Exercise and it's Role in the Secondary Prevention of Cardiac Disease

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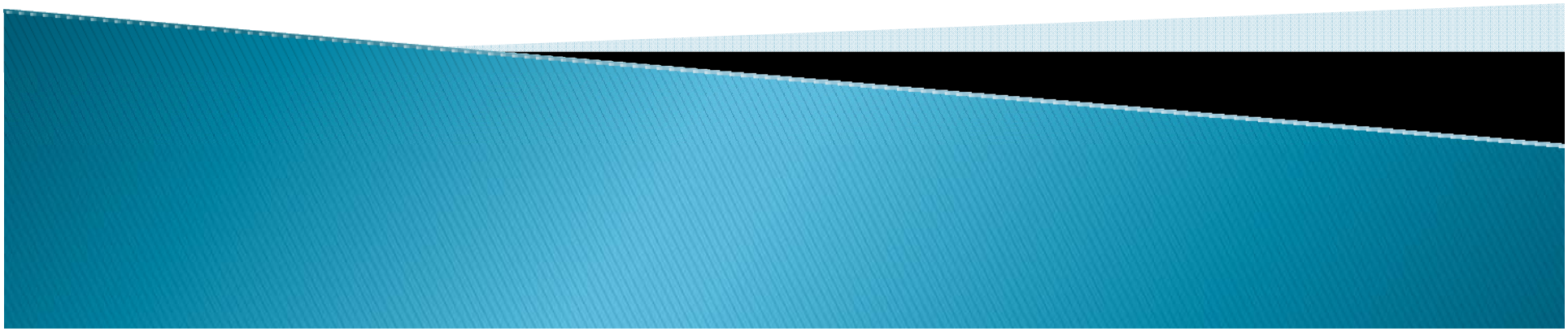


Scope of the Problem

- 12 percent of mortality in the US is related to decreased physical activity
- Lack of activity is associated with at least a 2 fold increase in coronary events
- Only 10-20% of eligible patients are referred for cardiac rehabilitation
  - Women, non-whites and those >65 years of age are particularly underrepresented
  - Co-morbidities, insurance coverage and geographic issues are also limiting factors

Potential Benefits

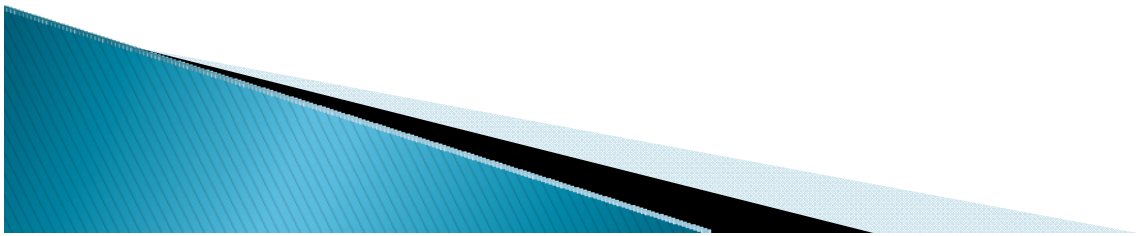
- 2005 Meta-analysis of supervised exercise
  - 21,295 secondary prevention patients
- Recurrent MI
  - 17% one year reduction
  - 24% two year reduction
- All-cause mortality
  - 28% one year reduction
  - 47% two year reduction
- Similar to results published >20 years ago and multiple current studies
- Similar benefit in contemporary environment of early PCI and multi-drug therapy

Special Populations

- Stable CAD – 20 minutes of exercise daily
  - One year MACE reduced from 88 to 70%
- Post PCI
  - Medicare patients 30% mortality reduction
  - Olmsted County – 50% reduction in 5 year all cause mortality
- Depression
  - 22% mortality compared to 5% non-depressed
  - Completing rehab reduced mortality from 30% to 8%
- Reduced LV function – 6 month training
  - LV EF increased from 34% to 38%
  - Earlier start had greatest benefit

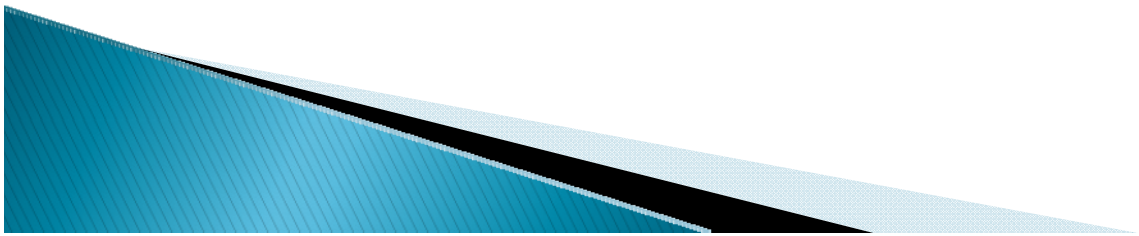
Special Populations

- Older patients
  - Attendance matters
    - 4 year reduction in recurrent MI and mortality
  - Equal benefits
    - <65 vs. 65 – 74 vs. ≥ 75 years old
  - Increased maintenance of independent living
  - Frail obtain greatest results
    - Lesser fitness prior to exercise program
  - No increase in complications or adverse outcomes



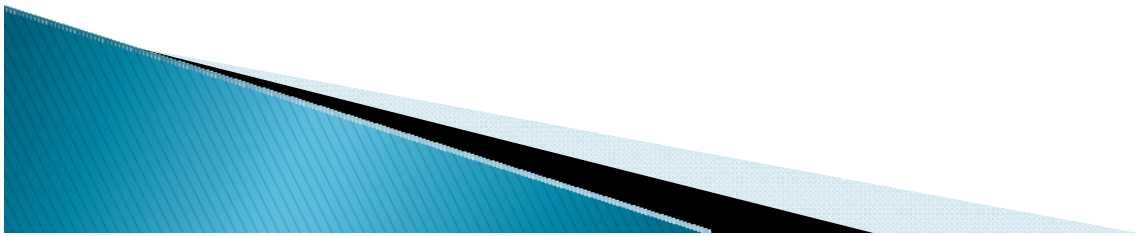
Potential Mechanisms

- Improvement in lipid profile
  - Reduces triglycerides
  - Increases HDL
  - Variable effects – Total, LDL and VLDL cholesterol
- Reduction in blood pressure
  - 5-15 mmHg in 4 weeks of moderate level exercise
- Ischemic pre-conditioning
  - Collateral development



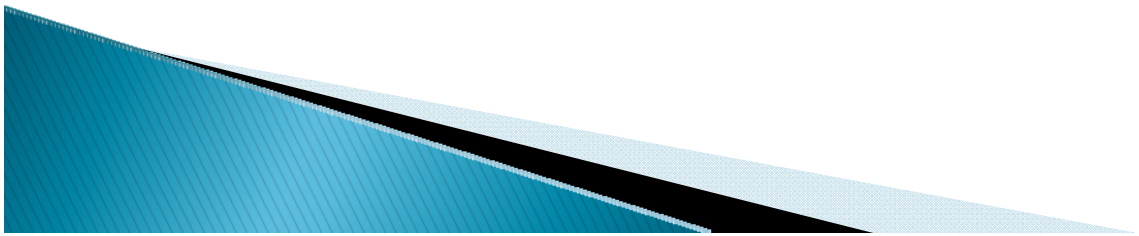
Potential Mechanisms

- Treat/prevent type 2 diabetes
  - Improved glucose utilization
  - Decreased insulin resistance
  - Lower rate of progression to overt type 2 DM
- Reduce inflammation/atherogenesis
  - HsCRP reduced
  - Reduces atherogensis of monocytes
  - Decreases atherogenic cytokines
  - Increases atheroprotective cytokines



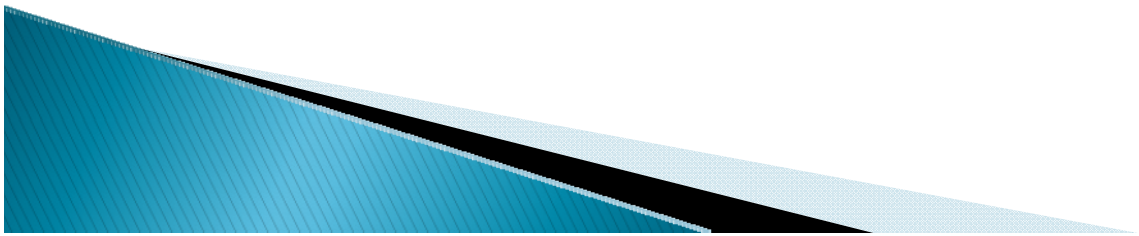
Risks

- Mortality
  - 1 per 1.51 million exercise episodes (Physicians Health Study)
  - 1.3 per million hours in cardiac rehabilitation setting
- Major adverse cardiac event
  - 1 per 60-80,000 hours of cardiac rehab
- Musculoskeletal injuries, arrhythmias



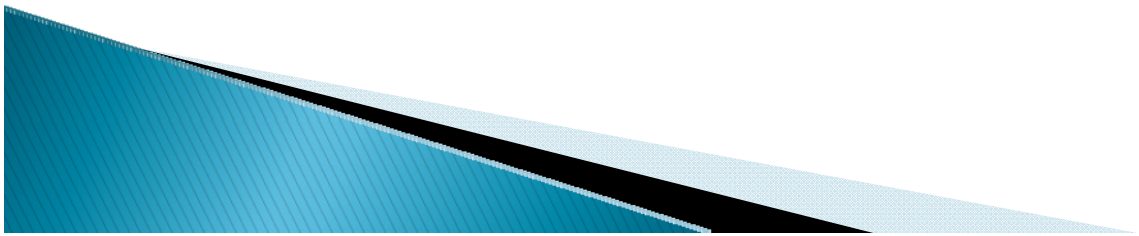
Prescribing Exercise

- Assess risk – ischemia, arrhythmia, CHF
- Total aerobic activity
  - 30 minutes per day most days of week
  - Sustained or intermittent
  - More is better
  - Resistance is suggested
- Endpoints
  - Breathlessness
  - Fatigue
  - Sweating
  - Goal HR not necessary – (220-age)*0.7 to 0.8



Prescribing Exercise
Older Patients

- Emphasize warm-up
  - Flexibility and range of motion
- Prolonged cool down
  - Peripheral vasodilation
  - Delayed baroreceptor response
- Slower return of heart rate to baseline
  - More time between activities
- Potential for overheating
  - Decrease in skin blood flow
  - Reduced efficiency of temperature regulation



Summary

- Multiple evidence based guidelines recommend:
  - Referral to cardiac rehabilitation programs for reduction in morbidity and mortality
  - Emphasis on increased physical activity for secondary prevention of CAD
  - Emphasis on special populations to include women, non-whites and the older patients