

Western Occupational and Environmental Medical Association
Webinar – December 16, 2010

EXERCISE as MEDICINE and Applications in Worksite Health Promotion

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PLEASE STAND BY
WEBINAR WILL BEGIN AT 12:00pm (Pacific Time)
For Audio:
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DISCLOSURES

My presentation will NOT include discussion of:

- 1) any commercial product or device with whom I have a relationship
- 2) any off-label or investigational use of a drug or device

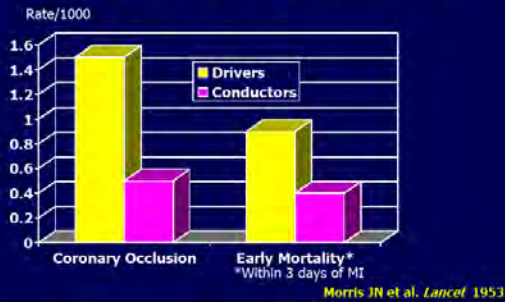
MORE DISCLOSURES & BIASES

- I have told patients for years:
“You’d be much better off to start exercising regularly, than to lose 30 pounds and not exercise.”
- My body mass index (BMI) is 32

Exercise & Health

- Physical inactivity has an astonishing breadth of harmful health implications.
- Exercise has a powerful effect on both treatment and prevention of chronic diseases, as well as on premature death.
 - Association holds for every subgroup of the population
- **Physical inactivity is THE major public health problem of our time.** (Based on Sallis, 2008)

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



History of Exercise as Medicine

- 1975: American College of Sports Medicine (ACSM) Guidelines for Exercise Testing and Prescription
- 1978: The Recommended Quantity/Quality of Exercise for Developing and Maintaining Fitness in Healthy Adults (ACSM)
- 1993: ACSM/CDC Public Health Recommendations on Physical Activity

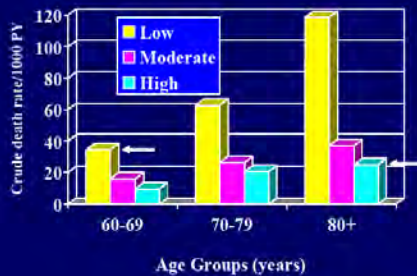
US Dept Health & Human Services (USDHHS) 2008 Recommendations

- All adults should perform:
 - 2.5 hrs/wk of moderate-intensity exercise, or
 - 1.25 hours of vigorous-intensity exercise, in
 - sessions of 10+ minutes spread through the week
 - Muscle strengthening exercises 2X per week
- Additional health benefits are provided by doubling the above recommendation

Exercise IS Medicine: A Global Initiative

- Joint initiative in US: ACSM & AMA
 - Major Corporate Sponsor: Coca-Cola
 - Bob Sallis, MD, President ACSM 2008
- TM in US by ACSM
- GOAL: Every physician should assess Physical Activity (PA), as a vital sign, at every visit

Death Rates/1000 by Fitness Level;
2135 Men Aged Grouped Men



Blair & Wei, *Am J Health Prom* 2000; 15:1-8

Why Do It?

- **Canada 2001 (Katzmarzyk, 2004)**
 - Obesity and inactivity account for 5% of HC costs
 - Physical inactivity: \$5.3 billion
 - Obesity: \$4.3 billion
- **US Data (Carlson et al, 2010)**
 - Only 43.5% of adults are aerobically active
 - 18.2% of these also meet muscle strengthening guideline

Do We Already Do It? (NO)

- **Australian Sports Med Providers (Ferney et al, 2009)**
 - 70% aware of US Surgeon General Report
 - 87% considered advice on PA to be important
 - Only 19% could correctly answer 4/5 questions regarding specifics of the advice to be provided
- **CDC Study (Lobelo et al, 2009)**
 - Only 34% of US adults counseled at last PC visit
- **Canadian Study (Sinclair et al, 2008)**
 - Only 42% had frequently received advice on PA

Definitions

- **PHYSICAL ACTIVITY (PA)**
 - Any bodily movement which burns calories
- **FITNESS**
 - A condition which comes about via regular and/or progressive exercise


Measurement of PA & Fitness

- Both show significant correlations between all methods of measurement
 - Global self-report
 - Exercise history
 - Aerobic testing

Self-Reported Fitness

- Self-reported poor fitness is at least as strong a predictor of mortality as self-reported poor health (Phillips et al, 2010)
 - 858 Scottish men and women followed for 16 years beginning at age 59
- They are independent risk factors
- They are lethal when present together

Physical Activity Affect on Cancer and CAD Death Rates



Cardiorespiratory Fitness (CRF) & All-Cause Mortality


- 2009 Meta-Analysis (Kodama et al)
 - Reviewed 33 eligible studies of relation between baseline CRF and CHD events and/or all cause mortality in healthy participants
 - 102,000 participants total, 6900 events
 - **13% decrease in all cause mortality, & 15% decrease in CHD/CVD events, PER MET OF MAX AEROBIC CAPACITY(MAC)**

What is a "MET"?

- MET = Metabolic equivalent of task, a measure of intensity of aerobic exercise (3.5 ml O₂/kg/min)
- 1 MET = Sitting quietly
- 3 METs = Walking a mile in 23 minutes
- 5 METs = Light stationary bicycling
- 8 METs = Running in place
- 18 METs = Running at 11 miles/hour (17.5 km/hr)
- 1 MET inc = 1 km/hr increase in run/walk speed


CANCER (CA) & PA/Fitness

- Fittest 1/3 of subjects have:
 - 27% less overall cancer risk
 - 37% less overall mortality (Laukkanen et al, 2010)
- Breast CA: 25% less risk, 30% less mortality
- Colon CA: 20% less risk, 25% less mortality
- Gastric CA: 50% less risk, 80% less mortality
- Lung CA: 215% less risk, 250% less mortality
- Endometrial CA: ???




Blood Sugar & Cancer

- Diabetics have 40% increase in CA mortality
 - Pre-diabetics 20%? (Landman et al, 2008)
- Specific cancers with increased mortality
 - Digestive
 - Breast
 - Endometrial
 - Kidney



Blood Sugar & Cancer

- CA mortality proportional to cumulative insulin use; 2X for <3 yrs, 6X for >12 years (Bowker et al, 2010)
- Metformin is partially protective
- 5 months of aerobic AND resistance training decreased HgbA1c by 1% (Sigal et al, 2007)
- Diabetes and obesity are independent risk factors for cancer



Obesity and Cancer

- Obese have 25% increase in cancer mortality (Teucher et al, 2010)
- Specific cancers with increased mortality
 - Digestive
 - Post-menopausal Breast
 - Endometrial
 - Kidney
 - Prostate

Common Pathway?

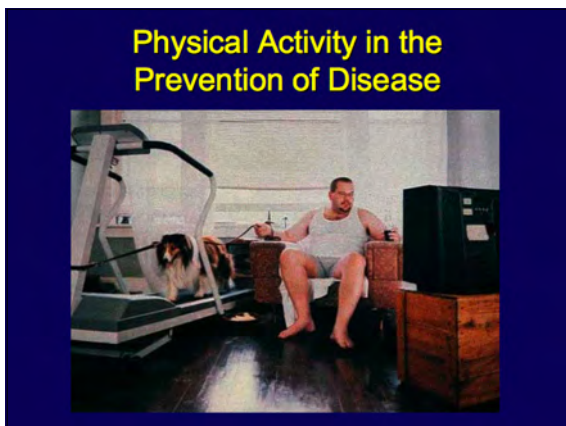
- Inflammatory mediators alter the promotion and progression of cancer
- Obesity, diabetes, inactivity, and other risk factors are associated with higher levels of inflammatory mediators
- Aerobic and resistance training decrease inflammatory mediators in specific ways

The “Obesity Paradox”

- Lower mortality in overweight/obese patients
- First observed in obese patients with CHF
- Extended to those with CAD, peripheral vascular disease (PVD), and hypertension (HBP)
- Then to atrial fib, dialysis, general surgery, and “suspected” CAD with normal nuclear studies
- VA study of 12,000 men aged 40-70 referred for suspected CAD shows “paradox” is mediated by fitness (McAuley et al, 2010)

Deaths Preventable by PA/Fitness

- If all Canadians followed PA Guidelines:
 - CHD 33+%
 - Stroke 25%
 - Hypertension 20%
 - Breast CA 14%
 - Colon CA 20%
 - Type 2 DM 20+%
 - Osteoporosis 25% (Warburton et al, 2007)

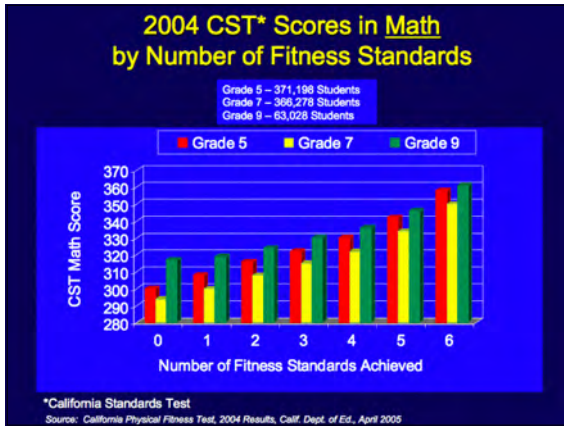


Cardiac Risk Factors & PA/Fitness

- Most active/fittest subjects have (compared to least active) AT LEAST 50% less incidence:
 - Metabolic syndrome
 - Type 2 diabetes
 - Hypertension (19% per MET)
 - Hip fracture (women) (Arena et al, 2010)

Cardiac Risks & PA/Fitness

- 1 MET increase in fitness is equivalent to:
 - 7 cm decrease in abdominal girth
 - 5 mm Hg decrease in systolic BP
 - 20 mg/dL decrease in FBS
- All risk factors act, in significant part, through inflammatory mediators
- PA/Fitness decrease inflammatory mediators



PA Late Breaker

- Erickson et al, 2010 (Oct Neurology)
 - 299 elderly adults (mean age 78)
 - Estimated weekly walking distances
 - Those who walked at least 6 miles/week (top quartile) had:
 - Better maintenance of gray cell volume
 - 50% less cognitive impairment over 13 years

PA/F and Work-Related Musculoskeletal (MS) Injury

- Nonspecific upper limb disorder
 - Subjects with poor self-reported physical fitness have increased severity and functional disability
- Whiplash injury (Geldman et al, 2008)
 - Subjects with medium/high fitness have earlier recovery and 2X better RTW

PA/F & Work-Related MS Injury

- Subacute LBP (Storheim et al, 2005)
 - Less RTW with poor fitness
- Chronic LBP (Sculco et al, 2001)
 - Low-mod aerobic exercise improves work status and decreases pain med prescriptions 80% over 2.5 years

PA/F & Work-Related MS Injury

- Swedish dental hygienists with “active leisure” have fewer MS disorders (Ylipaa et al, 1999)
- Aerobic conditioning leads to decreased pain & disability in chronic LBP
- Leisure-time PA decreases MS pain in sedentary workers
- Leisure-time PA decreases neck pain & disability (Hanney et al, 2010)

Role of Modified/Transitional Work

- Modified/Transitional work assignments, in low back injuries, are associated with:
 - More rapid RTW full duty
 - Decreased pain & disability
 - Decrease in back injury rate(Williams et al, 2007)

Heritability of Exercise Participation

- 50-70% in twin studies of Europe and Australia
- May involve genes influencing:
 - Acute mood effects of exercise
 - High exercise/weight loss abilities
 - Personality (De Moor et al, 2007)
- Chromosome 19; areas with genes which influence muscle performance and blood flow

Does Exercise Improve Fitness?

- Middle-aged adults
 - 0-20% increase in MAC over 6-12 months
 - At 100% of CDC recs, MAC increases 6% in 6 mos
 - At 50%, MAC increases 4%; at 150%, MAC increases 8%
 - Walking 15 min bid about as effective as 30 qd
 - Overall, expect 0.5 MET improvement at 6 months
- Healthy 70 year-olds
 - 10% increase in 6MWD over 1 year of exercise

Does Improved Fitness Have Benefits?

- Carnethon et al, 2007
 - 4000 Exercise treadmill tests (ETTs) in healthy 18-30 year-olds
 - Low fit subjects had 2X risk of developing HBP, DM, and metabolic syndrome
 - ETTs repeated after 7 years
 - Subjects with improved fitness lowered risks
 - Subjects with reduced fitness increased risks

HOW Do We Increase PA/Fitness?

- Some programs work best for males, and especially those with higher initial fitness
- Pedometer programs are appreciated by women, and often more effective in those with lower initial fitness
 - PA increased by average 27% over 3-6 months
 - Step goals increase effectiveness
 - 10,000+ steps/day = ACTIVE

Counseling to Increase Activity

- May increase PA over 3-12 months, especially if written materials and telephone follow-up
- Counseling for higher-intensity exercise may be more effective in increasing activity and adherence (Stensel, 2010)
- Counselors who themselves exercise are more effective (Lobelo et al, 2009)

How Increasing PA Benefits Employers

- Inactive employees have higher health care costs (\$1500 more per year) (Loeppke et al, 2009)
- Productivity losses (disability, absenteeism, & presenteeism) are at least twice as large
- A recent Dutch study concludes that efforts to stimulate PA are more effective in reducing absenteeism in obese workers than dieting (25% decrease) (van Strien & Koenders, 2010)

**WOEMA CME Webinar Series - Exercise as Medicine / Dennis Pocekay, MD, MPH
December 16, 2010 - 12:00pm - 1:00pm PDT**

Exercise and Workplace Health Promotion

- Employees prefer to exercise on site and to be paid for exercising
- Employers want objective measures of results of initiatives
- May be cost-effective to provide paid exercise time, & salary increases for improved fitness
- Group medical/workers' comp insurers should share in costs based on evidence

Objective Measurement of Fitness in Workplace Health Promotion (WHP)

- ETT is expensive and inaccurate – overestimates MAC by 10-30%
- 6-Minute Walk Test (6MWT)
 - Easy and well-tolerated, extensively researched
 - Best brief estimate of MAC (correlation 0.51-0.90)
 - Test-retest reliability 0.95
 - Change of 54-56 M is significant
 - Distance increases up to 30 M with encouragement, or with oval track (ATS, 2002)

6-Minute Walk Test Technique

- “The object of this test is to walk as far as possible for 6 minutes.”
- “Remember that the object is to walk AS FAR AS POSSIBLE for 6 minutes, but don't run or jog.”
- “Start now, or whenever you are ready.”
- “You are doing well. You have 5 minutes to go.”
- “Keep up the good work. You have 4 minutes to go.”
- “In a moment I'm going to tell you to stop. When I do, just stop right where you are and I will come to you.”

Prediction Equations for 6MWT

- 6MWD(Males, meters) =
 $7.57(\text{Ht, cm}) - 5.02(\text{Age}) - 1.76(\text{Wt, kg}) - 309$
&
- 6MWD(Females, meters) =
 $2.11(\text{Ht, cm}) - 5.78(\text{Age}) - 2.29(\text{Wt, kg}) + 667$
Enright & Sherrill (1998)


Issues in Obesity Treatment

- Felitti et al, 2010 (KP San Diego)
 - Obesity is not the core problem
 - It's a symptom and/or solution
 - Weight-loss programs must include:
 - Exploration of underlying psychodynamic issues (often childhood sexual abuse)
 - Consideration of protective effects, or unrecognized and unspoken benefits

EXERCISE is MEDICINE

- Exercise is powerful medicine, and has few side effects
- It is much simpler to address than obesity/BMI
- It should be prescribed more often, and managed better
- It should be addressed by every provider, and at every visit

**WOEMA CME Webinar Series - *Exercise as Medicine* / Dennis Pocekay, MD, MPH
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SELECTED REFERENCES

American Thoracic Society. ATS Statement; Guidelines for the six-minute walk test. *Am J Respir Crit Care Med.* 2002;166;111-7.

Arena R; Myers J; Guazzi M. The future of aerobic exercise testing in clinical practice: Is it the ultimate vital sign? *Future Cardiology.* 2010;6(3):325-42.

Blair SN; Wei M. Sedentary habits, health, and function in older women and men. *Am J Health Promot.* 2000;15(1):1-8.

Bowker SL; et al. Glucose-lowering agents and cancer mortality rates in type 2 diabetes: assessing effects of time-varying exposure. *Diabetologia.* 2010;53(8):1631-7.

Carlson SA; et al. Trend and prevalence estimates based on the 2008 Physical Activity Guidelines for Americans. *Am J Prev Med.* 2010;39(4):305-13.

Carnethon MR; et al. Cardiorespiratory fitness in young adulthood and the development of cardiovascular disease risk factors. *JAMA.* 2003;290(23):3092-100.

De Moor MH; et al. Genome-wide linkage scan for exercise participation in Dutch sibling pairs. *Eur J Hum Genet.* 2007;15(12):1252-9.

Enright PL; Sherrill DL. Reference equations for the six-minute walk test in healthy adults. *Am J Respir Crit Care Med.* 1998;158(5 Pt 1):1384-7.

Erickson KI; et al. Physical activity predicts gray matter volume in late adulthood: the cardiovascular health study. *Neurology.* 2010;75(16):1415-22.

Felitti VJ; et al. Obesity: problem, solution, or both? *Perm J.* 2010;14(1):24-30.

Ferney SL; et al. Awareness of and changing perceptions of physical activity guidelines among delegates at the Australian Conference of Science and Medicine in Sport. *J Sci Med Sport.* 2009;12(6):642-6.

Geldman M; Moore A; Cheek L. The effect of pre-injury physical fitness on the initial severity and recovery from whiplash injury, at six-month follow-up. *Clin Rehabil.* 2008;22(4):364-76.

Hanney WJ; et al. The influence of education and exercise on neck pain. *Am J Lifestyle Med.* 2010;4(2):166-75.

Katzmarzyk PT; Janssen I. The economic costs associated with physical inactivity and obesity in Canada: an update. *Can J Appl Physiol.* 2004;29(1):90-115.

Kodama S; et al. Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women: a meta-analysis. *JAMA.* 2009;301(19):2024-35.

Landman GW; et al. Increased cancer mortality in type 2 diabetes. *Anticancer Res.* 2008;28(2B):1373-5.

Laukkanen JA; et al. Cardiorespiratory fitness, lifestyle factors and cancer risk and mortality in Finnish men. *Eur J Cancer.* 2010;46(2):355-63.

Lobelo F; Duperly J; Frank E. Physical activity habits of doctors and medical students influence their counseling practices. *Br J Sports Med.* 2009;43(2):89-92.

Loeppke R; et al. Health and productivity as a business strategy: a multiemployer study. *J Occup Environ Med.* 2009;51(4):411-28.

McAuley PA; et al. Obesity paradox and cardiorespiratory fitness in 12,417 male veterans aged 40 to 70 years. *Mayo Clin Proc.* 2010;85(2):115-21.

Phillips AC; Der G; Carroll D. Self-reported health, self-reported fitness, and all-cause mortality: prospective cohort study. *Br J Health Psychol.* 2010;15(Pt 2):337-46.

Sculco AD; et al. Effects of aerobic exercise on low back pain patients in treatment. *Spine J.* 2001;1(2):95-101.

Sigal RJ; et al. Effects of aerobic training, resistance training, or both on glycemic control in type 2 diabetes: a randomized trial. *Ann Intern Med.* 2007;147(6):357-69.

Sinclair J; Lawson B; Burge F. Which patients receive advice on diet and exercise? Do certain characteristics affect whether they receive such advice? *Can Fam Physician.* 2008;54(3):404-12.

Stensel D. Primary prevention of CVD: physical activity. *Am Fam Phys.* 2010;82(2):136-38.

Storheim K; et al. Predictors of return to work in patients sick listed for sub-acute low back pain: a 12-month follow-up study. *J Rehabil Med.* 2005;37(6):365-71.

Teucher B; Rohrmann S; Kaaks R. Obesity: focus on all-cause mortality and cancer. *Maturitas*. 2010;65(2):112-6.

Van Strien T; Koenders P. How do physical activity, sports, and dietary restraint relate to overweight-associated absenteeism? *J Occup Environ Med*. 2010;52(9):858-64.

Warburton DE. Evidence-informed physical activity guidelines for Canadian adults. *Can J Public Health*. 2007;98(Suppl 2):S16-68.

Williams RM; et al. Effectiveness of workplace rehabilitation interventions in the treatment of work-related low back pain: a systematic review. *Disabil Rehabil*. 2007;29(8):607-24.

Ylipaa V; Arnetz BB; Preber H. Predictors of good general health, well-being, and musculoskeletal disorders in Swedish dental hygienists. *Acta Odont Scand*. 1999;57(5):277-82.