Risk Factors Associated with Cardiovascular Disease

There are a number of risk factors predisposing any one person to cardiovascular disease. While uncontrollable risk factors such as age, sex and heredity influence one's propensity for disease, there are other, controllable, risk factors most definitely associated with disease risk. Perhaps future medical and technological advances may allow us to be less concerned with controllable risk factors, but, at least for the present, our susceptibility for cardiovascular disease is largely dependent upon our choices, behaviors, habits and lifestyles.

Controllable Risk Factors

Hypertension

Hypertension means high blood pressure. The amount of pressure the blood exerts against the arteries may be high during heart contraction (systole) and/or high during the heart's relaxation (diastole) phases. The inner lining of blood vessels is known as the endothelium, a row of cells simple in nature, yet important to clotting, blood flow mechanics, vessel muscle tone and other complex processes. When the endothelium is damaged, the injury bleeds, causing a need for clotting. Since an inflamed area in an artery is prone to plaque accumulation, blood vessel damage due to high blood pressure can increase risk for atherosclerosis.

High blood pressure also causes the heart to work harder in order to move blood. A harder-working heart requires more oxygen. If enough oxygen fails to be delivered, angina can develop. Over a long period of time, a harder-working heart may also enlarge. An enlarged heart does not pump in an optimal manner, allowing fluids to pool throughout the body, a symptom of congestive heart failure.

Blood Lipids

The amount of lipids (fat) in the blood is considered a major risk factor for cardiovascular disease, which is often why individuals receive recommendations from physicians about watching their "junk food" intake.

When a person consumes fat, much of that fat is broken down into triglycerides. Triglycerides are carried through the bloodstream with the help of a protein carrier, in the form of VLDL (very low density lipoprotein). A diet high in fat will have a greater number of triglycerides, and, subsequently, a greater number of VLDL carriers. The VLDL transports triglyceride to the adipose (fat) tissue for storage. Once the VLDL's have transported the triglyceride, they become LDL's (low density lipoproteins). These lipoproteins, typically high in cholesterol, deliver cholesterol to cells need it. If oxidized LDL levels become high, the cholesterol can be deposited in the arterial walls, speeding up atherosclerosis. Because of its tendency to spur the collection of plaque on arterial walls, LDL is known as the "bad" cholesterol. Interestingly, the size of LDL particles matters. Smaller LDL particles appear to be more likely to deposit on arterial walls. Some individuals have a genetic predisposition for larger lipoprotein particles in their blood and thus may experience a decreased risk for complications due to atherosclerosis. Caucasians in general tend to have smaller LDL particles than other ethnicities, and men tend to have smaller LDL particles than women. High density lipoproteins (HDL's) contain a low amount of cholesterol, and serve to remove excess cholesterol from the blood and deliver it to the liver. It is this tendency to remove cholesterol from the arterial walls that causes HDL to be known as the "good" cholesterol. To help with learning, a video produced by Astra Zeneca, a 5-1/2 minute clip showing how cholesterol contributes to cardiovascular disease, is available via YouTube (R).

Smoking

Smoking is frequently considered the most controllable of all primary risk factors. While not everyone smokes, approximately 25% of the U.S. population does. To view compare smoking rates in Washington state and other
states, visit the Centers for Disease Control and Prevention (O). Tobacco contains nicotine, a stimulant, which can raise heart rate and blood pressure, which can over the a long period of time lead to endothelial lining damage, accelerating the atherosclerotic process. Furthermore, gases present in smoke displace oxygen in the blood, forcing the heart to work harder to deliver oxygen to the body's tissues. Chemicals present in smoke can also directly damage the endothelial lining of blood vessels, accelerating the atherosclerotic process. Smoking also lowers HDL levels in the blood.

**Physical Activity**

Regular aerobic physical activity (walking, jogging, aerobics, rowing, cross country skiing, swimming, bicycling, etc.) performed even at moderate intensities lowers one's risk for cardiovascular disease. Benefits include a decrease in blood pressure and an increase in HDL levels.

**Obesity**

Obesity refers to an excessive amount of body fat. Obesity is often associated with high blood pressure, high blood lipid levels, and diabetes. Because of its link to numerous conditions, many researchers feel obesity should be considered as one of the more important risk factors.

**Diabetes**

Diabetes, an endocrine (hormone) system disorder, will be discussed in the fourth week. Diabetic individuals have a greater risk of blood vessel damage. Since blood vessel damage may lead to atherosclerotic plaque buildup, diabetics experience a greater risk of cardiovascular disease than non-diabetics. With the growing incidence of diabetes in the United States, a concomitant concern for heart disease is growing.

**Inflammation**

Inflammation is the physiological response to injury. The medical community has more recently recognized that inflammation markers seen in the blood can predict one's risk for a cardiovascular incident. C-reactive protein (CRP) and fibrinogen are a couple examples of inflammatory markers used to assess cardiovascular disease risk. Paul Ridker, M.D., has played a central role in promoting the importance of inflammation regarding cardiovascular disease susceptibility, and in an online slide presentation (through "Lipids Online"), he cites findings from the famous Physicians Health Study (O), indicating that CRP was as predictive as cholesterol level in identifying myocardial infarction risk.

**Homocysteine**

Higher than normal blood levels of homocysteine, an amino acid, may be linked to an increased risk for cardiovascular disease. Researchers don't know enough about the relationship and how it works, or even if the relationship is certain. As described by Medscape (O) and WebMD, higher homocysteine levels are usually associated with smoking or certain dietary choices (red meat, for instance). There also appears to be a link to hypertension. A diet sufficient in B vitamins and folic acid specifically may play a role in modifying homocysteine levels in the blood. At this time, the nutrients are recommended via foods in the diet, as B vitamin supplementation to reduce homocysteine levels is controversial.

**Stress**

Stress can certainly play a contributing role in heart disease risk, particularly if other risk factors are present. During a stress response, the hormonal responses cause an increase in heart rate and blood pressure, and causes
a constriction of blood vessels. Increased work by the heart, coupled with any endothelial lining damage caused by high blood pressure, can increase risk for cardiovascular disease.

**Substance Abuse**

Nicotine use associated with smoking is very well recognized as a risk factor for cardiovascular disease. Many are surprised to realize that moderate alcohol consumption appears to have a *protective effect* against cardiovascular disease. Overconsumption of alcohol, however, is associated with increases in blood triglycerides and blood pressure. Because alcohol addiction, pregnancy, aspirin therapy and other conditions may interfere with alcohol's protective benefits, individuals should fully discuss this issue with their physicians or primary care professionals before integrating alcohol into their personal cardiovascular disease prevention programs.

**Non-Controllable Risk Factors**

There are other risk factors significantly impacting one's likelihood for cardiovascular disease development, particularly when those factors are combined with each other or with other primary risk factors. Many physicians and surgeons consider some of the below items primary risk factors while others feel smoking, high blood pressure, blood lipids and inactivity are better predictors of disease.

**Genetics**

A person may be more prone to cardiovascular disease based upon family history. While some conditions are thought to have more of a genetic connection than others, the research on this topic is more recent, so information grows and may be revised very quickly. [Esciencenews.com](http://Esciencenews.com) references a Duke University research study regarding the link between a specific genetic variation and increased risk for early onset cardiovascular disease (O).

**Age**

The older an individual, the higher his/her risk for cardiovascular disease.

**Sex**

Males are more likely than females to develop cardiovascular disease. It is thought that estrogen plays a protective factor for women. Therefore, upon menopause, women's risk for disease increases and approaches that of men.

**Ethnicity**

Overall, Asians and Pacific Islanders, as a group, have lower cardiovascular disease death rates than do African American, Hispanic and Caucasian groups. The disparity among Asian and Pacific Islander groups may be genetic in nature, but smoking habits and nutrition also appear to play roles in cardiovascular disease risk.

Much of our knowledge about cardiovascular disease risk factors results from the [Framingham Heart Study](http://FraminghamHeartStudy) (O). The website offers a bibliography and also provides information on the study's objectives and historical research milestones.

**Which Factor is Most Important?**
The person researching cardiovascular disease may read conflicting reports on which risk factor is "most" important. Being aware of the presence of several (or all) risk factors, however, might be a more proactive way of assessing one's risk for cardiovascular disease. An example of this multi-risk factor approach is a term referred to as the metabolic syndrome. The metabolic syndrome is a cluster of risk factors working together to increase one's risk for cardiovascular disease. The term metabolic syndrome has been existence for approximately 50 years, but was used more frequently in the research literature by the 1980s. The term is not widely recognized by the lay public, however. According to the American Heart Association (O), the metabolic syndrome includes:

- abdominal obesity (excessive fat tissue in the midsection of the body)
- high levels of triglycerides and LDL, low HDL
- high blood pressure
- insulin resistance (the body does not effectively manage blood sugar)
- high inflammation markers present in the blood (C-reactive protein)
- the presence of substances in the blood that can increase risk for clots