Which of the following best describes the physical activity performed in my leisure time?

- A. I perform vigorous physical activity 3X/week for 20 minutes each time
- B. I perform sustained activity (any intensity) 5X/week for 30 minutes each time
- C. I perform no physical activity because I am too busy studying!

USDHHS & AHA Recommendations

- **USDHHS = U.S. Department of Health & Human Services**
  - Recommends that healthy adults perform 150 minutes/week of moderate physical activity, or 75 minutes/week of vigorous physical activity, or some combination thereof
- **AHA = American Heart Association**
  - Recommends that healthy adults perform 30 minutes or more of moderate intensity physical activity on five, and preferably all, days of the week.
Normal Physiologic Response to Acute Aerobic Exercises

- Heart Rate
- Stroke Volume
- Cardiac Output
- Blood Flow
- Blood Pressure
- Pulmonary Ventilation

Why do we need to know the normal physiologic responses to acute aerobic exercise?

Abnormal Physiologic Response to Acute Aerobic Exercises

- Keep in mind that “abnormal responses can occur in individuals without known or documented disease.
- Routine monitoring of exercise response is important.
- In general, responses that are inconsistent with the normal responses described previously are considered abnormal.”
Risk Factors for Cardiac Disease

- **Modifiable Factors:**
  - Cholesterol – greater than 200 mg/dL
  - Hypertension
  - Smoking
  - Atherogenic diet
  - Physical inactivity
  - Stress

- **Non-Modifiable Factors:**
  - Age – risk increases with age
  - Sex – male > female
  - Family history

- **Secondary Factors:**
  - Alcohol consumption
  - Obesity
  - Coping with stress
  - Diabetes mellitus
  - Peripheral vascular disease
Symptoms of Cardiac Disease

- Chest pain
- Shortness of breath
- Cardiac arrhythmia (palpitation)
- Fainting
- Claudication
- Cyanosis of lips and nailbeds
- Fatigue
- Edema

Cardiac System Pathology

- **Atherosclerosis:**
  - Progressive accumulation of fatty plaques on the inner walls of blood vessels
  - This process begins in childhood
  - Over time, the plaque can block blood flow, leading to a heart attack or stroke

- **Coronary Artery Disease (CAD):**
  - Narrowing or blockage of the coronary arteries
  - This produces ischemia & necrosis of the myocardium
  - CAD includes thrombus, vasospasms, & atherosclerosis
  - CAD results from inheritance, environment, culture, nutrition, & smoking
Cardiac System Pathology

- **Congestive Heart Failure (CHF):**
  - Usually results from CAD
  - When the heart is unable to maintain adequate cardiac output
  - Characterized by abnormal fluid retention & congestion of pulmonary &/or systemic circulation
  - CHF = not a disease, but a symptom of heart muscle or valve pathology

Anatomical Illustrators

- Draw the heart on the board and indicate blood flow through the heart

Right Sided Heart Failure

- Elevated end-diastolic right ventricular pressure
- Systemic congestion
- Fatigue
- Oliguria, nocturia
- Cyanosis
- Pleural effusion
- Anorexia & bleeding
- Unexplained weight gain
Left Sided Heart Failure

- Elevated end-diastolic left ventricular pressure
- Pulmonary congestion
- Fatigue
- Oliguria
- Cyanosis
- Tachycardia

Cardiac System Pathology

**Aneurysm:**
- **Definition:** When a vessel wall becomes weak and produces a sac-like area
- **Etiology:** genetic disposition, trauma, infection
- **Most common sites:** aorta, abdominal aorta, femoral & popliteal arteries
- **Surgical repair PRIOR TO rupture = good prognosis**
- **Ruptured aneurysm = a medical emergency (high mortality rates)**

Cardiac System Pathology

**Symptoms of Aneurysm:**
- Dependent on site
- Intermittent or constant pain
- Abnormal heart beat
- Serious complications can occur
  - MI, stroke, renal failure, embolization
Cardiac System Pathology

• **Angina Pectoris:**
  – Temporary pain that occurs when the coronary arteries are unable to supply the heart with adequate oxygen

• **Symptoms:**
  – Temporary pain (usually lasting 1-5 minutes)
  – Sudden onset
  – Pain may radiate
  – Usually relieved with rest or nitroglycerin

Cardiac System Pathology

• **Myocardial Infarction (MI):**
  – Irreversible damage to a section of heart muscle due to prolonged ischemia

Cardiac System Pathology

• **Symptoms of Myocardial Infarction (MI):**
  – Severe chest pain
  – Chest heaviness
  – Radiating pain down one or both arms
  – Weakness
  – Nausea
  – Vomiting
  – Diaphoresis
  – Shortness of breath
Cardiac System Pathology

**Diagnosis of MI**
- Abnormal ECG
- Elevation in enzyme level
  - Creatine phosphokinase (CPK)
  - Aspartate aminotransferase (AST)
  - Lactate dehydrogenase

Cardiac System Pathology

**Infective Endocarditis:**
- Inflammation of the endothelium that lines the heart and cardiac valves
- Most commonly damages the mitral valve, the aortic & tricuspid valves
- Most commonly caused by bacteria that is normally present in the body
- Can occur after invasive medical or dental procedures
- At risk patients take antibiotic prophylaxis
- Once infected, not easily diagnosed or treated

Cardiac System Pathology

**Symptoms of Infective Endocarditis:**
- May have sudden onset or be asymptomatic for months
- Chest pain, CHF, clubbing
- Arthralgia, arthritis, acidosis
- Myalgia, low back pain
- Meningitis, stroke, confusion
Cardiac System Pathology

• **Myocarditis:**
  – Uncommon condition
  – Inflammation of the myocardium muscle itself
  – Usually due to infection
  – Can be treated with antimicrobial therapy
  – If left untreated, can quickly progress to heart failure

Cardiac System Pathology

• **Symptoms of Myocarditis:**
  – Mild, low-level chest pain
  – Soreness in the epigastric region
  – Fatigue
  – palpitations

Cardiac System Pathology

• **Pericarditis:**
  – Inflammation of the pericardium (the outer membrane) of the heart
  – May be acute or chronic, painful or asymptomatic
  – Etiology often unknown, but has been linked to infection, MI, radiation, post cardiac surgery, metabolic disorders, & aortic dissection
  – Prognosis = good
  – If left untreated, patient can experience shock or death
Cardiac System Pathology

- **Rheumatic Heart Disease:**
  - The result of damage to the heart due to inflammation from rheumatic fever.
  - Rheumatic fever occurs due to strep & can affect all connective tissues of the heart, joints, and CNS & frequently damages cardiac valves.

- **Symptoms:**
  - Carditis with chest pain
  - Acute onset of polyarthritis
  - Chorea [http://www.youtube.com/watch?v=OveGZdZ_sVs](http://www.youtube.com/watch?v=OveGZdZ_sVs)
  - Arthralgias & weakness
  - Fever
  - Palpitations

What are the most important points for you to know as a clinician from this lecture?

Questions???