

13: Chronic Diseases

Learning Objectives

- Discuss the roles of nutrition and lifestyle choices in the prevention and management of chronic disease.

Chronic Diseases

Chronic diseases are ongoing, life-threatening, and life-altering health challenges. They are the leading cause of death worldwide. Chronic conditions are increasing in frequency. They cause significant physical and emotional suffering and are an impediment to economic growth and vitality. It is important, now more than ever, to understand the different risk factors for chronic disease and to learn how to prevent their development.

The Risk Factors of Chronic Disease

A **risk factor** is a signal that your chances for acquiring a chronic disease may be increased. You might liken a risk factor to the flags that lifeguards sometimes set up at beaches. When you see these flags, you know immediately that swimming within the marked areas could be hazardous, and that if you choose to swim within these parameters anyway, you are doing so at your own risk. But, if you heed the warnings, you are taking the necessary step to protect your safety and health. Similarly, risk factors are warning signs that coincide with the development and progression of disease. However, risk factors are not a 100-percent guarantee that a person will develop a chronic disease, only that the conditions are right. For example, if a person gets sick with the flu, we can say with certainty that the illness was caused by a virus. However, we cannot say that a sedentary lifestyle caused the onset of cardiovascular disease in a patient, because a risk factor indicates a correlation, not a causation.

Chronic disease usually develops alongside a combination of the following risk factors: genetics, another health factor such as obesity or hypertension, dietary and lifestyle choices, and environmental problems. Risk factors such as genetics and age cannot be changed. However, some risk factors can be altered to promote health and wellness (such as diet). For example, a person who continuously eats a diet high in sugars, saturated fats, and red meat is at risk for developing Type 2 diabetes, cardiovascular disease, or several other conditions. Making more healthy dietary choices can greatly reduce that risk. Being a woman over age sixty-five is a risk factor for developing osteoporosis, but that cannot be changed. Also, people without a genetic predisposition for a particular chronic illness can still develop it. Not having a genetic predisposition for a chronic disease is not a guarantee of immunity.

Identifying Your Risk Factors

To estimate your own risk factors for developing certain chronic diseases, search through your family's medical history. What diseases do you note showing up among close blood relatives? This may be of concern to you. At your next physical, pay attention to your blood tests and ask the doctor if any results are out of the normal range. It is also helpful to note your vital signs, particularly your blood pressure and resting heart rate. In addition, you may wish to keep a food & mood diary to make a note of the dietary choices that you make on a regular basis and be aware of what your eating patterns are. As a general rule, it is important to look for risk factors that you can modify to promote your health. For example, if you discover that your grandmother, aunt, and uncle all suffered from high blood pressure, then you may decide to avoid a high sodium diet. Identifying your risk factors can arm you with the information you need to help ward off disease.

Cardiovascular Disease

Throughout the remainder of this section, we will examine some of the more prevalent chronic diseases, their risk factors, and the choices that can help to discourage their development or progression. Let's begin with cardiovascular disease. According to the Centers for Disease Control and Prevention (CDC), heart disease is the leading cause of death in the United States (1).

The disease generally starts with atherosclerosis, or a hardening of the arteries, a chronic condition so common that most people show signs of it by the time they turn thirty. Arteries start to narrow and harden when fats accumulate along their inner walls and form plaques. A plaque is made of fat, cholesterol, calcium, and other substances found in blood.

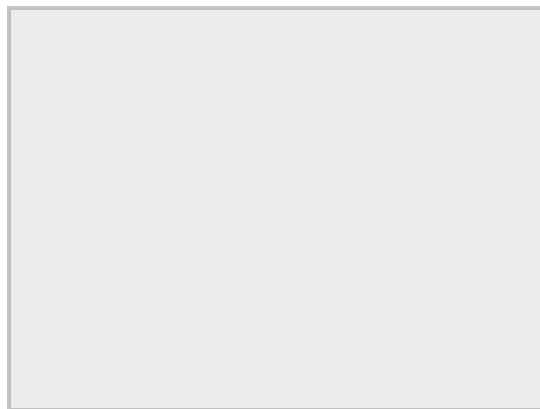


Figure 13.2: Illustration comparing a normal blood vessel and partially blocked vessel due to atherosclerotic plaque build-up. Plaque formation along arterial walls impedes blood flow and can create a thrombus, or stationary blood clot. from BruceBlais (via Wikipedia). For a video of the process [click here](#).

Plaque formation causes arteries to narrow and harden, which elevates blood pressure because the vessels can't expand effectively to accommodate blood pulses. Higher blood pressure strains the heart and causes more damage. Arterial walls can become so weakened due to high blood pressure that they balloon and form what is known as an aneurysm. If the aneurysm bursts, it becomes a life-threatening event. The plaques themselves can also rupture due to a spike in blood pressure or a tremor along an arterial wall, and the body responds to this perceived injury by forming blood clots. These clots are serious health threats, whether they are stationary (a thrombus) or moving (an embolus). A stable clot can slowly kill off surrounding tissue, or grow so big that it blocks blood circulation and causes thrombosis. When a moving clot becomes stuck in an artery too small for its passage, it cuts off blood flow and causes cell death. This is referred to as an embolism. Blood clots in heart and brain arteries can cause heart attacks or strokes.

Table 13.1: The Risk Factors for Cardiovascular Disease

Unmodifiable Risk Factors	Modifiable Risk Factors
<ul style="list-style-type: none"> • Age. Risk increases for men at forty-five, and for women at fifty-five. • Sex. Men have a higher risk than women, though the risk for women steeply rises after menopause. • Family history. The more family members who have heart disease, the greater the risk. 	<ul style="list-style-type: none"> • Cigarette smoking. Nicotine constricts blood vessels, and carbon monoxide damages their inner lining, which increases the risk of atherosclerosis. • Excess body fat. This worsens other risk factors. • Diabetes. This condition is associated with an increased risk of heart disease. Both types have certain risk factors in common, including obesity and high blood pressure. • Physical activity. Lack of exercise is associated with heart disease, too much exercise is associated with relative energy deficiency, and osteopenia. • Cholesterol levels. High levels of blood cholesterol can increase the risk. A high level of low-density lipoprotein (LDL), or the “bad” cholesterol, is a common contributing factor. However, a low level of high-density lipoprotein (HDL), or “good” cholesterol, can also promote atherosclerosis.

Steps to Reducing the Risk of Cardiovascular Disease

Diet and nutrition can play a significant role in reducing the risk of cardiovascular disease. It is helpful to lower sodium intake, increase consumption of dietary fiber, and limit consumption of saturated fat, which promotes plaque formation. In addition, it is important to replace refined starches and added sugar, which can boost triglycerides, with whole grains, fruits, and vegetables. Eating foods rich in omega-3 fatty acids, especially fish, using alcohol in moderation, and opting for low or no-fat dairy products can all help reduce your cardiovascular disease risk. Emphasizing vegetable-based sources of protein, such as beans and legumes, can be beneficial, as well as consuming more soy products. It is also important to maintain a healthy weight, manage cholesterol levels, and avoid smoking or chewing tobacco.

Hypertension

Chronic high blood pressure, also known as hypertension, is a significant health hazard affecting one out of three adults in the United States(2). This chronic condition is a major cause of heart attacks and strokes, yet it has no symptoms until blood pressure reaches very high levels, which is why it is known as “the silent killer.” The only way to find out if you have high blood pressure is to get an accurate reading of your resting blood pressure rate, which is best done by a medical professional and should be monitored regularly.

High blood pressure is such an important factor in cardiovascular disease, that keeping it within a healthy range is vitally important. Blood pressure readings consist of two numbers. The top number measures **systolic** pressure (when the heart contracts) and the bottom number measures **diastolic** pressure (when the heart is at rest). The key blood pressure numbers to keep in mind are:

- **Ideal.** below 120 over 80
- **Pre-hypertension.** 120-129 over 80
- **Hypertension.** Stage 1: 130 - 139 or 80-89, Stage 2: over 140 or over 90

Table 13.2: The Risk Factors for Hypertension

Unmodifiable Risk Factors	Modifiable Risk Factors
<ul style="list-style-type: none"> • Age. After fifty-five, the risk of developing high blood pressure is 90 percent. • Race. African-Americans are more likely to develop hypertension, manifest it at a younger age, and have higher blood pressure readings. • Family history. There is a strong genetic component to high blood pressure, and an individual’s risk goes up along with the number of family members who have hypertension. 	<ul style="list-style-type: none"> • Excess body fat. Roughly 60 percent of people with hypertension are obese. • Sodium consumption. The more salt in a person’s diet, the more likely they are to have high blood pressure. • Alcohol. Drinking more than two drinks per day for men and one drink for women increases the likelihood of hypertension. • Diet. In addition to salt and alcohol consumption, other dietary factors increase chances of developing hypertension. • Sleep. Not getting enough sleep on a regular basis is linked to an increased risk of heart disease, high blood pressure, and stroke.(3)

Steps to Reducing the Risk of High Blood Pressure

Although it is not possible to change one’s age or genetics, there are actions that people can take to decrease their risk of hypertension. Techniques to reduce blood pressure include becoming physically active, maintaining a healthy weight, reducing sodium intake below 2,400 milligrams per day (or below 1,500 milligrams if you are in a high-risk group or already have been diagnosed with hypertension), using alcohol moderately, and following the DASH diet. Additionally, vitamin C, calcium, and potassium have all been shown to promote healthy blood pressure. It is also vital to monitor your blood pressure levels on a regular basis. Prompt intervention when readings rise above the ideal level (120 over 80) can save lives, which is why everyone should know the status of their blood pressure.

Cancer

More than one hundred diseases are classified as different forms of cancer, all of them characterized by the uncontrolled growth of abnormal cells. Cancer is triggered by mutations in a cell’s genetic material. The cause of these changes may be inherited, or it may result from exposure to carcinogens, which are agents that can cause cancer. Carcinogens include chemicals, viruses, certain medical treatments such as radiation, pollution, or other substances and exposures that are known or suspected to cause cancer(4). The National Institutes of Health has classified fifty-four different compounds as known cancer-causing agents in humans (5).

Under normal conditions, a healthy cell will either repair any damage that has been done or self destruct so that no future cells will be affected. Cells become cancerous when their DNA is damaged, but they do not self-destruct or stop reproducing as normal cells would. As these abnormal cells continue their rapid growth, in most cancers they coalesce in a mass called a tumor. Cancer cells can overwhelm healthy cells and interfere with the healthy functioning of the body. They can also invade other organs and spread throughout the body in a process known as metastasis. Scientists and the medical community are giving considerable attention to the early stages of cancer, from the moment a healthy cell is exposed to a carcinogen to the point where cells with damaged DNA are replicating out of control. Intervention at any of these early stages could prove to be quite beneficial because it is thought that most cancers are the result of lifestyle choices and environmental exposure.

The risk factors for different cancers can vary. For example, exposure to ultraviolet radiation from the sun and from tanning beds is a risk factor for skin cancer, while exposure to asbestos is a risk factor for mesothelioma cancer. Table 13.3 shows some common risk factors for a number of different types of cancer.

Table 13.3: The Risk Factors for Cancer

Unmodifiable Risk Factors	Modifiable Risk Factors
<ul style="list-style-type: none"> • Age. Most cancers occur in people over the age of sixty-five. However, people of all ages, including children, can get cancer. • Family history. Certain types of cancer have a genetic link. However, environmental factors may also play a part. 	<ul style="list-style-type: none"> • Tobacco. Smoking or chewing tobacco greatly increases the risk for certain cancers, including cancer of the lungs, bladder, cervix, kidneys, mouth, and pancreas. • Alcohol. Drinking alcohol is linked to cancers of the mouth, throat, esophagus, and breast, as well as to cancers of the neck and head. • Excess body fat. Linked to cancers of the colon, uterus, pancreas, esophagus, kidney, and breast. • Cooking techniques. Grilling, smoking, and preparing meat at high temperatures forms carcinogens. • Red meat. The risk of colon cancer seems to increase with the consumption of red meat and processed meat. • Cured meats. According to a recent study, there is a mild risk of pancreatic cancer with the consumption of cured meats, such as sausage, pepperoni, bacon, ham, smoked turkey, salami, and hot dogs. • Physical inactivity. Linked to colon, breast, and other cancers. • Exposure to chemicals. People who have jobs that expose them to chemicals on a regular basis, such as construction workers and painters, have an increased risk of cancer. • Viruses or bacteria. Certain viruses or bacteria may increase the risk of developing cancer. For example, human papillomaviruses, which are sexually transmitted, are the primary cause of cervical cancer.

Steps to Reducing the Risk of Cancer

According to the American Cancer Society, half of all American men and one-third of American women will be diagnosed with some form of cancer in their lifetime (6). Although cancer is one of the leading causes of death worldwide, ongoing research and innovations in treatment have improved the outlook for cancer patients to the point where millions now survive or live with cancer, making it a chronic disease.

The American Institute for Cancer Research (AICR) has published guidelines for preventing cancer and staying healthy. They include several dietary and lifestyle choices, such as participating in physical activity for thirty minutes per day or more, and maintaining a healthy weight. In addition, AICR recommends consuming a plant-based diet (7). Several epidemiological studies have found a link between eating plenty of fruits and vegetables and a low incidence of certain cancers. Fruits and vegetables containing a wide variety of nutrients and phytochemicals may either prevent or reduce oxidative damage to cell structures. Cruciferous vegetables, such as cauliflower, broccoli, and Brussels sprouts, may also reduce the risk of certain cancers, such as endometrial, esophageal, and others. Also, studies have shown that the more fiber you have in your diet, the lower your risk of colon cancer.

Supplementation may also be helpful to a limited degree. Vitamin D and antioxidants have been linked to lowering the risk of some cancers (however taking an iron supplement may promote others); but, obtaining vital nutrients from **food first** is the best way to help prevent or manage cancer. In addition, regular and vigorous exercise can lower the risk of breast and colon cancers, among others. Also, wear sunblock, stay in the shade, and avoid the midday sun to protect yourself from skin cancer, which is one of the most common kinds of cancer (8).

Diabetes

The World Health Organization reports that more than 346 million people around the world have diabetes and they predict that deaths due to the consequences of diabetes will double from 2005 to 2030 (9). **Diabetes mellitus** is a metabolic disorder that results when the pancreas does not produce enough insulin to meet its needs or the body does not effectively utilize the insulin that it does produce. Insulin is the hormone that regulates blood glucose levels. The most common complication is hyperglycemia (elevated blood sugar), which gradually leads to damage in many of the body's systems, most notably the eyes, kidneys, nerves, and heart and blood vessels.

There are three kinds of diabetes: Type 1, Type 2, and gestational. Formerly known as juvenile or childhood-onset diabetes, Type 1 diabetes is an autoimmune condition in which the pancreas does not produce insulin. Type 1 diabetes is not preventable, and its cause is unknown. Symptoms include excessive urination, thirst, persistent hunger, weight loss, vision problems, and fatigue.

Formerly known as adult-onset diabetes, Type 2 diabetes results when the pancreas produces enough insulin initially, but the body is unable to use the hormone properly (insulin resistance). Until recently, this disease was only found in adults. However, it is now found among children, too. More than 90 percent of diabetics have Type 2 (10). Major contributing factors to the development of Type 2 diabetes include excessive body weight and physical inactivity. The symptoms for Type 2 diabetes are similar to Type 1, but are much less noticeable. As a result, Type 2 diabetes may remain undiagnosed for several years after the onset, generally after complications have already manifested.

About 3 to 8 percent of pregnant women develop gestational diabetes during the latter stages of pregnancy. This condition is caused by a shortage of insulin or by pregnancy hormones. Gestational diabetes has symptoms similar to Type 2 diabetes, and some women may not experience any symptoms at all. In general, gestational diabetes fades away after the birth of the baby. However, women who have had gestational diabetes are at a greater risk of developing Type 2 diabetes within five to ten years. Also, infants born of mothers who suffer from this condition are at an increased risk of developing Type 2 diabetes as they grow older (11).

Table 13.4: The Risk Factors for Diabetes

Unmodifiable Risk Factors	Modifiable Risk Factors
<ul style="list-style-type: none"> • Age. Risk increases after age forty-five • Medical history. Diabetes during a previous pregnancy or recently giving birth to an infant who weighs more than 9 pounds. • Family history. A history of diabetes among one or more close relatives. • Race and ethnicity. Individuals from specific ethnic groups may have an increased risk for developing diabetes, including African Americans, Hispanic Americans, Asian Americans, and Native Americans. • Viruses. Exposure to: Epstein-Barr, Coxsackie, mumps, or cytomegalo viruses may trigger Type 1 diabetes. 	<ul style="list-style-type: none"> • Cigarette smoking. Nicotine constricts blood vessels, and carbon monoxide damages their inner lining, which increases the risk of Type 2 diabetes. • Excess body fat. Excess body fat, especially around the waist, is a major contributing factor to Type 2 diabetes. • Physical inactivity. Lack of exercise is strongly associated with diabetes. • High blood pressure. Greater than or equal to 140/90 mmHg. • Cholesterol levels. HDL cholesterol under 35 mg/dL. • Blood sugar. Impaired glucose tolerance. • Blood fats. Elevated triglycerides (250 mg/dL or more).

Steps to Reducing the Risk of Diabetes

Unfortunately, Type 1 diabetes is almost impossible to prevent, although some clinical research suggests that breastfeeding an infant for at least three months may decrease the child's risk of developing this condition. However, people who are at risk for Type 2 or gestational diabetes can take steps to avoid the disease. For example, it is crucial to achieve and maintain a healthy body through regular physical activity. If you are at risk, strive for at least thirty minutes of moderate to intense exercise at least three times per week. Proper nutrition is also vital, and it is important to restrict sugary snacks, beverages, and desserts, and to limit the intake of trans fats and saturated fats. In addition, those who are at risk should consume whole grains, legumes, fruits, and vegetables, along with two servings of non-fried fish per week.

For people over age forty-five, it is important to have a glucose test every three years. Regular testing should begin at a younger age, and be performed frequently if you have any risk factors for developing Type 2 diabetes. In order to assess your health status, the following is recommended:

- Early diagnosis through blood testing
- Blood pressure measurement

- Blood lipid measurement

Food: The Best Medicine

Poor dietary choices and a sedentary lifestyle account for about 300–600 thousand deaths every year according to the US Department of Health and Human Services. That number is thirteen times higher than the deaths due to gun violence (12). The typical North American diet is too high in saturated fat, sodium, and sugar, and too low in fiber in the form of whole fruits, vegetables, and whole grains to keep people healthy. With so many threats to optimal health, it is vital to address those factors that are under your control, namely dietary and lifestyle choices. A diet that supplies your body with the needed energy and nutrients daily will result in efficient body functioning and in protection from disease. Making sound nutritional choices can also provide support for individuals undergoing treatment for short-term or chronic conditions. Finding a balance between nutritional needs with concerns about drug interactions can hasten recovery, improve quality of life, and minimize the side effects from treatment protocols.

Key Takeaways

Chronic diseases such as cardiovascular disease, high blood pressure, cancer, and diabetes are major public health threats and major causes of mortality. Knowing the modifiable risk factors (such as diet, level of physical activity, and cigarette smoking) for certain diseases can help you to adapt your lifestyle to protect them. By following a healthy diet, becoming active, and making other sound lifestyle choices, individuals can reduce their risk of developing chronic diseases, or better manage their condition to prevent further complications.

Discussion Starter

1. Assess your risk for developing one of the four chronic diseases discussed in this section. Which risk factors can be modified? Which risk factors can't be modified? What can you do to lessen the chance that you will develop the disease?

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