

# Coronary Heart Disease

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## DEFINITION AND EPIDEMIOLOGY

The term *coronary heart disease* (CHD) describes a number of cardiac conditions that result from the presence of atherosclerotic lesions in the coronary arteries. The development of atherosclerotic plaque within the coronary arteries can result in obstruction to blood flow, producing ischemia, which can be acute or chronic in nature. Atherosclerosis is a disease process that starts at a young age and can be present for years in an asymptomatic form until the degree of vessel obstruction leads to ischemic symptoms. Obstructive atherosclerotic lesions can cause chronic symptoms of exercise- or stress-related angina; or, in the case of plaque rupture and acute thrombosis, sudden death, unstable angina, or myocardial infarction (MI) may ensue.

In the United States, more than 17 million people experience some form of CHD. Approximately 10 million suffer from symptoms of angina, and at least 380,000 deaths occur each year from acute MI or CHD-related sudden death. Despite progress in therapy and overall reductions in CHD-related mortality, CHD remains the number one cause of death in both men and women, accounting for 27% of deaths in women (more than deaths due to cancer). The incidence of CHD increases with age for both men and women. There are at least 1.2 million MIs per year in the United States, and many more cases of unstable angina. CHD frequently results in lifestyle-limiting symptoms due to angina or impairment of left ventricular (LV) function. The cost of care related directly to CHD and indirectly to lost productivity from CHD is in the range of \$156 billion per year. CHD remains a major life-threatening disease process associated with significant economic impact.

## RISK FACTORS FOR ATHEROSCLEROSIS

Before delving into discussion of the pathology of atherosclerosis, a description of risk factors is warranted. There are a number of well-known risk factors for coronary artery disease (CAD), some of which are modifiable (Table 8-1). Although women ultimately also carry a significant atherosclerotic burden, men develop CAD at younger ages, and the prevalence of the disease also increases as men age. Another potent risk factor for the development of CAD is a family history of premature CAD. This speaks to a nonmodifiable, genetically based risk. Commonly, multiple family members develop symptomatic CAD before the age of 55 years (65 years for women). Risks are additive, making it very important to appreciate the modifiable risk factors such as hyperlipidemia, hypertension, diabetes mellitus, metabolic syndrome, cigarette smoking, obesity, sedentary lifestyle, and heavy alcohol intake.

Metabolic syndrome deserves particular attention given that up to 25% of the adult U.S. population may satisfy the definition of the disorder as laid out by the National Cholesterol Education Program Adult Treatment Panel. The definition of metabolic syndrome requires the presence of at least three of the following five criteria: waist circumference greater than 201 cm in men or 88 cm in women, triglyceride level 150 mg/dL or higher, high-density lipoprotein (HDL) cholesterol level lower than 40 mg/dL in men or 50 mg/dL in women, blood pressure 130/85 mm Hg or higher, and fasting serum glucose level 110 mg/dL or higher. The features of metabolic syndrome are largely modifiable risk factors for CAD.

Hyperlipidemia, in particular elevated levels of low-density lipoprotein (LDL) cholesterol, plays a pivotal role in the development and evolution of atherosclerosis. HDL-cholesterol is believed to be protective, likely due to its role in transporting cholesterol from the vessel wall to the liver for degradation. Increased levels of HDL are inversely proportional to the risk of CAD-related problems. The interplay among circulating lipids is complex. Elevated levels of triglycerides are a risk factor for CAD and are frequently associated with reduced levels of protective HDL. Hyperlipidemia is highly modifiable, and clinical trials have shown that drug treatment directed at lowering LDL-cholesterol significantly reduces the risk of CAD-related complications or death.

**TABLE 8-1** RISK FACTORS AND MARKERS FOR CORONARY ARTERY DISEASE

### NONMODIFIABLE RISK FACTORS

Age  
Male sex  
Family history of premature coronary artery disease

### MODIFIABLE INDEPENDENT RISK FACTORS

Hyperlipidemia  
Hypertension  
Diabetes mellitus  
Metabolic syndrome  
Cigarette smoking  
Obesity  
Sedentary lifestyle  
Heavy alcohol intake

### MARKERS

Elevated lipoprotein(a)  
Hyperhomocysteinemia  
Elevated high-sensitivity C-reactive protein (hsCRP)  
Coronary arterial calcification detected by EBCT or MDCT

EBCT, Electron beam computed tomography; MDCT, multidetector computed tomography.