Definition: **Cardiovascular Disease** from *Dictionary of Information Science and Technology*

the class of diseases that involve the heart or blood vessels and is the leading cause of death in developed countries (Reiter & Habetha, 2010)

Summary Article: **Heart Diseases (General)**
From *Encyclopedia of Global Health*

Heart disease is the leading cause of death and disability worldwide. Approximately 16.7 million people die from heart disease each year, with coronary heart disease killing more than 7 million people. Heart disease can affect any component of the cardiovascular system, which includes the heart muscle, valves, conduction system, coronary arteries and veins, as well as systemic arteries and veins. Coronary artery heart disease, alone, accounts for roughly 2.3 million cases of heart disease annually. There are a variety of types of heart disease that affect a wide range of age groups and ultimately may lead to heart failure. Congenital heart disease, valvular heart disease, cardiomyopathies, and coronary artery disease are examples of heart disease. The severity of these diseases is dependant upon the degree to which they affect the ability of the heart to adequately pump blood throughout the body to meet nutritional demands.

Coronary artery disease (CAD) is the most common form of heart disease. CAD is the number one killer worldwide for those older than 60 years of age, and is the second leading cause of death, behind HIV/AIDS, for those 15 to 59 years old. Each year, 3.8 million men and 3.4 million women worldwide die from CAD. Currently, in the United States it is estimated that one out of every 2,000 people are affected by CAD. Although genetics play a role in the development of CAD, 80 to 90 percent of people who die of CAD have one or more risk factors influenced by an unhealthy lifestyle. CAD occurs when the arteries that supply blood to the heart muscle become hardened and narrowed.

This process is due to a buildup consisting mostly of fat, cholesterol, and calcium that circulate in the blood. The buildup of material is referred to as a plaque and leads to a condition known as atherosclerosis. As the plaque grows in size, the amount of blood passing through the vessels decreases and heart muscle does not receive adequate oxygen needed to survive. The development of atherosclerosis is a process that develops over time, often beginning in childhood and gradually increasing with age. CAD varies in severity and its presentation can range from asymptomatic to chest pain associated with exertion (angina), heart attack, and sudden cardiac death. Acute coronary syndrome refers to the symptoms associated with acute myocardial ischemia due to CAD. Of all people who die within the first month of experiencing CAD symptoms, approximately two-thirds of these people die before reaching the hospital. This highlights the importance of prevention and early recognition of CAD symptoms.

Risk factors for CAD in developed countries are divided into two groups: modifiable and nonmodifiable. Modifiable risk factors include high blood pressure, high cholesterol, smoking, diabetes, excess weight, and sedentary lifestyle. Nonmodifiable risk factors include family history, increased age, and male

[https://search.credoreference.com/content/topic/heart_disease](https://search.credoreference.com/content/topic/heart_disease)
gender. Approximately 75 percent of heart disease can be attributed to conventional risk factors. Some less recognized risk factors include low socioeconomic status, mental illness, stress, alcohol, excess blood homocysteine, and inflammation. Those in developing countries face an even greater burden of risk factors in the fact that they also have to contend with low birth weight and folate deficiency due to malnutrition and communicable diseases, as well as the other risk factors.

As the name implies, modifiable risk factors are those factors that an individual can change in his or her daily lifestyle. High blood pressure, also known as hypertension, is a very common factor leading to CAD. It is estimated that by the time that a person reaches 60 years old, he or she has a greater than 60 percent chance that they are living with high blood pressure. Of that number, 31 percent of those people are unaware of the condition and are not experiencing any signs or symptoms. High cholesterol is most frequently a result of the food we eat; however genetics play an important role in determining cholesterol levels.

Cholesterol can be made by the body or obtained from the foods high in cholesterol (i.e., meat, fish, eggs). Foods that do not contain cholesterol but are high in saturated fats and trans fats also lead to elevated levels of cholesterol production and increase risk of heart disease. Cholesterol is divided into four different types. Increased levels of total cholesterol, triglycerides, and low-density lipoprotein (LDL) are responsible for increased risk, and an estimated one-third of all cardiovascular disease worldwide is attributed to high cholesterol. High-density lipoprotein (HDL) is the final type of cholesterol and has been shown to have a protective effect on the arteries of the body; therefore, decreased HDL levels leads to increased risk of heart disease. Therefore control of cholesterol is an important consideration in the attempt to decrease the risk of developing CAD.

**LIFESTYLE HEART RISKS**

Concerning smoking, cigarette smokers are 60 percent more likely to develop CAD due to toxins damaging the inner layer of the blood vessel walls. Even though there is an increased incidence of CAD in smokers, approximately 20 percent of adult men and 22 percent of adult women continue to smoke cigarettes. Healthcare costs directly related to smoking result in a global net loss of $200 billion per year, with one-third of those losses occurring in developing countries. Diabetes is a disease characterized by elevated blood sugar levels, and is primarily caused by decreased insulin production (type 1) or decreased responsiveness of tissues to insulin (type 2). Insulin is a hormone produced by the pancreas, and functions to transport sugars from the bloodstream to various tissues for nutrition and storage. Another risk factor is excess weight, which leads to increased workload of the heart and is a key factor in the development of high blood pressure. Body mass index (BMI) is a method to calculate the degree of excess weight, and takes into account the weight and height of the individual. Healthy people have a BMI in the range of 18.4 to 24.9, while an index of 25 to 29.9 is considered overweight and an index of more than 30 is considered obese. Studies have shown that a decrease in weight by 11 to 22 pounds can reduce the risk of developing high blood pressure by over 25 percent. It has been proven that physical activity improves the ability of the heart and lungs to pump blood more effectively. Subjects with a sedentary lifestyle have a twofold increased risk of having a fatal heart attack compared to active people of the same age with equal risk factors. Exercise on a regular basis also helps to decrease all of the other aforementioned modifiable risk factors.

Prevention strategies, such as lifestyle modifications, are the first step to decreasing the risk of heart disease. Recommendations to a healthier lifestyle include 30 minutes of moderate physical activity four
or more days a week, smoking cessation, and diets rich in fruits, vegetables, and potassium that avoid saturated fats and high-calorie meals. Decreasing body weight and avoiding stresses of daily life can reduce the demand on the heart. CAD typically occurs in middle-aged people, but risk factors are determined by lifestyle behaviors in childhood and early adulthood. Worldwide, 18 million children under 5 years are overweight, and 14 percent of 13- to 15-year-olds smoke cigarettes. This highlights the importance of healthy lifestyle choices early on to significantly decrease risk of heart disease in the future.

Congenital heart disease refers to defects of the heart that are present at birth, and most commonly affect the chambers of the heart, heart valves, and the arteries and veins in close proximity of the heart. Examples of the most common defects include atrial septal defect (ASD), ventricular septal defect (VSD), and patent ductus arteriosus (PDA), with VSD being the most common congenital defect. In the United States, in approximately six to eight of every 1,000 live births, the baby will be born with a congenital heart defect. Congenital diseases of the heart may be a consequence of genetic factors or adverse exposures during pregnancy such as maternal alcohol use, certain medications (e.g., warfarin, angiotensin converting enzymes) used by the expectant mother, maternal malnutrition, and maternal infections such as rubella. Although many of these defects will be detected at birth, many patients present for the first time in adulthood. It is estimated that more than 750,000 adults in the United States are currently living with congenital heart disease. This number is expected to increase by approximately 9,000 adults per year.

**CONGENITAL FACTORS**

Another category of heart disease involves the valves within the heart. These valves help direct the flow of blood by opening and closing with contraction and relaxation of the heart. The two types of valvular abnormalities involve difficulty opening valves (stenosis) and the inability to tightly close valves (regurgitation). These abnormalities can lead to decreased ability of the heart to efficiently pump blood and can eventually lead to heart failure. Within the heart, there are four valves: the aortic, mitral, tricuspid, and the pulmonic valves. The aortic valve, located in the left ventricle and leads to the aorta, and the mitral valve, located between the left atrium and left ventricle and regulates blood flow within the heart and are key in any discussion concerning valvular abnormalities. There are two types of aortic stenosis that are not congenital in nature; these include aortic stenosis due to calcium deposits and rheumatic aortic stenosis due to old rheumatic fever.

Calcific aortic stenosis has a high correlation with coronary artery disease. The most common etiology for congenital aortic stenosis is bicuspid aortic valve. Stenosis decreases the size of the outlet from the heart, thus the heart muscle must work harder to pump out the same amount of blood as a normal heart. This increased workload causes the heart muscle to thicken, and eventually the muscle will not be able to maintain the workload and it will ultimately result in heart failure. Regurgitation is the development of backflow through valves that are unable to tightly close. This additional blood that leaks back causes the heart muscle to stretch and the chambers of the heart to become dilated, leading to decreased efficiency and potentially heart failure. Regurgitation most commonly occurs in three of the four valves of the heart: the aortic, mitral, and tricuspid valves. The cause of this regurgitation can be related to aging, infection, genetics (e.g., Marfan's syndrome), and autoimmune diseases (e.g., systemic lupus erythematosus). Concerning mitral stenosis, the majority of cases are secondary to rheumatic heart disease, and predominantly affect women. Mitral valve stenosis and regurgitation affect blood flow between the left atrium and left ventricle, and are attributed to the same factors as aortic
stenosis and regurgitation. Mitral valve prolapse, most commonly diagnosed valvular abnormality, is a condition where the mitral valve bulges into the left atrium. Prolapse is a direct result of insufficient or lax fibrous bands, called chordae tendenae, which anchor the valve to the left ventricle. The tricuspid and pulmonic valves are also susceptible to stenosis and regurgitation; however, this occurs with less frequency than the aortic and mitral valves. Therapies for valvular dysfunctions vary from medical management to treat the symptoms or surgical intervention to replace or repair the valve itself.

**ILLNESS AND HEART DISEASE**

Rheumatic fever can develop following a bacterial infection in the blood, and results in an inflammatory illness that can lead to disability or death. Rheumatic fever and rheumatic heart disease affects 15.6 million people globally, including 2.4 million children. It is the most common cardiac disease in children and young adults. There are an estimated 500,000 new cases each year, 300,000 of which are from Africa. Rheumatic fever is due to bacterial invasion by *Streptococcus pyogenes* and is typically preceded by a sore throat and fever that is left untreated. The aortic and mitral valves are the most commonly affected; however, the tricuspid and pulmonic valves are not immune to damage. Ultimately, acute rheumatic fever can lead to scarring of the heart valves. Theses valves that are affected by rheumatic heart disease are more susceptible to colonization by other bacteria, and can progress to infective endocarditis.

Cardiomyopathies are diseases of the heart muscle that alter the ability of the heart to pump adequate blood throughout the body. An estimated 50,000 Americans are affected by cardiomyopathies, and they are the leading cause of heart failure leading to transplantation. The three main categories of cardiomyopathy include genetic, mixed, and acquired cardiomyopathies. The most important causes of genetic abnormalities include hypertrophic cardiomyopathy. Hypertrophic cardiomyopathy involves the thickening of the heart muscle, which causes outflow obstruction and inadequate filling of the heart chambers with blood. This condition is inherited in half the cases, and affects one out of 500 live births in the United States.

Hypertrophic cardiomyopathy is the second leading cause of heart disease, and the most common cause of sudden death in young, otherwise healthy athletes. Examples of mixed cardiomyopathies include dilated and restrictive cardiomyopathy. In dilated cardiomyopathy, the heart muscle becomes stretched and loses its ability to contract, and can be due to a virus, excessive alcohol intake, or due to unknown causes. It is also the third most common cause of heart failure and the most frequent cause of heart transplantation. Restrictive cardiomyopathy hinders the ability of the muscle to contract and relax due to scarring or abnormal deposits in the muscle, but in most cases the cause remains unknown. Chest radiation, chemotherapy, and connective tissue diseases can lead to scarring and fibrosis, while amyloidosis and hemochromatosis are responsible for abnormal deposits. The final classification, acquired cardiomyopathy, can be due to inflammation (myocarditis), stress, or chronically elevated heart rates.

It is important to recognize the extent and impact of heart disease among the worldwide population. The incidence continues to rise in developing countries as the average life expectancy increases. Genetics plays a minor role in the development of heart disease, leaving unhealthy lifestyle decisions to be the greatest predictor of the development of heart disease. There are many decisions one can make to decrease the risk of heart disease such as smoking cessation, diets low in cholesterol and high in fruits and vegetables, and regular exercise. Proper education for children concerning healthy lifestyles
should be taught at a young age to reduce the incidence of heart disease in adulthood. There have been great strides made in diagnostic technology and the treatment of heart disease; however, the fundamental message concerning heart disease is that the greatest reduction in death and disability can be seen with prevention and not cure.

SEE ALSO:
Heart Attack; Heart Bypass Surgery; Heart Disease—Prevention; Heart Transplantation.

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