CARDIOVASCULAR DISEASE (CVD)

- Major cause of death in U.S. and Europe
- Includes hypertension, coronary heart disease, congestive heart failure, and stroke
- No longer a disease of men or the elderly
- Associated with inactivity
Cardiovascular Disease

- Worldwide CVD may be responsible for 16.7 million deaths annually
- In developed countries, 15%-20% of annual deaths are due to CVDs
CVD IN SOUTH AFRICA – HEART STOPPING STATISTICS!

Every day in SA
33 people die of heart attack

Every day in SA
60 people die of stroke

Every day in SA
37 people die of heart failure

Every day in SA
200 people die of some form of CVD (2004 data)
Coronary Heart Disease (CHD)

• Greatest killer among all diseases

• Diseases of the heart caused by a lack of blood flow to heart muscle, resulting from atherosclerosis
Atherosclerosis

http://www.youtube.com/watch?v=M0NF2ODfd9E
Plaque That Has Been Surgically Removed from Coronary Artery

Courtesy Ronald D. Gregory and John Riley, MD.
Myocardial Ischemia and Angina

**Angina pectoris:** Chest pain that is typically severe and crushing with a feeling just behind the sternum of pressure and suffocation, due to an inadequate supply of oxygen to the heart muscle. The term "angina pectoris" comes from the Latin "angere" meaning "to choke or throttle" + "pectus" meaning "chest".

**Myocardial Ischemia:** A disorder of cardiac function caused by insufficient blood flow to the muscle tissue of the heart. The decreased blood flow may be due to narrowing of the coronary arteries due to obstruction by a thrombus. Severe interruption of the blood supply to the myocardial tissue may result in death of cardiac muscle (myocardial infarction).
Arteriosclerosis

- Hardening of the arteries due to conditions that cause the arterial walls to become thick, hard, and nonelastic
CHD Risk Factors

• Family history
• Hypercholesterolemia
• Hypertension
• Current cigarette smoking
• Impaired fasting glucose (diabetes)
• Obesity
• Physical inactivity
Physical Activity and CHD

- 22% worldwide cases of CHD related to physical inactivity
- Lower incidence of MI and CHD mortality
- Reduce risk of CHD
- Physical fitness = NB risk factor for CHD than PA
Blood Pressure

• Typical BP for the average person:

  120  Systolic: When the heart is contracting
  80  Diastolic: When the heart is relaxing

• BP unit of measurement:

  milligrams of mercury (mmHg)
Hypertension

• High blood pressure
• Excessive pressure against the walls of the arteries

• Systolic BP >140
• Diastolic BP >90
Pre-hypertension

- BP = higher than normal but not high enough to be considered hypertension
  - SBP 120-139 mmHg
  - DBP 80-89 mmHg
BP Response to Exercise

• Inverse relationship btwn Resting BP & levels of PA

<table>
<thead>
<tr>
<th>Ex Prescription to Reduce BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Intensity</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Duration</td>
</tr>
</tbody>
</table>
Hypercholesterolemia & Dyslipidemia

http://www.youtube.com/watch?v=6_pT_uL2b3E

• Hypercholesterolemia = high total cholesterol (TC)
• Also known as hyperlipidemia (high blood lipid levels)
Hypercholesterolemia and Dyslipidemia (continued)

• Dyslipidemia = abnormal blood lipid level
  – High TC and/or
  – High low-density lipoproteins (LDL-C) and/or
  – Low high-density lipoproteins (HDL-C)
Lipoproteins
Fat-carrying proteins in blood
# Lipoproteins

**LDL**
- Deposit in arterial walls
- Bad cholesterol
- High levels
  - stimulate formation of plaque
  - increase risk of CHD
- <100mg.dL

**HDL**
- Picks up cholesterol and helps remove it from the body
- Good cholesterol
- >45mg.dL
- NB screening both HDL-C & TC
Lipids Response to Exercise

- Endurance exercise reduces triglycerides & increases HDL-C
- TC & LDL-C are lowered ONLY when exercise training increases lean body mass & decreases body fat
- Resistance training no effect on HDL-C &
Cigarette Smoking

• Largest preventable cause of disease and premature death
  – Smokers’ risk of heart attack is 2 times nonsmokers’,
  – Smoking is linked to CHD, stroke, chronic lung disease, and several cancers
Cigarette Smoking (continued)

• Risk for CHD declines rapidly with quitting
  – Risk declines 50% in the first year
Type 1 Diabetes

- Usually occurs before age 30
- However, can develop at any age
- Not as common as type 2
Type 2 Diabetes

- Most common form of DM
- 90-95% have type 2 diabetes
- Healthy lifestyle choices decrease risk
- Reduction of DM = associated with the frequency of vigorous exercise
Obesity and Overweight

• Categories defined by body mass index (BMI)
  – BMI = [kg/(m$^2$)]
  – Overweight = BMI between 25-29.9 kg/m$^2$
  – Obese = BMI $\geq$ 30 kg/m$^2$
Obesity and Overweight (continued)

- Obesity shortens life expectancy and increases risk for the following:
  - CHD
  - DM
  - Hypercholesterolemia
  - Hypertension
  - Osteoarthritis
  - Some cancers
Causes of Obesity and Overweight

- Some evidence for genetic source
- Majority of evidence points to environment
GENETICS

• Running in the family??

• Genetics 15% accountable for obesity

• Genetics alone cannot explain this epidemic....
Metabolic Syndrome

- Cluster of specific CVD risk factors
- Must have at least 3 of those risk factors
- Increases risk of CHD and DM
Table 1.4  Risk Factors for Metabolic Syndrome*

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Risk criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waist circumference</td>
<td>&gt;102 cm (&gt;40 in.) for men</td>
</tr>
<tr>
<td></td>
<td>&gt;88 cm (&gt;35 in.) for women</td>
</tr>
<tr>
<td>Blood pressure (BP)</td>
<td>≥130 mmHg (systolic BP) or ≥85 mmHg (diastolic BP) or both</td>
</tr>
<tr>
<td>Fasting blood glucose</td>
<td>≥100 mg·dl⁻¹ or ≥6.1 mmol·L⁻¹</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>≥150 mg·dl⁻¹ or ≥1.6 mmol·L⁻¹</td>
</tr>
<tr>
<td>High-density lipoprotein cholesterol (HDL-C)</td>
<td>&lt;40 mg·dl⁻¹ or &lt;1.04 mmol·L⁻¹ for men</td>
</tr>
<tr>
<td></td>
<td>&lt;50 mg·dl⁻¹ or &lt;1.29 mmol·L⁻¹ for women</td>
</tr>
</tbody>
</table>

*Metabolic syndrome is defined as three or more risk factors.

National Cholesterol Education Program 2001
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Musculoskeletal Issues

- Physical inactivity contribute to musculoskeletal diseases and disorders
- Osteoporosis
- Osteopenia
- Low back pain