Exercise and the heart

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Outline

- Review specific benefits of exercise
- Discuss the risks associated with exercise
- Know the cardiovascular risk assessments
- List the current recommendations on exercise
“All parts of the body if used in moderation and exercised in labors to which each is accustomed, become thereby healthy and well developed, and age slowly; but if unused and left idle, they become liable to disease, defective in growth, and age quickly.”

Hippocrates
Professor Jeremy Morris
London
1950

Physical Activity at Work and Coronary Artery Disease, 31,000 London Transport Workers

Rate/1000

- Drivers
- Conductors

Coronary Occlusion
Early Mortality*
*Within 3 days of MI

Morris JN et al. Lancet 1953
Increase in the peer evidence literature

![Graph showing Increase in peer evidence literature](chart.png)

**Articles/Period-Web of Science**

Physical Activity or Physical Fitness and Cardiovascular Disease

# of Articles

- 1950-59
- 1960-69
- 1970-79
- 1980-89
- 1990-94
- 1995-99
- 2000-04
- 2005-06

*Estimated from # Published 2005 to 11/7/06*
Benefits of Exercise on the Heart

- **Reduces the incidence of CAD**
  - Most physically Active have CAD rates half those of the most sedentary
  - Graded relationship of decreasing CAD rate with increasing physical activity

- **Manage some CAD risk factors:** lipids; hypertension; glucose intolerance; obesity
  - 4.6% increase in HDL and decrease LDL by 5%
    (meta-analysis; Circulation 2001)

- **Treating patients with CAD; HF; claudication**
  - Exercise-based cardiac rehab reduces mortality rate in patients after MI; angioplasty; CABG; angina
    (Cochrane database 2000)
Relative risks of death from any cause among participants according to their exercise capacity

Risks of Physical Activity

Most studies of exercise-related cardiovascular events are associated with sports participation in young athletes and vigorous exercise in adults.
Most common risk is musculoskeletal risk

- Cohort of community adults with average activity
  - 25% reported musculoskeletal injury over 1 year
  - 1/3 of injured stopped exercising

- Risk of injury increases with obesity, vigorous exercise
Risks of Physical Activity

Vigorous Physical Activity increases the risk of sudden cardiac death; MI among individuals with diagnosed and occult heart disease

- 1 exertion related death per year for every 15,000 to 18,000 healthy men (Athletes)

- 1 death per 82,000 member of fitness facility
  (61 male and 10 females out of 3 million member over 2 years)

- 5-10% of MIs are associated with vigorous activity
Risks of Physical Activity

RR of exercise-related MI and sudden death are greatest in those who are least physically active

RR of cardiac arrest during vigorous exercise compared to all other times of the day is 56 times greater among men who exercise infrequently and only 5 times greater among men who exercise frequently

On the other hand
Overall risk of developing cardiovascular disease 25-50%
Pathologic basis for Exertion-related cardiovascular events

- Young individuals (<30 years of age)
  - Congenital abnormalities: HCM, Coronary artery anomalies; aortic stenosis; arrhythmias

- Adults
  - Coronary artery disease is the culprit
  - Among asymptomatic adults, plaque disruption is common
Pre participation Screening

- Young Athletes
  - AHA recommends cardiovascular screening for high school and college athletes at 3-4 year interval with a questionnaire and physical exam

- No need for routine EKG
Preparticipation Screening

**Adults**

<table>
<thead>
<tr>
<th>ACC/AHA</th>
<th>ACSM</th>
<th>USPSTF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic persons with DM who start vigorous exercise (IIa)</td>
<td>Asymptomatic persons with DM who start vigorous exercise</td>
<td>Against routine exercise testing of low risk adults in general and insufficient evidence for stress test before training</td>
</tr>
<tr>
<td>Asymptomatic men &gt;45 and women &gt;55 who start vigorous exercise (IIb)</td>
<td>Asymptomatic men &gt;45 and women &gt;55 and those who has &gt;2 risk factors who start vigorous exercise</td>
<td></td>
</tr>
</tbody>
</table>
Pre participation Screening and Risk stratification in patients with CAD

- Class A: Apparently Healthy
  - Under 40 years with no symptoms or known presence of heart disease or major coronary risk factors
  - Individuals of any age without known heart disease or major risk factors and have normal exercise test

Activity guidelines: no restrictions
ECG and blood pressure monitoring: not required
Supervision required: none
Pre participation Screening and Risk stratification in patients with CAD

Class B: Presence of known, stable cardiovascular disease with low risk for vigorous exercise

- CAD (MI, CABG, angioplasty, stable angina) whose condition is stable
- Valvular heart disease
- Cardiomyopathy

AND the following clinical Symptoms
- NYHA class 1 and 2
- No evidence of heart failure
- Free of ischemia at rest or on exercise test below 6 METS

Activity guidelines: Individualized

ECG and blood pressure monitoring: During early phase for 6-12 sessions

Supervision required: Initially
Pre participation Screening and Risk stratification in patients with CAD

- **Class C:** Moderate to high risk for cardiac complications during exercise
  - CAD (MI, CABG, angioplasty, stable angina, valvular heart disease)
  - Cardiomyopathy
  - Low EF <30%
  - Three vessel disease or left main
  - **AND the following clinical Symptoms**
    - NYHA class 3 or greater
    - 2 or more MIs
    - Exercise capacity less than 6 METS

**Activity guidelines:** Individualized

**ECG and blood pressure monitoring:** Continuous till safety is established

**Supervision required:** Medically until safety is established
Pre participation Screening and Risk stratification in patients with CAD

- Class D: Unstable diseases
  - Unstable angina
  - Decompensated heart failure
  - Uncontrolled arrhythmias
  - Severe AS

Activity guidelines: No activity
Treat until back to class C or less
To promote and maintain health

- All healthy adults 18-65 need moderate intensity aerobic physical activity for a minimum of 30 minutes on 5 days of the week or vigorous exercise for minimum of 20 minutes on three days of the week in addition to routine daily living activities.

- Every adult should perform activities that maintain or increase muscular strength and endurance a minimum of two days each week.
Updated Recommendation for Adults
ACSM and AHA
Circulation 2007

To promote and maintain health

- **Combinations** of moderate-vigorous are beneficial

- **Bouts** of 10 or more minutes to accumulate towards the target is beneficial

- To improve fitness or reduce risk of diseases should exceed the minimum recommendation
# What is moderate/vigorous exercise

<table>
<thead>
<tr>
<th>Light</th>
<th>Moderate</th>
<th>Heavy/Vigorous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking, slowly</td>
<td>Walking, briskly</td>
<td>Walking, briskly uphill</td>
</tr>
<tr>
<td>Cycling, stationary</td>
<td>Cycling, pleasure</td>
<td>Cycling, fast</td>
</tr>
<tr>
<td>Swimming, slow treading</td>
<td>Swimming, moderate</td>
<td>Swimming, fast treading</td>
</tr>
<tr>
<td>Calisthenics, stretching</td>
<td>Calisthenics, general</td>
<td>Calisthenics, aerobic dance</td>
</tr>
<tr>
<td>Golf, power cart</td>
<td>Golf, pulling/carrying clubs</td>
<td>Racket sports (competitive)</td>
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<tr>
<td>Bowling</td>
<td>Fishing, standing/casting</td>
<td>Fishing in stream</td>
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<tr>
<td>Fishing, sitting</td>
<td>Canoeing, leisure</td>
<td>Canoeing, rapid (&gt; 4 mph)</td>
</tr>
<tr>
<td>Boating, power</td>
<td>Home care, general cleaning</td>
<td>Moving furniture</td>
</tr>
<tr>
<td>Home care, sweeping/vacuuming</td>
<td>Mowing, power mower</td>
<td>Mowing, hand mower</td>
</tr>
<tr>
<td>Mowing lawn, riding mower</td>
<td>Mowing, power mower</td>
<td></td>
</tr>
<tr>
<td>Home repair, carpentry</td>
<td>Home repair, painting</td>
<td></td>
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</tbody>
</table>

*Data from Ainsworth et al., Leon, and McArdle.*

http://prevention.sph.sc.edu/tools/compendium.
Your health. Your choice.

Thank you