Cardiovascular Health
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- Risk Factors for Cardiovascular Disease
- Major Forms of Cardiovascular Disease
- Protecting Yourself Against Cardiovascular Disease
Introduction

- **Cardiovascular disease (CVD):** Collective term for various diseases of the heart and blood vessels
  - Affects nearly 84 million Americans
  - Leading cause of death in the US
  - CVD largely due to way of life
American Heart Association identified 6 major risk factors we can change

Tobacco use

- Pack-a-day smokers are at twice the risk for heart attack that nonsmokers are
  - Smoking two or more packs a day triples the risk
- Heart attack victims two to three times more likely to die if they smoke
- Smoking damages the lining of arteries
Major Risk Factors That Can Be Changed

- Tobacco use
  - Reduces levels of HDL, triglycerides and LDL
  - Nicotine increases blood pressure/heart rate
  - Causes platelets to stick together in the blood stream leading to clotting
    - **Platelets**: Cell fragments in the blood that are necessary for the formation of blood clots
  - Speeds development of fatty deposits in arteries
Major Risk Factors That Can Be Changed

- High blood pressure
  - Hypertension: Sustained abnormally high blood pressure
    - Occurs when too much force is exerted against the walls of the arteries
  - Atherosclerosis: A form of CVD in which the inner layers of artery walls are made thick and irregular by plaque deposits; arteries become narrowed, and blood supply is reduced
# TABLE 11.1

## Blood Pressure Classification for Healthy Adults

<table>
<thead>
<tr>
<th>CATEGORY*</th>
<th>SYSTOLIC (mm Hg)</th>
<th>DIASTOLIC (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal**</td>
<td>below 120</td>
<td>and below 80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120–139</td>
<td>or 80–89</td>
</tr>
<tr>
<td>Hypertension*</td>
<td>Stage 1</td>
<td>140–159 or 90–99</td>
</tr>
<tr>
<td></td>
<td>Stage 2</td>
<td>160 and above or 100 and above</td>
</tr>
</tbody>
</table>

*When systolic and diastolic pressure fall into different categories, the higher category should be used to classify blood pressure status.

**The risk of death from heart attack and stroke begins to rise when blood pressure is above 115/75.

*Based on the average of two or more readings taken at different physician visits. In persons over 50, systolic blood pressure greater than 140 is a much more significant CVD risk factor than diastolic blood pressure.

Major Risk Factors That Can Be Changed

- Unhealthy cholesterol levels
  - Lipoproteins: Protein-and-lipid substances in blood that carry fats and cholesterol; classified by size, density, and chemical composition
    - Low-density lipoprotein (LDL): Lipoprotein with moderate amount of protein and large amount of cholesterol; “bad” cholesterol
    - High-density lipoprotein (HDL): Lipoprotein with relatively little cholesterol that helps transport cholesterol out of the arteries; “good” cholesterol
Major Risk Factors That Can Be Changed

- Improving cholesterol levels
  - Raise the HDL levels by exercising, losing weight, quitting smoking, and altering the amount and type of fat you consume
  - Physical inactivity
    - 40 to 60 million Americans are so sedentary that they have high risk for developing CVD
  - Obesity
    - Death from CVD 2 to 3 times higher in obese people
FIGURE 11.1
Travels with cholesterol

1. The liver regulates the body's production of cholesterol, based on the amount of fat and cholesterol that is consumed.

2. Saturated and trans fats in the diet act on the liver to increase the amount of LDL circulating in the blood. Thus saturated and trans fats are more important than dietary cholesterol for raising blood cholesterol to unhealthy levels.

3. The liver packages cholesterol with triglycerides (fat) and sends it into the bloodstream as very low-density lipoproteins (VLDLs).

4. As VLDLs travel through the bloodstream, they are broken down into triglycerides (fat) and cholesterol-rich low-density lipoproteins (LDLs). Triglycerides are used for energy or are stored as fat.

5. LDLs deliver cholesterol to cells throughout the body. High LDL levels cause an excess of cholesterol to be delivered to cells.

6. Cholesterol not used by the cells spills out and collects on artery walls. The resulting plaque buildup inhibits blood flow and may result in a heart attack.

7. High-density lipoproteins (HDLs) seek out excess cholesterol, reducing the amount available for buildup on artery walls. High HDL levels can help reverse heart disease.

8. HDLs return cholesterol to the liver, where it is converted into bile acids for elimination or recycling.
Major Risk Factors That Can Be Changed

- Diabetes
  - People with diabetes are at increased risk for CVD
    - Elevated blood glucose levels can damage lining of arteries
  - Even those whose diabetes is under control face an increased risk of CVD
High Triglyceride levels

- **Triglycerides**: Blood fats absorbed from food and manufactured by the body
- High triglyceride levels reliable predictor of heart disease
  - Reduce level through weight loss, regular exercise, and a diet high in fiber and low in simple sugars and refined carbohydrates and that favors unsaturated over saturated fats
Contributing Risk Factors That Can Be Changed

- Psychological and social factors
  - The cardiovascular system is affected by sudden, acute episodes of mental stress and more chronic, underlying emotions of anger, anxiety, and depression

- Alcohol and drugs
  - Drinking too much alcohol raises blood pressure and can increase risk of stroke and heart failure
Major Risk Factors That Can’t Be Changed

- Heredity
  - Multiple genes contribute to the development of CVD and its risk factors

- Aging
  - For people over 55, the incidence of stroke more than doubles in each successive decade
Major Risk Factors That Can’t Be Changed

- Being male
  - CVD is the leading killer of men and women, but men are more likely to have CVD earlier in life
  - Estrogen production may offer premenopausal women some protection against CVD
  - By age 75, the gender gap disappears
Major Risk Factors That Can’t Be Changed

- **Ethnicity**
  - African Americans have much higher rates of hypertension, heart disease, and stroke than other groups
  - Puerto Rican Americans, Cuban Americans, and Mexican Americans are more likely to suffer from high blood pressure and angina
  - Asian Americans have historically had lower rates of CVD
FIGURE 11.2
Percentage of adult Americans with cardiovascular disease

SOURCE: American Heart Association, 2013 Heart Disease and Stroke Statistics—2013 Update Dallas, Texas: American Heart Association
Major Risk Factors That Can’t Be Changed

- Inflammation
  - When an artery is injured by smoking, cholesterol, hypertension, or other factors, the body’s response is to produce inflammation
  - CRP released into the bloodstream which elevates the risk of heart attack and stroke
Possible Risk Factors Currently Being Studied

- High blood levels of homocysteine associated with increased risk of CVD
- LDL pattern B increase the risk of CVD
  - Exercise, a low fat diet, and certain lipid lowering drugs may help lower CVD risk
- Infectious agents, including Chlamydia pneumoniae, cytomegalovirus, and Helicobacter pylori, may contribute to inflammation in arteries
FIGURE 11.3
Blood supply to the heart
### TABLE 11.2
Cholesterol Guidelines

<table>
<thead>
<tr>
<th>TOTAL CHOLESTEROL (mg/dl)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 200</td>
<td>Desirable</td>
</tr>
<tr>
<td>200–239</td>
<td>Borderline high</td>
</tr>
<tr>
<td>240 or more</td>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LDL CHOLESTEROL (mg/dl)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100</td>
<td>Optimal</td>
</tr>
<tr>
<td>100–129</td>
<td>Near optimal/above optimal</td>
</tr>
<tr>
<td>130–159</td>
<td>Borderline high</td>
</tr>
<tr>
<td>160–189</td>
<td>High</td>
</tr>
<tr>
<td>190 or more</td>
<td>Very high</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HDL CHOLESTEROL (mg/dl)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 40</td>
<td>Low (undesirable)</td>
</tr>
<tr>
<td>40 or more</td>
<td>High (desirable)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRIGLYCERIDES (mg/dl)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 150</td>
<td>Normal</td>
</tr>
<tr>
<td>150–199</td>
<td>Borderline high</td>
</tr>
<tr>
<td>200–499</td>
<td>High</td>
</tr>
<tr>
<td>500 or more</td>
<td>Very high</td>
</tr>
</tbody>
</table>

### Table 11.3
Defining Characteristics of Metabolic Syndrome

<table>
<thead>
<tr>
<th>Abdominal obesity (waist circumference)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>&gt;40 in (&gt;102 cm)</td>
</tr>
<tr>
<td>Women</td>
<td>&gt;35 in (&gt;88 cm)</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>≥150 mg/dl</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>&lt;40 mg/dl or drug-treated</td>
</tr>
<tr>
<td>Women</td>
<td>&lt;50 mg/dl or drug-treated</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>≥110/ ≥ 85 mm Hg or drug-treated</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>≥100 mg/dl or drug-treated</td>
</tr>
</tbody>
</table>

*A person is diagnosed with metabolic syndrome if he or she has three or more of the risk factors listed here.

Atherosclerosis

- Atherosclerosis is a form of arteriosclerosis
  - Cells lining the arteries become damaged
    - **Plaque**: A deposit of fatty (and other) substances on the inner wall of the arteries
    - **Coronary heart disease (CHD)**: Heart disease caused by atherosclerosis in the arteries that supply blood to the heart muscle; also called coronary artery disease (CAD)
    - Blockage of coronary artery causes heart attack
    - Blockage of a cerebral artery causes a stroke
Heart Disease and Heart Attacks

- **Heart attack**: Damage to, or death of, heart muscle, resulting from a failure of the coronary arteries to deliver enough blood to the heart; also known as myocardial infarction (MI)
  - **Angina pectoris**: Condition in which the heart muscle does not receive enough blood, causing severe pain in the chest and often in the left arm and shoulder
Heart Disease and Heart Attacks

- **Arrhythmia**: A change in normal pattern of the heartbeat
- **Sudden cardiac death**: A nontraumatic, unexpected death from sudden cardiac arrest, most often due to arrhythmia; in most instances, victims have underlying heart disease
Heart Disease and Heart Attacks

- Heart attack symptoms may include:
  - Pain or pressure in the chest
  - Pain in the arm, neck, or jaw
  - Difficulty breathing
  - Excessive sweating
  - Nausea and vomiting
  - Loss of consciousness
Heart Disease and Heart Attacks

- Get immediate medical care if symptoms of heart attack occur
  - Tests include stress tests, electrocardiograms, magnetic resonance imaging, and angiograms
  - Treatments include balloon angioplasty, implanting coronary stents, or coronary bypass surgery
Stroke

- **Stroke**: An impeded blood supply to some part of the brain resulting in the destruction of brain cells; also called cerebrovascular accident (CVA)
  - May be ischemic or hemorrhagic stroke
  - Effective treatment requires prompt recognition of symptoms and correct diagnosis of type of stroke
  - Many people have strokes without knowing it
Congestive Heart Failure

- **Congestive heart failure**: Condition resulting from the heart’s inability to pump out all the blood that returns to it; blood backs up in the veins leading to the heart causing an accumulation of fluid in various parts of the body
  - Treatments include reducing heart workload, lowering salt intake, and taking drugs to eliminate fluids
Protecting Yourself Against Cardiovascular Disease

- Eat heart-healthy
  - Decrease fat and cholesterol intake
    - Fat should account for no more than 30% of total daily calories
    - The American Heart Association and 2010 Dietary Guidelines Advisory Committee recommend that no more than 7% of daily calories come from saturated fats
Steps to Take

- Eat heart-healthy
  - Fiber
    - High-fiber diet associated with 40 to 50% reduction in the risk of heart attack and stroke
    - Consume the recommended 25 to 38 grams of dietary fiber a day by eating whole grains, fruits, and vegetables
Steps to Take

- Eat heart-healthy
  - Sodium and potassium
    - Reduce sodium intake while increasing potassium intake to help reduce blood pressure
    - The American Heart Association and 2010 Dietary Guidelines Advisory Committee recommend sodium intake be reduced to no more than 1,500 mg per day
Steps to Take

- Eat heart-healthy
  - Alcohol
    - Moderate alcohol use may increase HDL cholesterol and reduce stroke risk
    - Excessive alcohol use increases risk of serious health problems

- Exercise regularly
  - Moderate amount of physical activity significantly reduces risk of CVD
    - A formal exercise program offers greater benefits
Steps to Take

■ Avoid tobacco
  ▪ Smoking is number-one risk factor for CVD
  ▪ Take steps to prevent exposure to smoke

■ Know and manage your blood pressure
  ▪ If no CVD risk factors exist, have blood pressure measured at least once every two years
  ▪ If your blood pressure is high, follow physician’s advice on lowering it
Steps to Take

- Know and manage cholesterol levels
  - People 20 and over should have cholesterol checked once every five years
- Develop ways to handle stress and anger
- Develop strategies for handling the stress in your life
- Shore up your social support network
FIGURE 11.4
Strategies for reducing your risk of cardiovascular disease

**Do More**
- Eat a diet rich in fruits, vegetables, whole grains, and low-fat or fat-free dairy products. Eat five to nine servings of fruits and vegetables each day.
- Eat several servings of high-fiber foods each day.
- Eat two or more servings of fish per week; try a few servings of nuts and soy foods each week.
- Choose unsaturated fats rather than saturated and trans fats.
  - Be physically active; do both aerobic exercise and strength training on a regular basis.
  - Achieve and maintain a healthy weight.
  - Develop effective strategies for handling stress and anger. Nurture old friendships and family ties, and make new friends; pay attention to your spiritual side.
- Obtain recommended screening tests and follow your physician’s recommendations.

**Do Less**
- Don’t use tobacco in any form: cigarettes, spit tobacco, cigars and pipes, bidis and clove cigarettes.
- Limit consumption of fats, especially trans fats and saturated fats.
- Limit consumption of salt to no more than 2300 mg of sodium per day (1500 mg if you have or are at high risk for hypertension).
- Avoid exposure to environmental tobacco smoke.
- Avoid excessive alcohol consumption—no more than one drink per day for women and two drinks per day for men.
- Limit consumption of cholesterol, added sugars, and refined carbohydrates.
- Avoid excess stress, anger, and hostility.