

Diseases: what can go wrong with the cardiovascular system

The following are just a few of the many diseases and disorders that can impair the cardiovascular system or its parts.

Atherosclerosis is a general term for hardening of the arteries. Atherosclerosis is a condition in which fatty material and other substances accumulate on and in the walls of large arteries, impairing the flow of blood. Cholesterol, a fatlike substance produced by the liver, is an essential part of cell membranes and body chemicals. Normally, the body produces all the cholesterol it needs. Eating foods high in saturated fats (found mostly in animal products such as egg yolks, fatty meats, and whole milk dairy products) can cause an increase in blood cholesterol levels. The excess cholesterol not taken up by the cells accumulates on the walls of arteries. There it combines with fatty materials, cellular waste products, calcium, and fibrin to form a waxy buildup known as plaque, which can either partially or totally obstruct blood flow.

Coronary artery disease arises when atherosclerosis occurs in the coronary (heart) arteries. When the blood flow in these arteries is restricted, the heart muscles do not receive the proper amount of blood and oxygen. Chest pain or pressure, called angina pectoris, may occur. If the blood flow is blocked, cardiac muscle cells begin to die and a heart attack may result. If blood flow is blocked in any cerebral (brain) arteries, brain cells quickly begin to die and a stroke may result. Depending on what area of the brain has been affected, a stroke may cause memory loss, speech impairment, paralysis, coma, or death.

Heart attack or myocardial infarction (MI) or acute myocardial infarction (AMI) is the interruption of blood supply to part of the heart, causing some heart cells to die. This is most commonly due to occlusion (blockage) of a coronary artery following the rupture of atherosclerotic plaque in the wall of an artery. The resulting ischemia (restriction in blood supply) and oxygen shortage, if left untreated for a sufficient period of time, can cause damage or death (infarction) of heart muscle tissue (myocardium). Classical symptoms of acute myocardial infarction include sudden chest pain (typically radiating to the left arm or left side of

the neck), shortness of breath, nausea, vomiting, palpitations, sweating, and anxiety. Approximately one quarter of all myocardial infarctions are silent, without chest pain or other symptoms. A heart attack is a medical emergency.

Heart failure is a condition that can result from any structural or functional cardiac disorder that impairs the ability of the heart to fill with or pump a sufficient amount of blood throughout the body, therefore leading to the heart and body's failure.

Hypertension is high blood pressure. It is normal for blood pressure to be elevated for brief periods because of exercise, emotional stress, or a fever. Consistent arterial blood pressure measuring 140/90 or higher, however, is hypertension. The condition, the most common one affecting the cardiovascular system, is a serious one. Although it shows no symptoms, hypertension should be treated. If left unchecked, it can lead to atherosclerosis, heart attack, stroke, or kidney damage. Hypertension most often strikes African Americans, middle-aged and elderly people, obese people, heavy alcohol drinkers, and people suffering from diabetes or kidney disease.

Ischaemic heart disease (IHD), or myocardial ischaemia, is a disease characterised by reduced blood supply to the heart muscle, usually due to coronary artery disease (atherosclerosis of the coronary arteries). Its risk increases with age, smoking, hypercholesterolaemia (high cholesterol levels), diabetes, hypertension (high blood pressure) and is more common in men and those who have close relatives with ischaemic heart disease. Symptoms of stable ischaemic heart disease include angina (characteristic chest pain on exertion and decreased exercise tolerance). Unstable IHD presents itself as chest pain or other symptoms at rest. Diagnosis of IHD is with an electrocardiogram, blood tests, cardiac stress testing or a coronary angiography. Depending on the symptoms and risk, treatment may be with medication or coronary artery bypass surgery.

Inflammatory heart disease involves inflammation of the heart muscle and/or the tissue surrounding it.

- **Endocarditis** – inflammation of the inner layer of the heart, the endocardium. The most common structures involved are the heart valves.

- **Inflammatory cardiomegaly**, pathological enlargement of the heart due to different reasons
- **Myocarditis** – inflammation of the myocardium, the muscular part of the heart.

Obstructions

- **Thrombosis** is the formation of a blood clot (thrombus) inside a blood vessel, obstructing the flow of blood through the circulatory system. When a thrombus occupies more than 75% of surface area of the lumen of an artery, blood flow to the tissue supplied is reduced enough to cause symptoms. More than 90% of obstruction can result in a complete lack of oxygen, and infarction, a type of cell death.
- **Embolism** occurs when an object (embolus) migrates from one part of the body (through circulation) and causes a blockage (occlusion) of a blood vessel in another part of the body. This is in contrast with a thrombus, which forms at the blockage point within a blood vessel and is not carried from somewhere else.

Valvular heart disease is disease process that affects one or more valves of the heart. The valves in the right side of the heart are the tricuspid valve and the pulmonic valve. The valves in the left side of the heart are the mitral valve and the aortic valve.

- **Aortic valve stenosis (AS)** is a valvular heart disease caused by the incomplete opening of the aortic valve. The aortic valve controls the direction of blood flow from the left ventricle to the aorta. When in good working order, the aortic valve does not impede the flow of blood between these two spaces. Under some circumstances, the aortic valve becomes narrower than normal, impeding the flow of blood.
- **Aortic insufficiency (AI)** is the leaking of the aortic valve of the heart that causes blood to flow in the reverse direction during ventricular diastole, from

the aorta into the left ventricle. Aortic insufficiency can be due to abnormalities of either the aortic valve or the aortic root (the beginning of the aorta).

- **Tricuspid insufficiency** (TI) refers to the failure of the heart's tricuspid valve to close properly during systole. As a result, with each heart beat some blood passes from the right ventricle to the right atrium, the opposite of the normal direction.