.	Coconut, coconut oil, palm and palm kernel oil, hydrogenated fats, butter, lard, beef tallow, salt pork, bacon, bacon drippings, ham hock, animal fat,
Nuts & Seeds: Unsalted pumpkin seeds, sesame seeds, sunflower seeds, any nuts not on the avoid list.	shortening, suet, chocolate, cocoa butter. Cashews, macadamia, pistachio, brazil, salted seeds & nuts.

Whether it is type 1, type 2, or gestational diabetes mellitus, the nutritional goals are similar: to keep blood glucose as near as possible to that of a person without diabetes. Nutritionally, the three factors that impact blood glucose levels most significantly include:

1. The amount of carbohydrates you eat – especially at one sitting
2. The form of the carbohydrate – liquid or solid
3. Whether the carbohydrate is eaten alone or mixed with protein and fat.

As far as carbohydrates go, *your* nutritional plan should look like the following:

1. Contain only moderate amounts of carbohydrates.
2. Distribute carbohydrates evenly throughout the day.
3. Mix carbohydrates with proteins and fats together in meals and snacks
4. Contain only small or limited amounts of liquid carbohydrates.

Carbohydrate Budget Guidelines

	Weight Loss	Weight Maintenance	Added carbs for the physically active
Women	40-50 grams 3 times per day	50-60 grams 3 times per day	15-20 grams Added between meals
Men	50-60 grams 3 times per day	60-70 grams 3 times per day	15-20 grams Added between meals

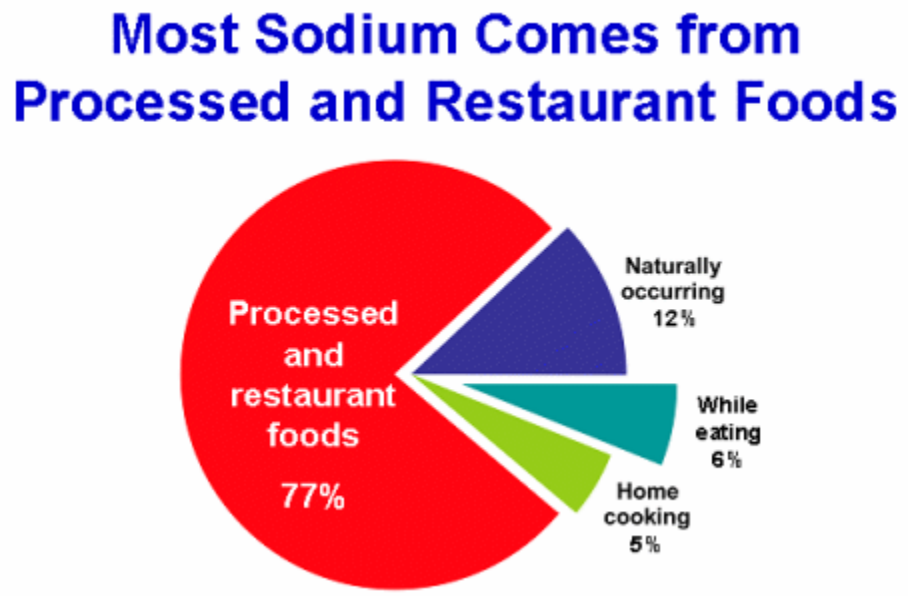
What does a serving of carbs look like? Every serving listed below is equal to approximately 15 grams of carbohydrates.

Bread (any variety)	1 slice
Hamburger/Hot dog buns	1/2 (1 oz.)
English muffin	1/2
Flour, dry	3 Tbsp
Oats	1/2 cup
Pasta	1/2 cup
Rice, white or brown	1/3 cup
Corn	1/2 cup
Mixed veggies with corn, peas, or pasta	1 cup
Potato, baked	1 (3 oz.)
Beans	1/2 cup
Apple	1/2 large or 4 oz.
Strawberries	1 cup
Apple juice	1/2 cup
Orange juice	1/2 cup
Milk	1 cup
All vegetables	1 1/2 cup

What you choose to eat also affects your chances of developing high blood pressure, also known as hypertension. Recent studies show that blood pressure can be lowered by following the Dietary Approaches to Stop Hypertension (DASH) eating plan – and by eating less salt. The general principles of the DASH eating plan are as follows:

Total Fat	27% of calories	Sodium	2,300 mg.
Saturated Fat	6% of calories	Potassium	4,700 mg.
Protein	18% of calories	Calcium	1,250 mg.
Carbohydrate	55% of calories	Magnesium	500 mg.
Cholesterol	150 mg.	Fiber	30 grams

Salt or sodium is included by many food manufacturers or preparers before it arrives at the table, such that *the average American consumes two to four times the amount of sodium required by his or her body!*



A new CDC report shows that 2 out of 3 (69%) adults in the United States fall into these three groups who are at especially high risk for health problems from consuming too much sodium. Thus, if you are in the following population groups, you should consume no more than 1,500 mg of sodium per day (approximately 2/3 teaspoon), and meet the potassium recommendation (4,700 mg/day) with food.

- You are 40 years of age or older.
- You are African American.
- You have high blood pressure.

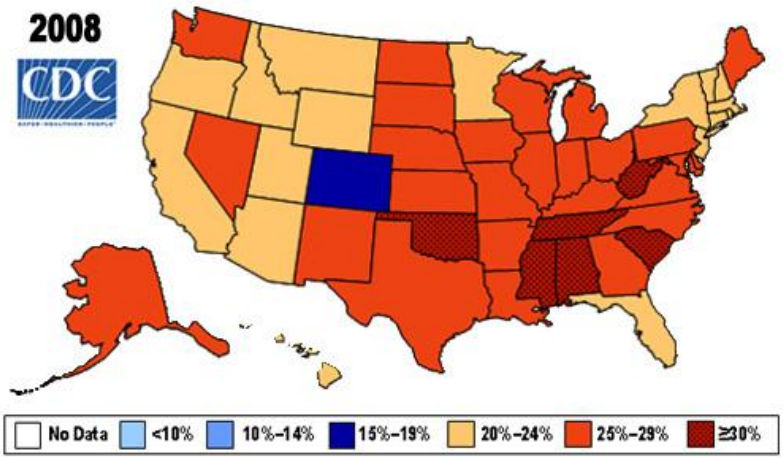
It is therefore extremely important for you to recognize the sources of sodium in your diet. See the NHLBI's "Your Guide to Lowering Your Blood Pressure With DASH" for more information (http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf).

Tips to Reduce Dietary Sodium

1. Choose low or reduced sodium, or no salt added, versions of foods and condiments when available.
2. Choose fresh, frozen, or canned (low sodium or no salt added) vegetables.
3. Use fresh poultry, fish, and lean meat, rather than canned, smoked, or processed types.
4. Choose ready-to-eat breakfast cereals that are lower in sodium.
5. Limit cured foods (such as bacon and ham); foods packed in brine (such as pickles, pickled vegetables, olives, and sauerkraut); and condiments (such as mustard, horseradish, ketchup, and barbecue sauce).
6. Cook rice, pasta, and hot cereals without salt. Cut back on instant or flavored rice, pasta, and cereal mixes, which usually have added salt.
7. Choose convenience foods that are lower in sodium. Cut back on frozen dinners and mixed dishes such as pizza, packaged mixes, canned soups or broths, and salad dressings—these often have a lot of sodium.
8. Rinse canned foods, such as tuna and canned beans, to remove some of the sodium.
9. Use spices instead of salt in cooking and at the table; flavor foods with herbs, spices, lemon, lime, vinegar, or salt-free seasoning blends.

Body weight and excess (i.e., obesity) is generally the result of excess intake of foods from any or all of the food groups so that the total calories taken in exceeds those consumed by the normal metabolic rate or by those metabolic demands created by physical activity. According to the CDC, during the past 20 years there has been a dramatic increase in obesity in the United States. In 2008, only one state (Colorado) had a prevalence of obesity less than 20 percent. Thirty-two states had a prevalence equal to or greater than 25 percent; six of these states (Alabama, Mississippi, Oklahoma, South Carolina, Tennessee, and West Virginia) had a prevalence of obesity equal to or greater than 30 percent. The following map shows this distribution.

Percent of Obese (BMI ≥ 30) in U.S. Adults



Naturally, when it comes to eliminating excess weight or managing obesity, it is all about reducing the number of food calories taken in. There are a number of resources that can provide us with the necessary calculations to determine how much we should be eating and what, based on how active we are. However, this newly acquired knowledge might not be enough, especially if we are unaware of why we eat and what keeps driving us to eat more.

The following table (from the National Institutes of Health) provides a list of "triggers" to increased food intake, the effects they have upon our food intake, and the approaches we can take to prevent or reduce their harmful effects. It is important to note that many of the triggers relate to our cultural and social interactions, so the more we share this information with our families and friends, the better prepared we are to take on the challenge of weight loss as a community.

Triggers of Increased Food Intake

Eating Trigger	Effect	Approach
Culture	Studies suggest we are what we eat. Food and nutrition is intertwined with our cultural identity, especially mainstream foods with commercial appeal. Often we feel obligated to eat these particular types of foods and eat excessively. Example: Italian/Pasta.	Many commercialized "traditional" foods are rich in calories and loaded in fat and/or sugar. Be creative and go untraditional with your choices. Separate personal and cultural identity from food.
Social	As a society, we gather to eat. Studies suggest when individuals gather socially around food, they will over eat.	Design gatherings around nonfood-based events. If unavoidable, eat before attending and watch your snacks.
Hunger	All animals eat when hungry; however, most stop when full. The physiological need to eat is quickly satiated when food is consumed.	Listen to your body. Eat slowly to allow your stomach to catch up with your brain.
Chemical	Certain foods initiate hunger. Foods such as sugar, sweeteners, and caffeinated beverages can falsely send signals of hunger.	Avoid diets rich in simple sugars, sweeteners, and caffeine.
Memory	Recent research illustrates the emotional component of food and the desire to overeat to stimulate an emotional response. A food can remind an individual of a happier time, a lost one, or the feeling of companionship.	The best thing is to recognize the fact that what you are feeling is temporary and that what you will be left with are unwanted pounds. The best way to deal with unresolved emotional feelings is to talk with someone.

For a heart healthy eating plan for weight loss, go to the NHLBI's Aim for a Healthy Weight website (at http://www.nhlbi.nih.gov/health/public/heart/obesity/lose_wt/). This site provides practical tips on healthy eating, physical activity, and controlling your weight. If you are

overweight or obese, carrying this extra weight puts you at risk for developing many diseases, especially heart disease, stroke, diabetes, and cancer. Losing this weight helps to prevent and control these diseases. The NHLBI guidelines provide you with a new approach for the measurement of overweight and obesity and a set of steps for safe and effective weight loss.

According to the NHLBI guidelines, assessment of being overweight involves using three key measures:

- **Body mass index (BMI)**
- **Waist circumference**
- **Risk factors for diseases and conditions associated with obesity.**

Although the consideration and assessment of all three key measures is beyond the scope of this heart health document, you should give particular consideration to the BMI, which is a measure of your weight relative to your height. BMI is a reliable indicator of total body fat, which is related to the risk of disease and death. The score is valid for both men and women, but it does have some limits. The **limits** include:

- It may **overestimate** body fat in athletes and others who have a muscular build.
- It may **underestimate** body fat in older persons and others who have lost muscle mass.

Use the BMI calculator (available at http://www.nhlbisupport.com/bmi/) or tables to estimate your total body fat. The BMI score means the following:

	BMI
Underweight	Below 18.5
Normal	18.5 - 24.9
Overweight	25.0 - 29.9
Obesity	30.0 and Above

If you are considered obese (BMI greater than or equal to 30) or are overweight (BMI of 25 to 29.9) and have two or more risk factors, the guidelines recommend weight loss. If you are overweight or obese, you have a greater chance of developing high blood pressure, high blood cholesterol or other lipid disorders, type 2 diabetes, heart disease, stroke, and certain cancers. Even a small weight loss (just 10 percent of your current weight) will help to lower your risk of developing those diseases. However, patients who are overweight, do not have a high waist measurement, and have less than 2 risk factors may need to prevent further weight gain rather than lose weight.

Heart Healthy Exercise

Regular physical activity can lower many CAD risk factors, including LDL ("bad") cholesterol, high blood pressure, diabetes, and obesity. Exercise of nearly any muscle group and for nearly any period of time helps your heart and body get into shape. Most importantly, certain exercises

performed regularly can help you prevent or manage heart disease. Benefits of being physically fit include:

- The heart pumps blood and oxygen to the body with less effort
- Lowers blood pressure
- HDL (good cholesterol) increases and LDL (bad cholesterol) and triglycerides decrease
- Body fat is lost
- Helps with feeling less anxiety or feeling depressed
- Helps lower blood sugar, decreases clotting risks, and decreases adrenaline.

To achieve and maintain physical and cardiovascular fitness, it is important that you follow a balanced fitness program. Such a program includes the following:

- If you have an existing medical condition, or are just starting an exercise program, **be sure to consult your physician prior to beginning the program** to make sure the exercise program is designed with your health and wellness in mind.

- Choose an activity that you will enjoy. You are more likely to continue exercising if you are doing something that you like.

- In the beginning, follow a program that includes moderate, not vigorous, physical activity. Start off with 30 minutes a day, and allow for some variety in your fitness routine – not only in the fitness activity that you choose, but in the time and setting. This helps to eliminate boredom with any one activity or location.

- Be sure to start off any work-out/exercise session with proper warm-up and stretching exercises. This will help to avoid post-exercise soreness or injury.

- Wear the proper attire when exercising, including shoes with the proper support for the activity. Also, be sure to dress appropriately for the weather.

- Just as warming-up and stretching is important as you begin each exercise session, so is a cool-down period at the end of your exercise activity. This should include at least several minutes of stretching or walking.

Although exercise is generally beneficial, in some cases, there is an increased risk of aggravating a pre-existing heart disease condition. Those who are unaware of their condition(s) and without the benefit of medical management may experience worsening of their pre-existing heart disease if they undertake too aggressive an exercise program without the benefit of a medical assessment. Symptoms may range from feeling discomfort only after vigorous exercise, to the relatively rare suffering of a heart attack or experiencing significant trouble breathing and weakness after walking across a room. The following is the commonly used Physical Activity

Readiness Questionnaire, which can assist you in determining whether or not a medical assessment is appropriate prior to the start of your exercise program.

Physical Activity Readiness Questionnaire (PAR-Q) and You

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly:

YES	NO		
☐	☐	1.	Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
☐	☐	2.	Do you feel pain in your chest when you do physical activity?
☐	☐	3.	In the past month, have you had chest pain when you were not doing physical activity?
☐	☐	4.	Do you lose your balance because of dizziness or do you ever lose consciousness?
☐	☐	5.	Do you have a bone or joint problem that could be made worse by a change in your physical activity?
☐	☐	6.	Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
☐	☐	7.	Do you know of any other reason why you should not do physical activity?

If you answered:

YES to one or more questions

Talk to your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want – as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- Start becoming much more physically active – begin slowly and build up gradually. This is the safest and easiest way to go.
- Take part in a fitness appraisal – this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively.

Delay becoming much more active:

- If you are not feeling well because of a temporary illness such as a cold or a fever – wait until you feel better; or
- If you are or may be pregnant – talk to your doctor before you start becoming more active.

Please note: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed use of the PAR-Q: Reprinted from ACSM's Health/Fitness Facility Standards and Guidelines, 1997 by American College of Sports Medicine

A heart healthy exercise program generally improves heart health through exercises that will increase cardiovascular endurance. This means that aerobic activities, such as those provided in the following table, are best. 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 the activity all at once or break it up into shorter periods of at least 10 minutes each.

Cardiovascular Endurance Exercises: Levels and Examples

Active Living	Health Moderate activity		Fitness Aerobic Range		Performance High Intensity
Age	Level 1 (<50%)	Level 2 50-60%)	Level 3 (60-70%)	Level 4 (70-80%)	Level 5 (80-85%)	Level 6 (85%)
20	< 100	100 – 120	120 – 140	140 – 160	160 – 170	170 <
25	< 98	98 – 117	117 – 137	137 – 156	156 – 166	166 <
30	< 95	95 – 114	114 – 133	133 – 152	152 – 162	162 <
35	< 93	93 – 111	111 – 130	130 – 148	148 – 157	157 <
40	< 90	90 – 108	108 – 126	126 – 144	144 – 153	153 <
45	< 88	88 – 105	105 – 123	123 – 140	140 – 149	149 <
50	< 85	85 – 102	102 – 119	119 – 136	136 – 145	145 <
55	< 83	83 – 99	99 – 116	116 – 132	132 – 140	140 <
60	< 80	80 – 96	96 – 112	112 – 128	128 – 136	136 <
65	< 78	78 – 93	93 – 109	109 – 124	124 – 132	132 <
70	< 75	75 – 90	90 – 105	105 - 120	120 – 128	128 <

Choosing an Aerobic Activity

	Dance	Bicycle (I)	Bicycle (O)	Cross Country (I)	Cross Country (O)	Jog/Run	Row (I)	In-Line Skate	Jump Rope	Stair Machine	Swimming	Treadmill (Walk/Run)	Walking (O)	Water Exercises
Easy to learn		•	•		•	•	•		•	•	•	•	•	•
Good beginner activity		•	•		•		•				•	•	•	•
I'm out of shape	•	•	•	•	•		•	•			•	•	•	•
I'm in great shape	•	•	•	•	•	•	•	•	•	•	•	•		
I'm overweight		•	•	•	•		•	•			•	•	•	•
I'm older		•	•		•		•				•	•	•	•
Low injury rate		•		•	•		•			•	•	•	•	•
Burns many calories	•	•	•	•	•	•	•	•	•	•		•		
Bone building	•					•			•			•	•	
Outdoors			•		•	•		•	•		•		•	•
Indoors	•	•		•			•	•	•	•	•	•	•	•
Group activity	•		•		•	•		•					•	•
Solo activity	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Inexpensive	•					•			•		•		•	•
Equipment/facility required		•	•	•	•		•	•		•	•	•		•
I'm busy	•	•	•		•	•	•	•	•				•	
Can do anywhere	•	•	•		•	•	•	•	•				•	
Time efficient				•		•	•		•	•		•		
Hate to sweat											•			•
I need variety	•		•		•			•						•
I'm competitive	•		•		•	•					•			
Develops muscular endurance	•			•	•		•		•		•			•
Develops flexibility	•			•	•		•				•			•

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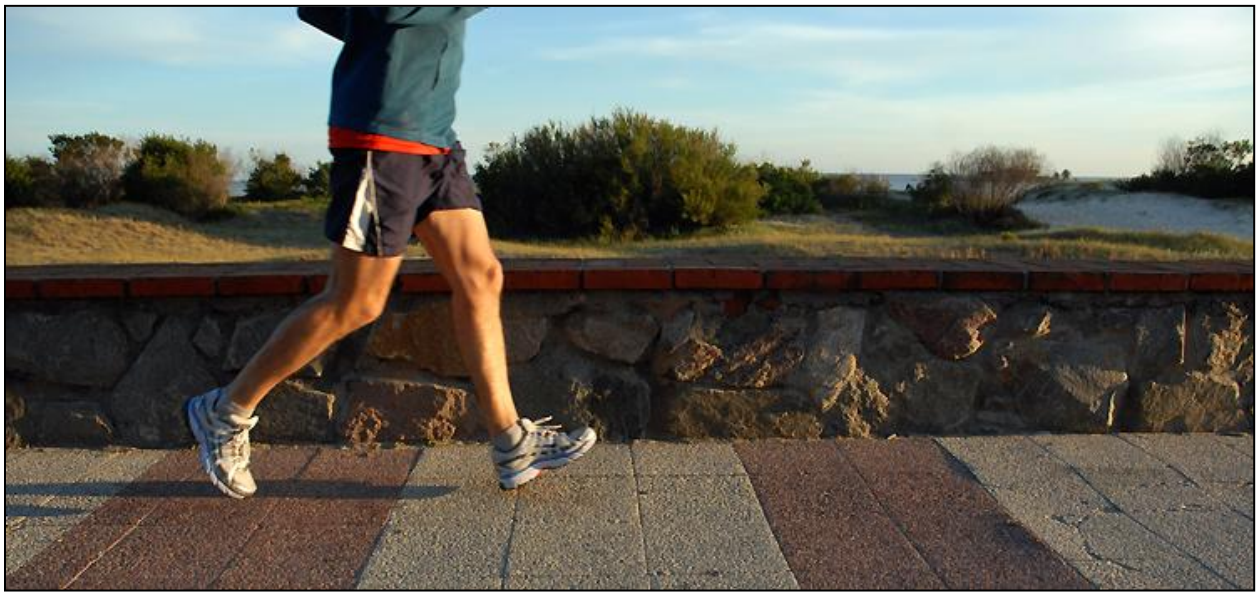
Getting started in a heart healthy exercise program is easy – even low-to-moderate intensity activities for as little as 30 minutes a day can improve your heart health. For an informal heart healthy exercise program, activities may include:

- pleasure walking
- climbing stairs
- gardening
- yard work
- moderate-to-heavy housework
- dancing
- home exercise.

For a more formal heart health exercise program, more vigorous aerobic activities, done three or four times a week for 30 to 60 minutes, are best for improving the fitness of your heart and lungs. Regular, aerobic physical activity increases your capacity for exercise and plays a more significant role in prevention of cardiovascular diseases. Aerobic exercise may also help to lower your blood pressure. Aerobic exercises include:

- brisk walking
- running
- swimming
- cycling
- roller skating
- jumping rope.



Your exercise can be done all at one time, or intermittently over the day. Initial activities may be walking or swimming at a slow pace. You can start out by walking 30 minutes for three days a week and build to 45 minutes of more intense walking, at least five days a week. All adults

should set a long-term goal to accumulate at least 30 minutes or more of moderate-intensity physical activity daily. Walking is particularly attractive because of its safety and accessibility. Also, try to increase "every day" activity, such as taking the stairs instead of the elevator. With time, you may be able to engage in more strenuous activities! Competitive sports, such as tennis and volleyball, can provide an enjoyable form of exercise for many, but care must be taken to avoid injury.

A "prescription" from an exercise professional for a heart healthy aerobic, or cardiovascular, exercise program will depend upon the following factors:

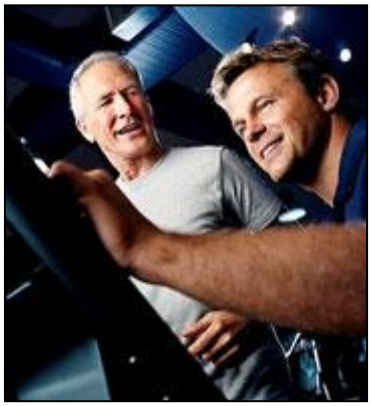
1. **Fitness level**
   - e.g., poor, fair, average, good, excellent
   - begin at a lower intensity with lower cardio fitness and higher intensities with greater cardio fitness
   - see cardiovascular fitness tests.
2. **Fitness goal(s)**
   - health
   - fat loss
   - cardiovascular performance
   - sports performance.
3. **Time constraints**
   - time of day
   - time per day
   - days available.
4. **Exercise preferences**
5. **Equipment availability**
6. **Orthopedic limitations or concerns.**

The American College of Sports Medicine (ACSM) recommends that the duration or length of time of your activity should be between 20 to 60 continuous minutes of aerobic activity. Your time constraints must certainly be considered. Depending upon your fitness goals, exercise sessions may be of moderate duration (20 to 30 minutes) excluding time spent warming up and cooling down. Initial programs may last 12 to 15 minutes and progress toward 20 minutes. People who are out of shape may need to perform several sessions of short duration (~10 minutes). Duration should increase as adaptation to training occurs without evidence of undue fatigue or injury (ACSM 1995).

The frequency of activity or how often you exercise is part of an exercise prescription. The ACSM recommends aerobic activity to be performed 3 to 5 session times a week. It is recommended that individuals beginning an exercise program should perform aerobic exercise 3 days per week on non-consecutive days. Individuals just beginning weight-bearing exercise (e.g., jogging, aerobic dance) may be advised to wait 48 hours between bouts to prevent overuse injuries and may also need to focus on low- or no-impact alternatives such as exercise bicycles.

If exercising on consecutive days, alternating between two modes of exercise (e.g., walking one day, cycling the next day) can be suggested, particularly for those who are overweight or those who have had certain orthopedic injuries in the past.

The volume or total amount of work you perform in a given training phase is also part of an exercise prescription. It includes the duration of the activity, the distance, and the number of times a bout was performed within a training period (e.g., 20 miles per week). Importantly, this can also consist of several different types of exercises in combination. *The type of exercises you choose should be personally enjoyable.* The risk of injury from high-impact activities must be weighed when choosing exercise modalities, particularly for novice or overweight individuals. A variety of different exercises may be helpful to reduce repetitive orthopedic stresses (ACSM 1995).



The mode or type of activity is an additional, important consideration. Activities that use your large muscle groups over longer periods of time offer the greatest improvement in VO2max, the commonly used measure of how much oxygen your body can use per kilogram of body weight. These activities are rhythmic and aerobic in nature (e.g., walking, running, hiking, stair climbing, swimming, cycling, rowing, dancing, skating, cross country skiing, rope jumping). Your skill and enjoyment of an activity are factors that will help you stick with your program and achieve your goals for heart health (ACSM 1995).

The progression of exercise should be discussed with your exercise professional. For the beginner, activity level can begin at a very light rate and would include an increase in standing activities, special chores like room painting, pushing a wheelchair, yard work, ironing, cooking, and playing a musical instrument. The next level would be light activity such as slow walking of 24 minute/mile, garage work, carpentry, house cleaning, child care, golf, sailing, and recreational table tennis. The next level would be moderate activity such as walking 15 minute/mile, weeding and hoeing a garden, carrying a load, cycling, skiing, tennis, and dancing. High activity would include walking 10 minute/mile or walking with a load uphill, tree felling, heavy manual digging, basketball, climbing, or soccer/kick ball.

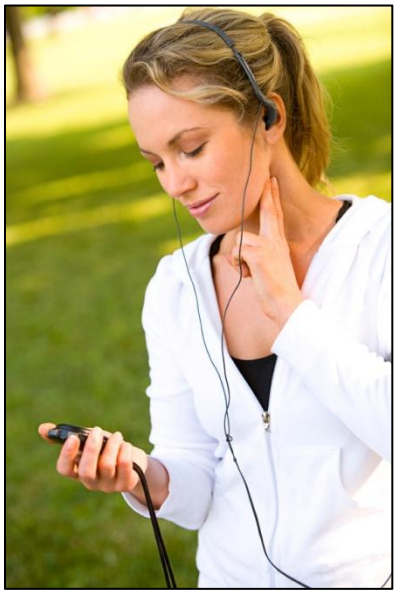
Monitoring your health status during a heart health exercise program is extremely important! You can measure how hard your heart is working by taking your heart rate (counting your pulse). Everyone has a peak heart rate and a target heart rate. Your peak heart rate is how fast your heart can beat during an exercise test. You will not be exercising at this rate. Your target heart rate is 65-75 percent of your peak heart rate. To get the best cardiovascular results with minimal risk of injury, you will need to exercise at your target heart rate for 30-45 minutes, four to five times a week.

A simple (but not exact) way of finding your target heart rate is to multiply your age times 0.7 and then subtract that product from 208—65-75 percent of that number is your target heart rate.

This method does not work if you are taking medicine that slows down your heart rate. A range of example target heart rates is shown in the table below.

AGE	30	35	40	45	50	55	60	65	70	75	80
Target Heart Rate (75 %)	145	143	142	140	138	136	135	133	132	130	125

You can count the rate of your heartbeat by feeling certain places on your body where arteries are close to the skin. One place that you can feel your pulse is on the wrist. Hold your arm with your palm up facing you. Bend your hand slightly away from you. Place your index and middle fingers of your other hand on the thumb side of your wrist, about an inch from the center of the wrist. Apply gentle but firm pressure for the pulsation. It may take practice to take your pulse. Sometimes it is easier on the opposite wrist.



Another place is the carotid artery in the neck. To do this, place two or three fingers on your windpipe and move them 2-3 inches to the left or the right. Feel for the pulse point low on your neck. **DO NOT press hard, and DO NOT press on both sides of the neck at the same time.** You can interrupt blood supply to the brain by applying pressure on both sides at the same time, too high, or too hard on the carotid artery. Count the beats for 6 seconds; then add a zero to that number.

Know your resting heart rate (pulse taken during inactivity). Each morning, take your pulse for one full minute - this way you can pick up any irregular or skipped beats. The ideal resting heart rate is between 60-90 beats a minute.

Take your pulse before starting your exercise. Count your pulse for 6 seconds and add a zero to that number. Example, if you count 8 beats in 6 seconds, your heart rate would be 80. You can also count your pulse for 15 seconds and multiply the number times 4. **First,** exercise as prescribed. **Second,** count your pulse immediately following exercise. **Third,** your heart rate should reach your target heart rate, or 10 to 30 beats higher than your resting heart rate.

Example:

If your resting heart rate is 70, with exercise it should go to 80-100. If your heart rate does not go up at least 10 beats higher (80), you need to exercise more to increase your heart rate.

If your resting heart rate is 70, with exercise it goes over 100, you are exercising too hard and would need to decrease the level of exercise.

If your resting heart rate is 70 and goes up to 95 with exercise, then returns to 70-80 after 3-5 minutes rest, you are doing well and should continue at this pace. If your heart rate does not

return to within 10 beats of your resting heart rate in 3-5 minutes following exercise, you need to decrease the exercise and gradually increase your activity level.

If your actual heart rate never matches your target heart rate, you may need to talk to your doctor or exercise counselor.

At first, you may want to check your pulse several times during exercise to be sure that you are still within your target range. Unless you are being monitored, your heart rate should not go over 10 percent of your target heart rate.

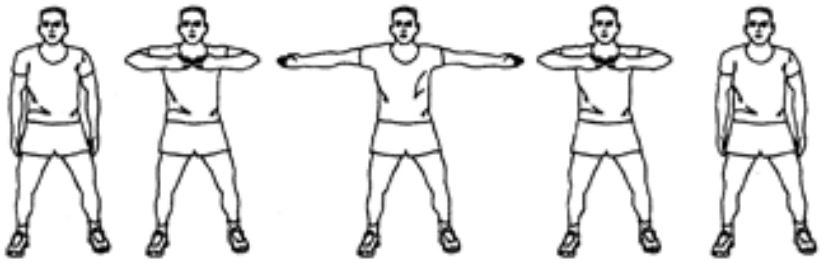
Warm-up and cool-down exercises are an important part of a heart healthy exercise program. Consider the following maneuvers:

1. **Head Tilt (side to side)**
2. **Arms**
3. **Bends (hold 10 seconds)**
4. **Shoulder Shrugs**
5. **Calf Stretch (hold 10 seconds)**
6. **Reach**
7. **Side Reach (wide stance - reach arm across body).**

Remember, these exercises are extremely important to the success (or failure) of your heart healthy exercise program. They are demonstrated on the following page, which you can print out and post in your favorite exercise area! Due to the time required for your body to redistribute blood between your parasympathetic (resting) and sympathetic (exercising) circulatory systems, and the need for the body to cool down after exercise, it can take up to 30 minutes for a full recovery!

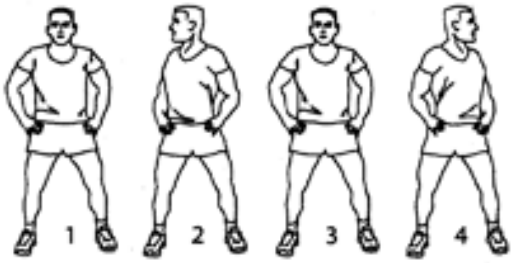
Warm-up / Cool-down Exercises

1. Head Tilt (side to side)



2. Arms

3. Side Bends



4. Twist

5. Calf Stretch
(hold 10 seconds)

6. Quadriceps
(hold 10 seconds)

7. Shoulder Shrugs

8. Reach

9. Side Reach
(wide stance - reach arm across body)

For More Information…

For specific questions or concerns regarding heart health resources within the U.S. Department of Energy (DOE), please contact the following individuals:

- **DOE Occupational Medicine:**
  - Michael Ardaiz, MD, MPH, CPH, Chief Medical Officer
    Email: michael.ardaiz@hq.doe.gov
    Phone: (202)360-3650
  - Claudia Beach, RN, BA, COHN-S
    Email: claudia.beach@hq.doe.gov
    Phone: (301)903-9826

- **Idaho National Laboratory:**
  - Bradley Snedden, DSM, MPH, CSCS, Division of Occupational Medicine
    Email: Bradley.Snedden@inl.gov
    Phone: (866)495-7440

- **DOE Office of Corporate Safety Analysis:**
  - William Roege, Director
    Email: william.roege@hq.doe.gov
    Phone: (301)903-0502
  - Charles Lewis, Deputy Director
    Email: charles.lewis@hq.doe.gov
    Phone: (301)903-1250

- **DOE Office of Injury and Illness Prevention Programs:**
  - Gerald Petersen, PhD, Director, Office of Health Studies
    Email: gerald.petersen@hq.doe.gov
    Phone: (301)903-2340
  - Clifton Strader, PhD, IISP Program Manager
    Email: cliff.strader@hq.doe.gov
    Phone: (301)903-5799

- **DOE Employee Assistance Program:**
  - Maritza Skelton, Program Manager, Contractor Employee Assistance Programs
    Email: Maritza.skelton@hq.doe.gov
    Phone: (301)903-7776
  - Evelyn Joy, Employee Assistance Program Specialist, Office of Human Resource Services (Federal employees)
    Email: evelyn.joy@hq.doe.gov
    Phone: (202)586-8420

Additional sources of support for heart health include the following DOE-sponsored programs and materials:

- **The Office of Health, Safety and Security's Heart Disease Prevention webpage** provides web-based resources to inform DOE workers of the hazard of CHD, as well as opportunities to eliminate or reduce those risk factors:
  http://www.hss.doe.gov/HealthSafety/occmed/heartdiseaseprevention.html

- **Guidance for DOE employers regarding the reporting of potentially work-related MI's** assists health and safety professionals to recognize the potential existence of causes or contributors to CHD in the workplace:
  http://www.hss.energy.gov/CSA/csp/safety_bulletins/sb-2008-03.pdf

- **The Office of Health, Safety and Security's (HSS) *Injury and Illness Surveillance Program (IISP)***, as noted above, which provides vital data to support the implementation of workplace interventions against risk factors leading to CHD:
  http://www.orau.gov/iisp/

- **Guidance for DOE employers supporting the use of automated external defibrillators (AED):**
  http://www.hss.energy.gov/CSA/csp/safety_bulletins/safety_bulletin_2007-07.pdf

DOE acknowledges that the following resources were used in the creation of this report, and they will provide valuable information in your efforts to prevent heart disease:

- **U.S. Department of Health and Human Services (DHHS)**:

  A. Office of the Surgeon General
  http://www.surgeongeneral.gov/index.html
  Phone: (202) 205-0143

  B. Centers for Disease Control and Prevention
  www.cdc.gov/heartdisease/
  Phone: 1–800–CDC–INFO (1–800–232–4636)

  C. National Institute for Occupational Safety and Health (NIOSH)
  Cancer, Reproductive, and Cardiovascular Disease
  http://198.246.98.21/niosh/programs/crcd/
  Phone: 1-800-CDC-INFO (1-800-232-4636)

- **National Institutes of Health (NIH)**

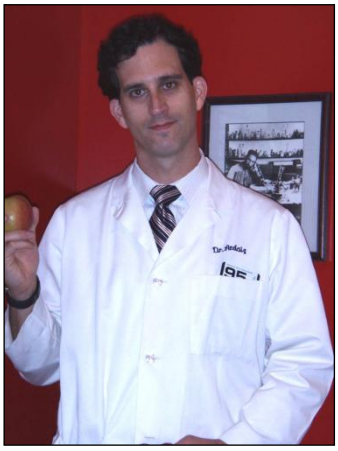
  A. National Heart, Lung, and Blood Institute
  http://www.nhlbi.nih.gov/health/public/heart/index.htm
  Phone: (301) 592 8573

B. National Cholesterol Education Program
http://www.nhlbi.nih.gov/about/ncep/
Phone: (301) 592 8573

C. National Institute on Aging
http://www.nia.nih.gov/
Phone: (301) 496-1752

D. National Cancer Institute
http://www.smokefree.gov
Smoking Quitline 1–877–44U–QUIT (1–877–448–7848)

Acknowledgements



Michael Ardaiz, MD, MPH, CPH

Michael is the Chief Medical Officer for the U.S. Department of Energy where he resides within the Office of Health, Safety and Security. Dr. Ardaiz holds advanced degrees in medicine and public health and is certified by the National Board of Preventive Medicine in the specialty of Occupational & Environmental Medicine. Before coming to DOE, Dr. Ardaiz was a member of the faculty of the Georgetown University Medical Center after which he trained in Occupational Medicine at the George Washington and Johns Hopkins Universities.

Brad Snedden, DSM, MPH, CSCS

Brad is the Disease & Injury Prevention Coordinator for the Division of Occupational Medicine at the Idaho National Laboratory (INL). Dr. Snedden holds advanced degrees in community health, athletic administration, sport management, and is certified by the National Strength and Conditioning Association. Before coming to the INL, Dr. Snedden was affiliated with several NCAA Division I-AA universities and worked closely with several local hospitals in the development of their physical conditioning and wellness programs.

Acronyms Used in the Report

ACSM	American College of Sports Medicine
BMI	Body Mass Index
CAD	Coronary Artery Disease
CDC	Centers for Disease Control
CRP	C-reactive Protein
DOE	U.S. Department of Energy
EBCT	Electron-Beam Computed Tomography
EKG	Electrocardiogram
HDL	High-density Lipoprotein
HSS	Office of Health, Safety and Security
IISP	Injury and Illness Surveillance Program
LDL	Low-density Lipoprotein
MRI	Magnetic Resonance Imaging
NHANES	National Health and Nutrition Examination
NHLBI	National Heart, Lung, and Blood Institute
PET	Positron Emission Tomography
TLC	Therapeutic Lifestyle Changes
WHO	World Health Organization