Exercise and Cardiovascular Disease

Eli M Friedman, MD FACC

Clinical Cardiology
Memorial CVI

Sports Cardiology
Memorial Sports Medicine Center
Disclosures

• None
Objectives

• Identify the recommended activity levels
• Describe benefits of exercise in the prevention and treatment of cardiovascular disease
• Identify ways to improve exercise compliance
Case

- 48 year old male PMH of Stage I hypertension in for a preventative cardiac evaluation due to a family history of coronary artery disease
- Asymptomatic
- Nonsmoker, rare social alcohol
- Sedentary desk job
- Goes for occasional walks with his wife, not on a dedicated exercise program
  - Though he wants to start
- Adheres to no specific diet and is aware he makes bad choices at times
- Father underwent bypass in his 60s, mother with a stent in her 70s, brother has an elevated calcium score and is on a statin
Case

• Exam
  – Blood pressure 136/92, HR 89, weight 223 lbs, BMI 29
  – No significant abnormalities

• Labs
  – Total cholesterol 224, HDL 32, LDL 160, triglycerides 156
  – Others normal
Case

• What is the next best step?

  1) Coronary calcium score
  2) Initiate anti-hypertensive treatment
  3) Assess barriers to healthy diet and implement a therapeutic dietary strategy
  4) Assess barriers to exercise and implement a therapeutic exercise program
Exercise

• How much should we be doing?
  – 150 minutes of moderate intensity/week
    • Conversational, sweating
  – 75 minutes of high intensity/week
    • Yes/No, huffing and puffing
  – Done in at least 10 minute intervals, 20 minutes best

https://www.who.int/dietphysicalactivity/factsheet_adults/en/
Accepted Manuscript

Arnett et al.
2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease
A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines

Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Geriatrics Society, the American Society of Preventive Cardiology, and the Preventive Cardiovascular Nurses Association

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*Contributed equally to the writing
†Retired
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# Exercise and Physical Activity

## Recommendations for Exercise and Physical Activity

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>I</td>
<td>B-R</td>
<td>1. Adults should be routinely counseled in healthcare visits to optimize a physically active lifestyle.</td>
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<tr>
<td>I</td>
<td>B-NR</td>
<td>2. Adults should engage in at least 150 minutes per week of accumulated moderate-intensity or 75 minutes per week of vigorous-intensity aerobic physical activity (or an equivalent combination of moderate and vigorous activity) to reduce ASCVD risk.</td>
</tr>
</tbody>
</table>
FIGURE 7.1. Percentage of adults aged 18 and over who met 2008 federal physical activity guidelines for aerobic activity through leisure-time aerobic activity: United States, 2006–September 2018

SOURCE: NCHS, National Health Interview Survey, Sample Adult Core component
Figure 7.2. Percentage of adults aged 18 and over who met 2008 federal physical activity guidelines for aerobic activity through leisure-time aerobic activity, by age group and sex: United States, January–September 2018

In this chart, the percentage of adults who met the 2008 federal physical activity guidelines for aerobic activity through leisure-time activity are broken down by age group and sex. The height represents percentage who met the 2008 guidelines. Colors represent sex categories: total, male and female. Clusters of bars are shown for age categories: 18 and over, 18–24, 25–64, 65–74, and 75 and over. The view is filtered by year and data range for the most current year.

SOURCE: NCHS, National Health Interview Survey, Sample Adult Core component
Figure 7.3. Age-sex-adjusted percentage of adults aged 18 and over who met 2008 federal physical activity guidelines for aerobic activity through leisure-time aerobic activity, by race and ethnicity: United States, January–September 2018
Percentage of population engaged in sports and exercise on an average day, by sex, 2003–15

Click legend items to change data display. Hover over chart to view data. 

Figure 1: Change in the annual number of men, women and overall finishers 'Ironman Hawaii' from 1985 to 2012.

Worldwide trend ultramarathon finishers
Does Sitting Worsen Health?

_CENTRAL ILLUSTRATION:_ Joint Associations of Sitting and Physical Activity Time and All-Cause Mortality Events

How Does Exercise Improve CV Health?

Cardioprotective Mechanisms of Physical Activity

Psychologic
- ↑ Social Interactions
- ↓ Psychosocial Stress
- ↓ Depression

Anti-Arrhythmic
- ↑ Heart Rate Variability
- ↓ Adrenergic Activity
- ↑ Vagal Tone

Anti-Thrombotic
- ↑ Fibrinolysis
- ↓ Platelet Adhesion
- ↓ Fibrinogen
- ↓ Blood Viscosity

Anti-atherosclerotic
- ↑ Insulin Sensitivity
- ↑ HDL / ↓ LDL
- ↓ Triglycerides
- ↓ Blood Pressure
- ↓ Adiposity
- ↓ Inflammation

Hemodynamics
- ↑ Coronary Flow
- ↑ EPCs and CACs
- ↓ Myocardial O₂ Demand
- ↓ Endothelial Dysfunction
- ↑ Nitric Oxide

## Physical Activity and Secondary Prevention

### Table 2

<table>
<thead>
<tr>
<th>First Author (Ref. #)</th>
<th>Subjects</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>Myers et al. (67)</td>
<td>0.213 men (3,679 with abnormal stress or documented CHD)</td>
<td>Peak exercise capacity in METs was the strongest predictor of death both in normal subjects and those with CVD. Each 1-MET increase in exercise capacity conferred a 12% improvement in survival.</td>
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<td>Clark et al. (72)</td>
<td>21,293 pts with C-HD (from 63 randomized trials)</td>
<td>Comparison of the effects of cardiac prevention programs with or without exercise. Overall, the summary risk ratio was 0.95 (95% CI: 0.77 to 0.94) for all-cause mortality and 0.83 (95% CI: 0.74 to 0.94) for recurrent MI at 12 months. Risk factor education + exercise program: 0.88 (95% CI: 0.74 to 1.04) for mortality and 0.62 (95% CI: 0.44 to 0.97) for myocardial infarction. Risk factor education alone: 0.87 (95% CI: 0.76 to 0.99) for mortality and 0.86 (95% CI: 0.72 to 1.03) for myocardial infarction. Exercise program alone: 0.72 (95% CI: 0.34 to 0.99) for mortality and 0.76 (95% CI: 0.57 to 1.01) for myocardial infarction.</td>
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<tr>
<td>Tylor et al. (73)</td>
<td>8,940 pts with C-HD from 48 trials</td>
<td>Cardiac rehabilitation was associated with reduced all-cause mortality (OR: 0.89, 95% CI: 0.68 to 1.00) and cardiac mortality (OR: 0.76, 95% CI: 0.51 to 0.96). There were greater reductions in total cholesterol, triglyceride levels, systolic blood pressure, and lower rates of self-reported smoking. There were no significant differences in the rates of nonfatal myocardial infarction and revascularization, and no changes in high- and low-density lipoprotein cholesterol levels and diastolic blood pressure.</td>
</tr>
<tr>
<td>Wannamethee et al. (74)</td>
<td>5,934 men with C-HD</td>
<td>The lowest risks for all-cause and cardiovascular mortality were seen in light and moderate activity groups (adjusted relative risk compared with inactive/occasionally active: light 0.42 (0.25 to 0.71); moderate 0.47 (0.24 to 0.92); and moderately vigorous/vigorous 0.63 (0.39 to 1.03). Recreational activity of 24 h/weekend, moderate or heavy gardening, and regular walking (&gt;40 min/day) were all associated with a significant reduction in all-cause mortality.</td>
</tr>
<tr>
<td>Steffen-Batey et al. (78)</td>
<td>406 Mexican American and non-Hispanic white women and men MI survivors</td>
<td>Over a 7-y period, the relative risk (95% CI) of death compared with the sedentary no change group was as follows: 0.21 (0.10 to 0.44) for the active, no change group; 0.11 (0.03 to 0.46) for the increased activity group; and 0.39 (0.26 to 0.90) for the decreased activity group. The relative risk of reinfarction was as follows: 0.40 (0.24 to 0.66) for the active, no change group; 0.22 (0.10 to 0.54) for the increased activity group; and 0.03 (0.05 to 1.42) for the decreased activity group.</td>
</tr>
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</table>

Fletcher, G.F. et al. J Am Coll Cardiol. 2018; 72(14) 1622-39
But.....
Caveats

- Atrial fibrillation increases on the high end
- Coronary calcium higher on high end in men versus sedentary men
Figure 1. Tukey Box-and-whisker plot of coronary artery calcium (CAC) scores in male athletes and relatively sedentary healthy males with CAC ≥1 Agatston units. *Control outliers 226 to 570. **Athlete outliers 723 to 3422.
How Do We Assess?

**CENTRAL ILLUSTRATION: PA/PI and CVD Prevention**

**Consequences of Physical Inactivity**
- Energy Imbalance
- Oxidative Stress
- SM Dysfunction
- Glycemic Dysreg.
- Inflammation
- Vascular Dysfunction

**Caregivers of Health Promotion**
- Strong Physician PA Endorsement
- Referral to Specialists

**Physical Activity (PA)**
- **Personal Action**
  - Identify personal PA barriers
  - Develop self-regulatory skills for long-term PA adherence
  - Set PA goal
  - Self-monitor (i.e., wearables)
  - Feedback about progress
  - Evaluate progress and correct
  - Goal setting

- **Education & Community**
  - Disseminate PA education through outpatient clinics, PA specialist referrals
  - Identify evidence-based community wellness programs that facilitate PA behavior change

- **Societal Factors**
  - Public parks and playgrounds associated with active residents
  - Outdoor gyms: affordable exercise
  - Promote use of active transportation

**Mortality Risk**

Take Home Points

• Exercise is good for all of us, but still almost half of the population is not doing enough
  – Sitting is BAD!

• Exercise has positive impacts across the CV health spectrum

• We need to actively question our patients about exercise at every visit and engage on how to improve and maintain
Thank you