Lecture 13

Cardiovascular Disease
HEAL 101: Health and Lifestyle
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Objectives

- Discuss the incidence of cardiovascular disease
- Describe the anatomy and physiology of the heart and circulatory system
- Review the various types of heart disease
- Discuss the risk factors for cardiovascular disease
- Determine those risk factors you can and cannot control
- Discuss some of the methods of diagnosing and treating cardiovascular disease

An Epidemiological Overview

- CVD is the leading single cause of death around the world
- It is nearly 2.5 times the rate of the second leading killer, cancer
- More than 2600 Americans die of CVD each day
- ~1 million CVD deaths per year

Heart Function

- Deoxygenated blood enters right atrium
- Atrium moves blood to right ventricle through tricuspid valve and pumps through pulmonary arteries to the lungs
- Lungs oxygenate blood, sending it back to the left atria via the pulmonary veins
- Blood is pumped into the left ventricle through the mitral valve and out to the body via the aorta
Systemic Vessels

- Arteries
  - Carry blood away from the heart - oxygenated
- Arterioles
  - Smaller arteries that terminate into capillaries
- Capillaries
  - Smallest of the blood vessels that exchange oxygen, carbon dioxide, nutrients and waste products with the cells
- Venules
  - Arise from capillaries and bring blood back to heart - deoxygenated
- Veins
  - Form from venules and bring blood back to right atrium via the inferior vena cava

Types of Cardiovascular Disease

- Coronary Heart Disease
  - Blockage of coronary arteries
  - Ischemic Heart Disease - damages heart muscle
- Stroke
  - Blockage of arteries leading to brain
  - Damages brain tissue
- Hypertension
  - High BP - can damage other organs such as kidneys
- Congestive Heart Failure
  - Weak left heart causes fluid to accumulate in lungs

Types of Cardiovascular Disease

- Hyperlipidimia
  - Abnormally high blood lipid level
  - Results in accumulation of plaque on arterial walls
- Congenital Heart Disease
  - Damage to heart muscle or valves at birth
- Rheumatic Heart Disease
  - Damage to heart from Rheumatic Fever
- Other
  - Arrhythmias
  - Rapid or slow pulse

Deaths from Cardiovascular Disease

- 55% Coronary heart disease
- 17% Stroke
- 0.4% Rheumatic fever/rheumatic heart disease
- 0.5% Congenital cardiovascular defects
- 2% Atherosclerosis
- 6% Congestive heart failure
- 5% High blood pressure
- 15% Other
Coronary Heart Disease

- Myocardial infarction (MI) – heart attack
  - Heart suffers permanent damage to myocardium due to blocked blood supply. Ischemia causes death
- Angina pectoris - heart’s O₂ supply reduced due to ischemia; result is chest pain or angina, no necrosis
- Caused by:
  - Coronary artery thrombosis – stationary blood clot
  - Coronary artery embolus – dislodged blood clot or plaque
Heart Attack Movie

Brain cells deprived of adequate oxygen = cerebrovascular accident (CVA) or stroke

Transient ischemic attacks (TIAs) – interruptions of blood supply causing dizziness, weakness, temporary paralysis, memory loss, blurred vision, nausea

Stroke
Hyperlipidemia

- Elevated blood fats
  - Cholesterol
    - HDL
      - Good cholesterol
        - >60 protective
    - LDL
      - Bad cholesterol
    - VLDL
  - Triglycerides

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Hyperlipidemia

- Many doctors use the ratio of total cholesterol to HDL cholesterol in place of the total blood cholesterol. This is obtained by dividing the HDL into total cholesterol.
- For example, if a person has a total cholesterol of 200 mg/dL and an HDL cholesterol level of 50 mg/dL, the ratio would be 4:1.
- The goal is to keep the ratio below 5:1; the optimum ratio is 3.5:1.

Arrhythmias

- Irregularity in heart beat
- Fibrillation – sporadic, quivering pattern with inefficient blood flow through system
- Rapid heart rate
  - Tachycardia
- Slow heart rate
  - Bradycardia

Ventricular Fibrillation and Defibrillation
Congenital & Rheumatic Heart Disease

- **Congenital**
  - Present at birth
  - Holes in heart or abnormal valves
  - Causes irregular sounds or murmurs

- **Rheumatic heart disease**
  - Caused by *streptococcal infection* of the throat
  - Antibodies from immune system may attack heart as well as bacteria
  - Usually in children 5-15 years

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**Risks You Can Control**

- Avoid tobacco
- Cut back on saturated fats
- Monitor your blood chemistry: HDL, LDL and cholesterol
- Eat foods high in olive and canola oil
- Maintain a healthy weight
- Exercise regularly
- Control diabetes
- Control blood pressure
- Control stress
  - Are you Type A or Type B?
Risks You Cannot Control

- Heredity – a family history of heart disease is a significant risk
- Age – 75% of all heart attacks occur in people over age 65
- Gender – men are at much greater risk, except for women who:
  - Take oral contraceptives; have high blood pressure or kidney disease
- Race – blacks are at 45% greater risk for hypertension and CVD than whites, and blacks have less chance of surviving heart attacks

Diagnosing & Treating Heart Disease

Angioplasty

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Angioplasty vs. Bypass Surgery

- Coronary Artery Bypass Grafting
  - Blood vessel rerouted or taken from another site in patient's body and implanted to bypass blocked arteries
- Angioplasty
  - Fewer risks
  - Balloon is threaded through blocked coronary artery and flattens any deposits against the artery walls

Aspirin ~ Can It Help?

- 80 milligrams daily is beneficial to heart patients due to blood thinning properties
- Preventive strategy for individuals with no current heart disease symptoms
- Major concern for those with gastrointestinal intolerance or people with blood clotting difficulties.

Cardiac Rehabilitation

- Increases stamina and reduces CVD risks
- Involves exercise training and health education classes on nutrition
- Exercise can cause the formation of collateral circulation
- Benefits of cardiac rehabilitation far outweigh risks when conducted by certified health professionals