Physical Inactivity: The Biggest Public Health Problem of the 21st Century

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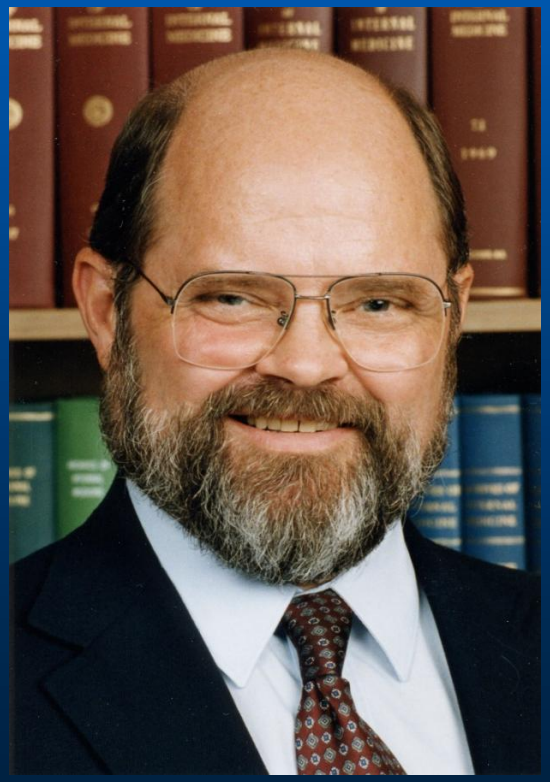
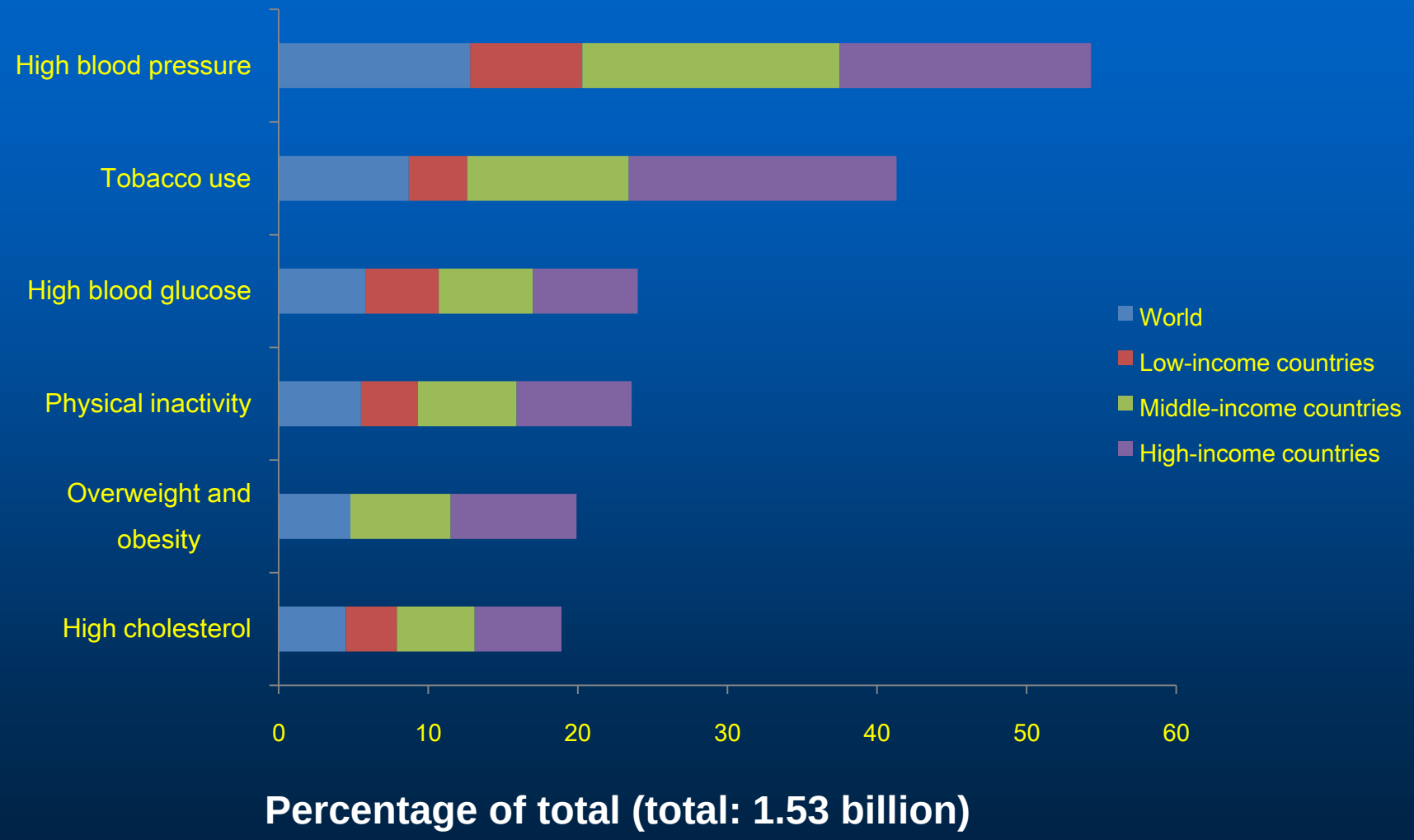


ACTIVE LIVING partners

Question

- Rank the following exposures by the number of deaths caused worldwide.
  - Tobacco use
  - Obesity
  - High blood pressure
  - Physical inactivity
  - High blood glucose

Ranking of selected risk factors: 6 leading causes of death by income group, estimates for 2004

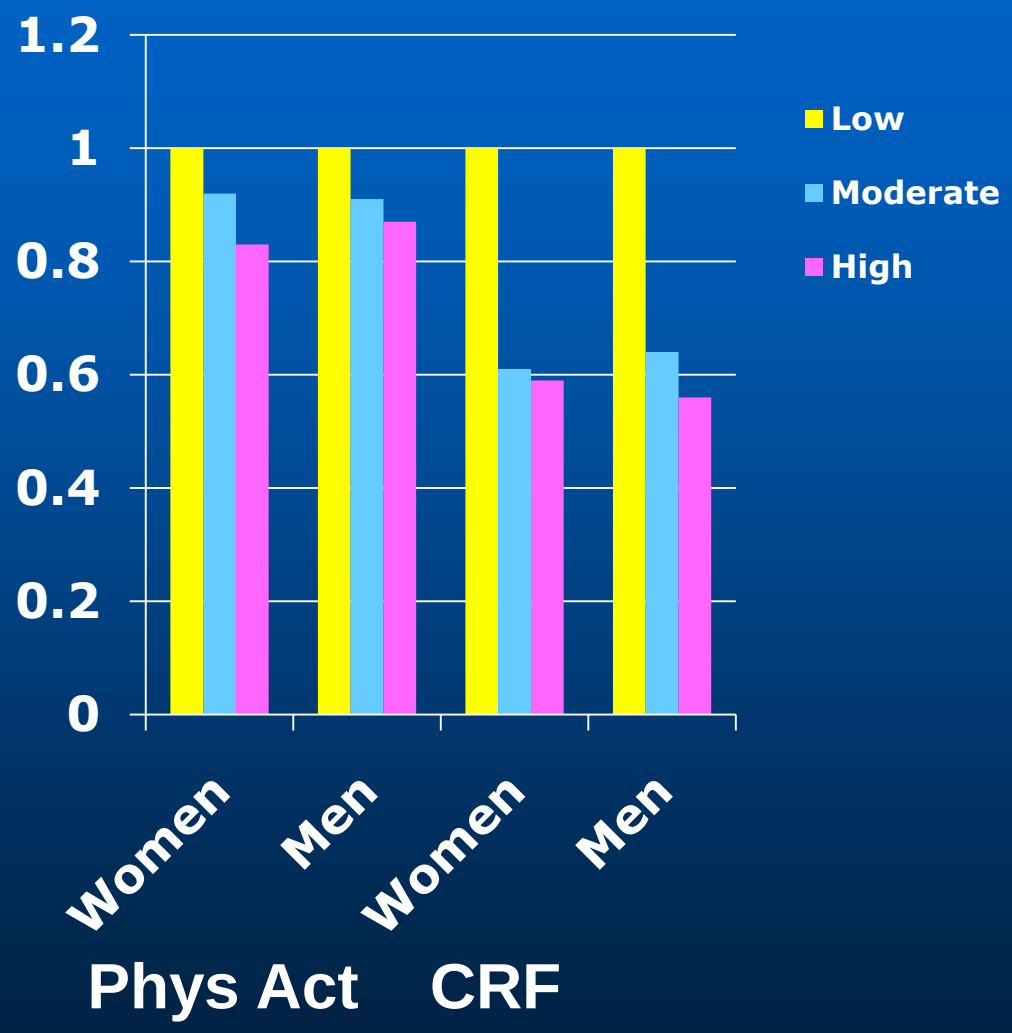


World Health Organization.

http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/index.htm

Physical Activity and CRF as Predictors of All-cause Mortality

- 31,818 men and 10,555 women
- 1492 deaths in men during average follow-up of 14.6 years, and 230 deaths in women during average follow-up of 12.8 years
- PA mortality trends not significant after adj for CRF
- CRF trends significant after adj for PA



Lee DC, et al. *BJSM;* pub online April 23, 2010

Aerobics Center Longitudinal Study

Design of the ACLS

1970 More than 80,000 patients 2005

Cooper Clinic examinations--including history and physical exam, clinical tests, body composition, EBT, and CRF

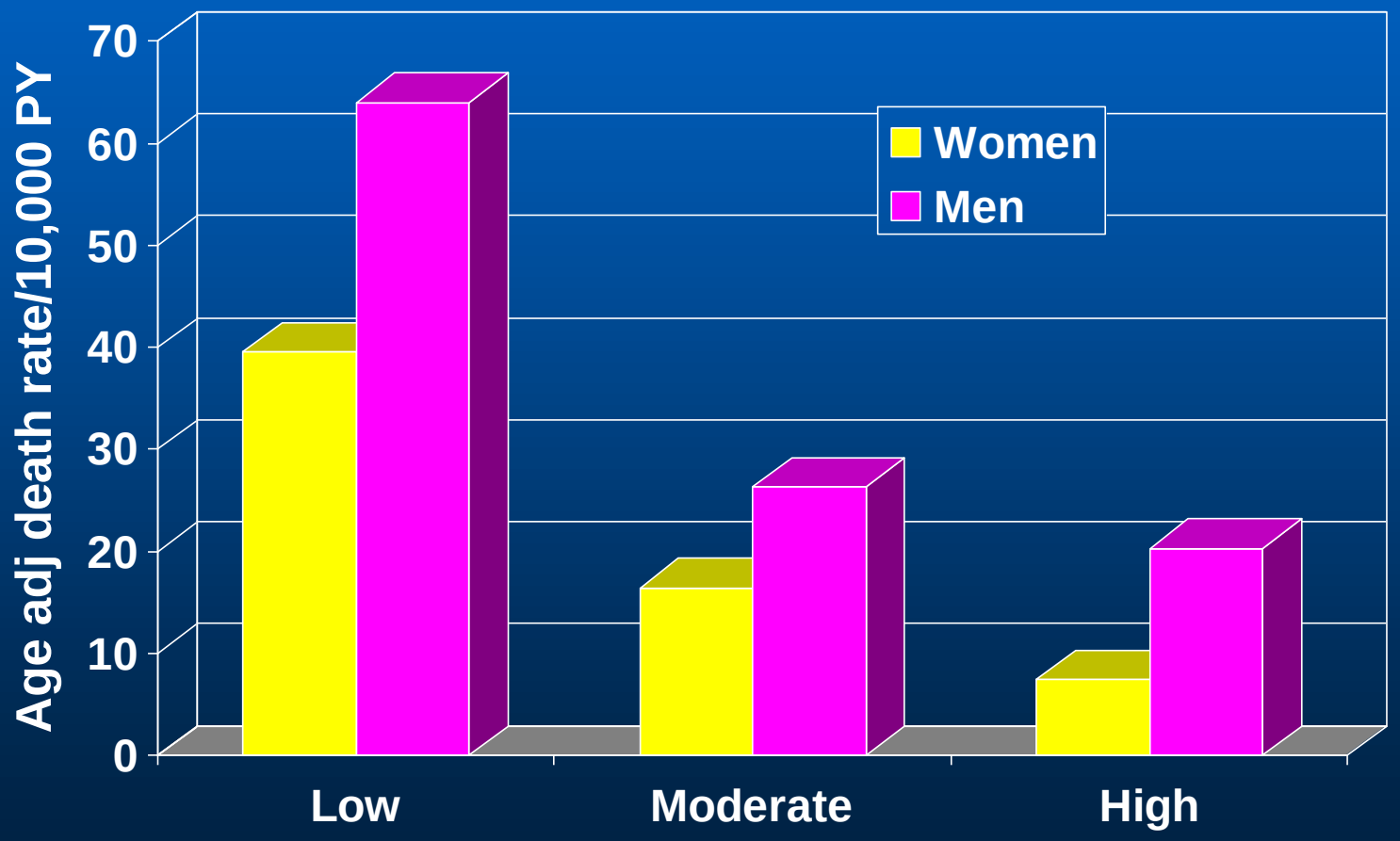
Mortality surveillance to 2003

More than 4000 deaths

1982 ‘86 ‘90 ‘95 ’99 ‘04

Mail-back surveys for case finding and monitoring habits and other characteristics

All-Cause Death Rates by CRF Categories—3120 Women and 10 224 Men—ACLS



Blair SN. *JAMA* 1989

Does Changing Cardiorespiratory Fitness Reduce Mortality Risk?

Fitness Change Categories

- Unfit was defined as the least fit 20% of men in each age group
- Men were classified as fit or unfit at both examinations
- Change categories
  - unfit at both examinations = never fit
  - unfit at first, fit at second = improvers
  - fit at both examinations = always fit

Blair SN et al. *JAMA* 1995; 273:1093-8

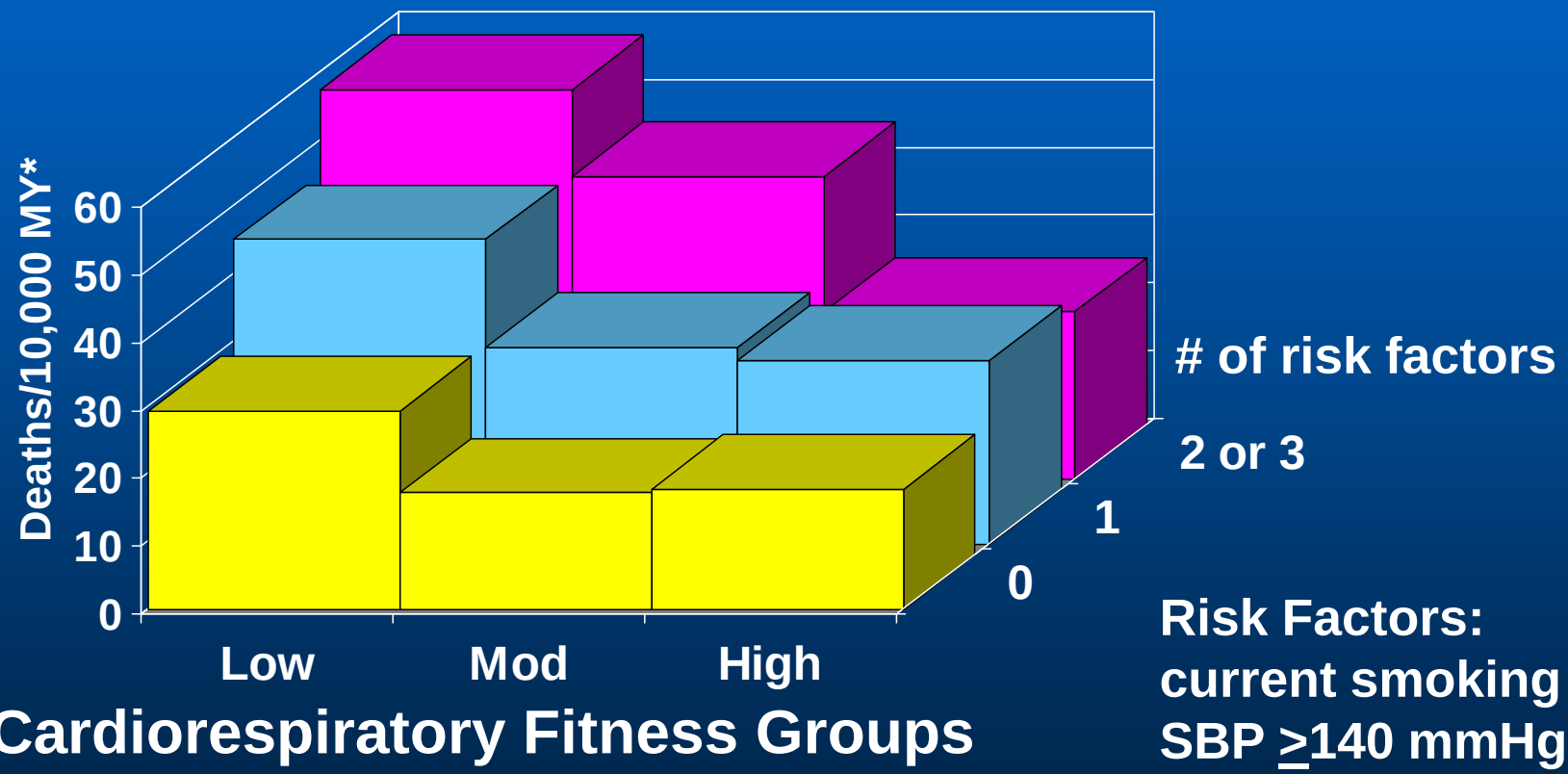
Age-Adjusted Death Rates by Fitness Change Groups, Men, ACLS

	Age-adjusted Death Rates/10,000 Man-years	
Fitness Groups	**CVD**	**All-cause**
Never fit	**65**	**122**
Improvers	**31**	**68**
Always fit	**14**	**40**

Blair SN et al. *JAMA* 1995; 273:1093-8

CRF and Other Health Outcomes

Cardiorespiratory Fitness, Risk Factors and All-Cause Mortality, Men, ACLS



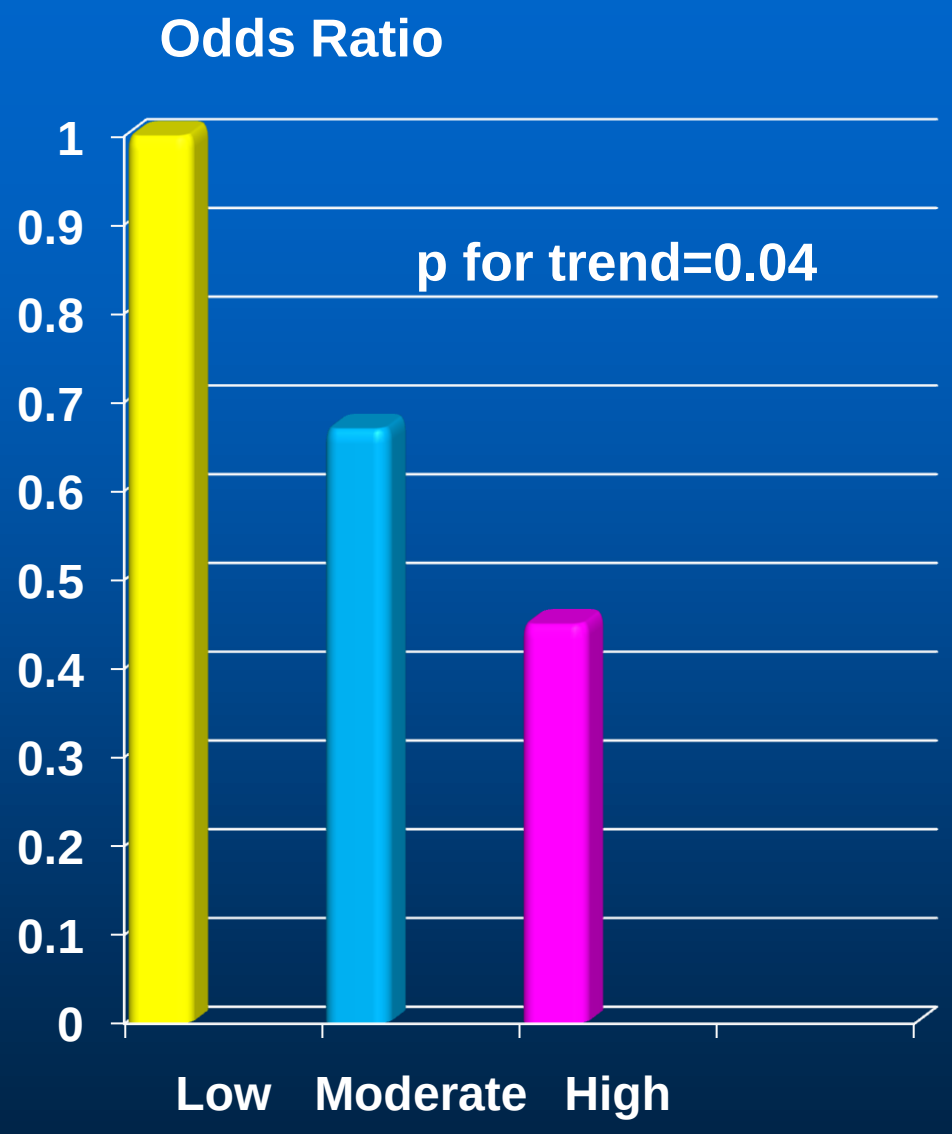
Risk Factors:
current smoking
SBP ≥140 mmHg
Chol ≥240 mg/dl

*Adjusted for age, exam year, and other risk factors

Blair SN et al. *JAMA* 1996; 276:205-10

CRF and Breast Cancer Mortality

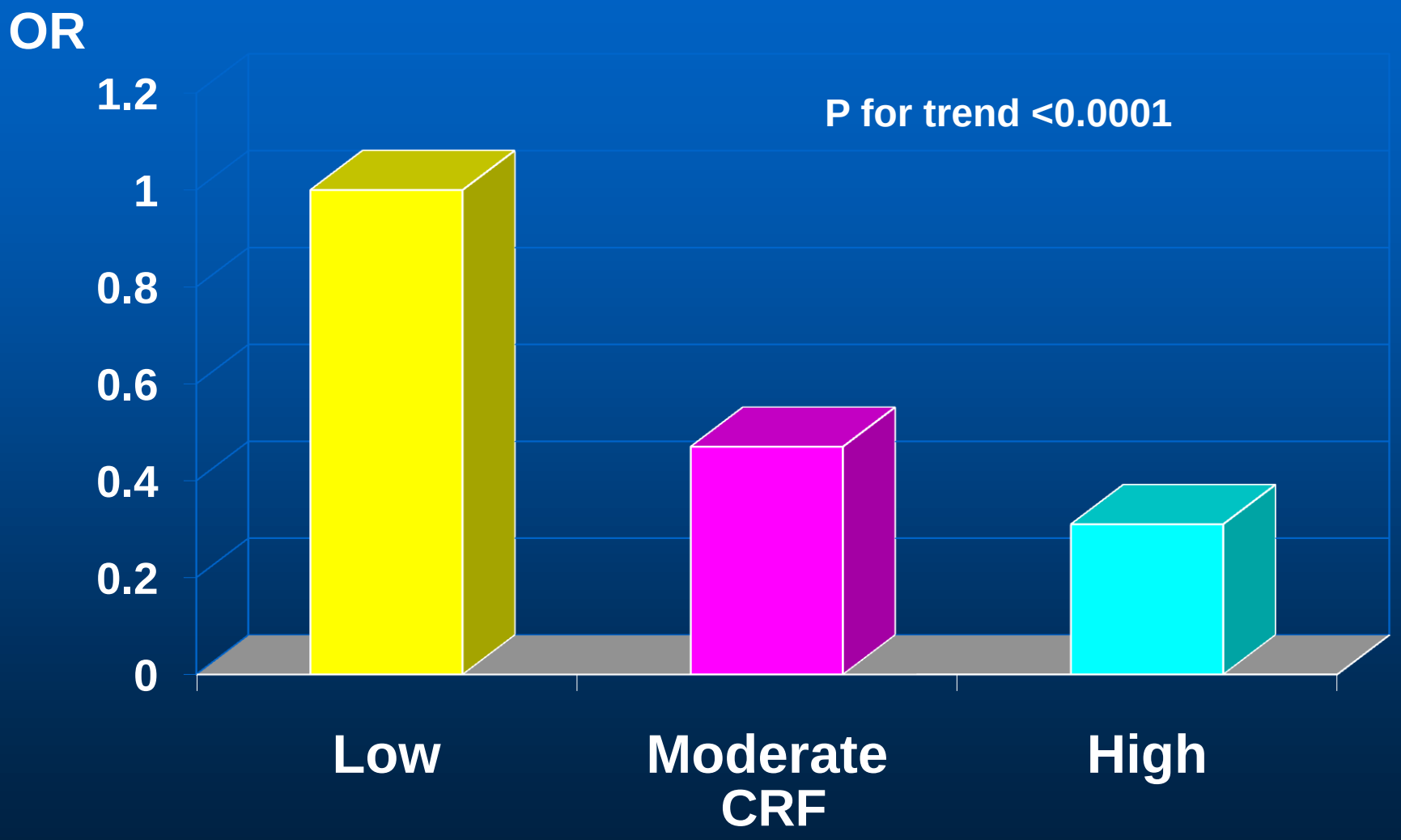
- 14,551 women, ages 20-83 years
- Completed exam 1970-2001
- Followed for breast cancer mortality to 12/31/2003
- 68 breast cancer deaths in average follow-up of 16 years
- Odds ration adjusted for age, BMI, smoking, alcohol intake, abnormal ECT, health status, family history, & hormone use



Sui X et al. *MSSE* 2009; 41:742

Multivariate adjusted OR for Incident Hypertension by Levels of CRF, ACLS, 4884 Women

Barlow CE, et . *Am J Epidemiol 2006;163:142-5l0*

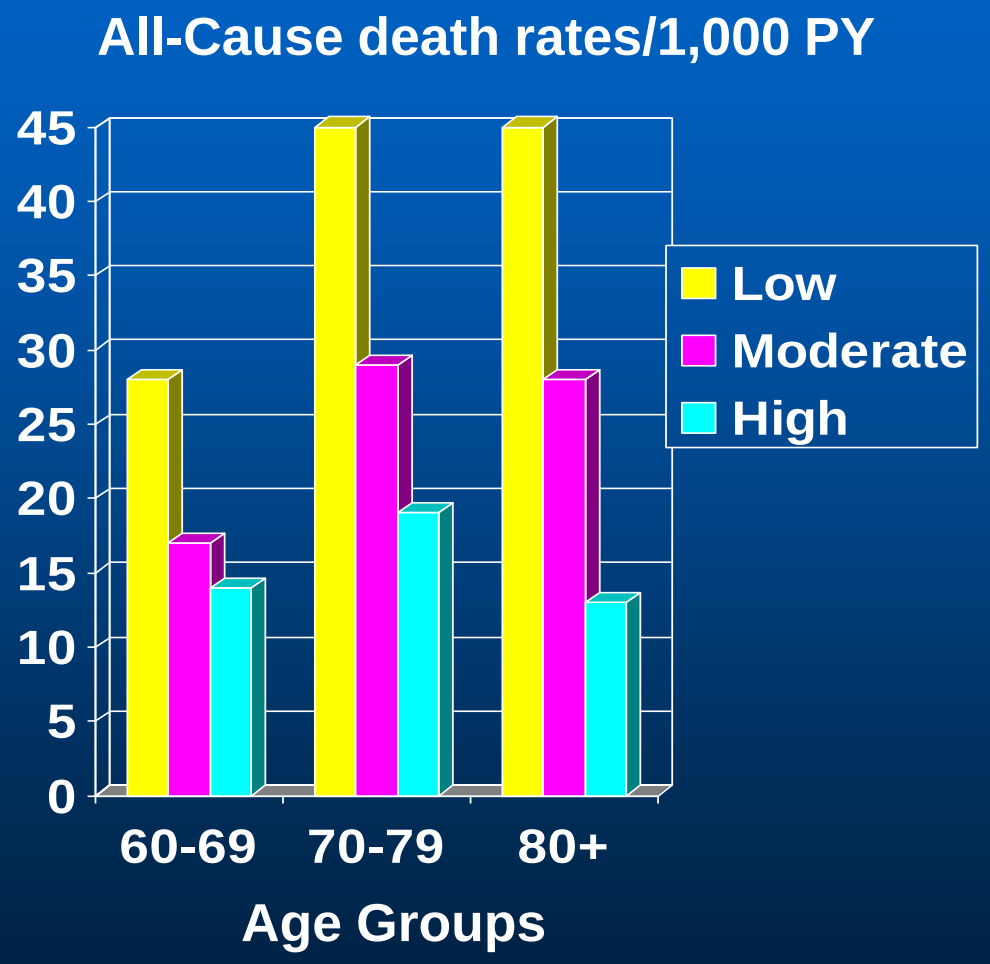


*Adjusted for age, exam year, smoking, drinking, BP, family history **HTN**

Activity, Fitness, and Mortality in Older Adults

Cardiorespiratory Fitness and All-Cause Mortality, Women and Men ≥60 Years of Age

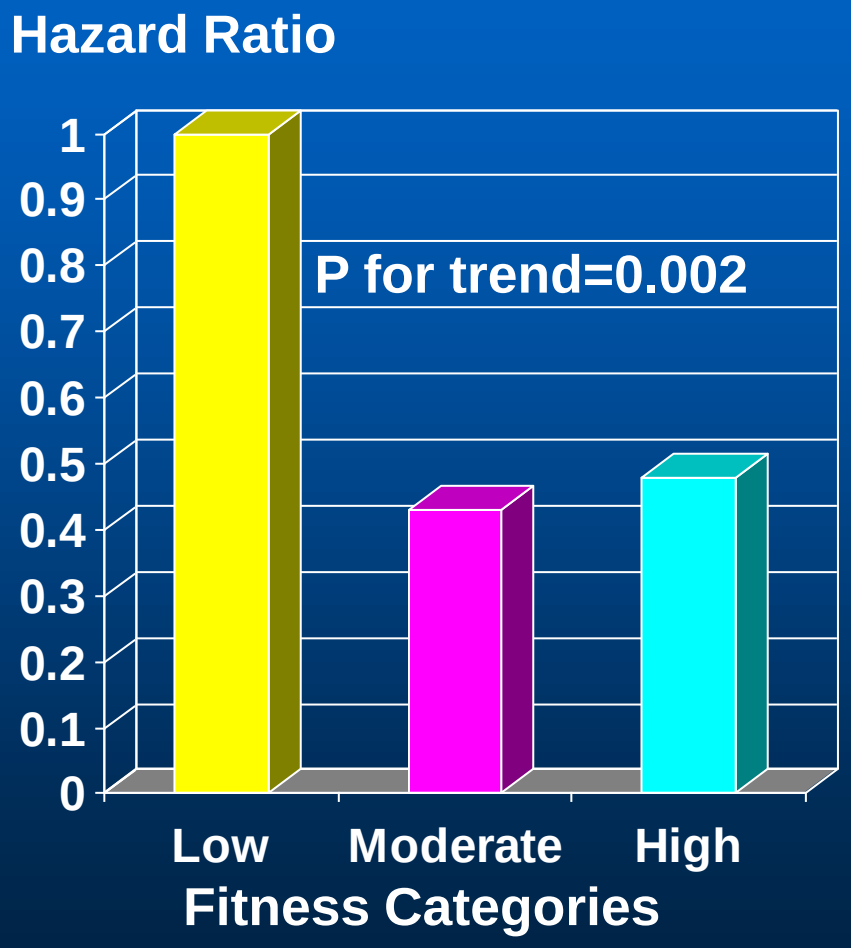
- 4060 women and men ≤60 years
- 989 died during ~14 years of follow-up
- ~25% were women
- Death rates adjusted for age, sex, and exam year



Sui M et al. *JAGS* 2007.

Cardiorespiratory Fitness and Risk of Dementia, ACLS

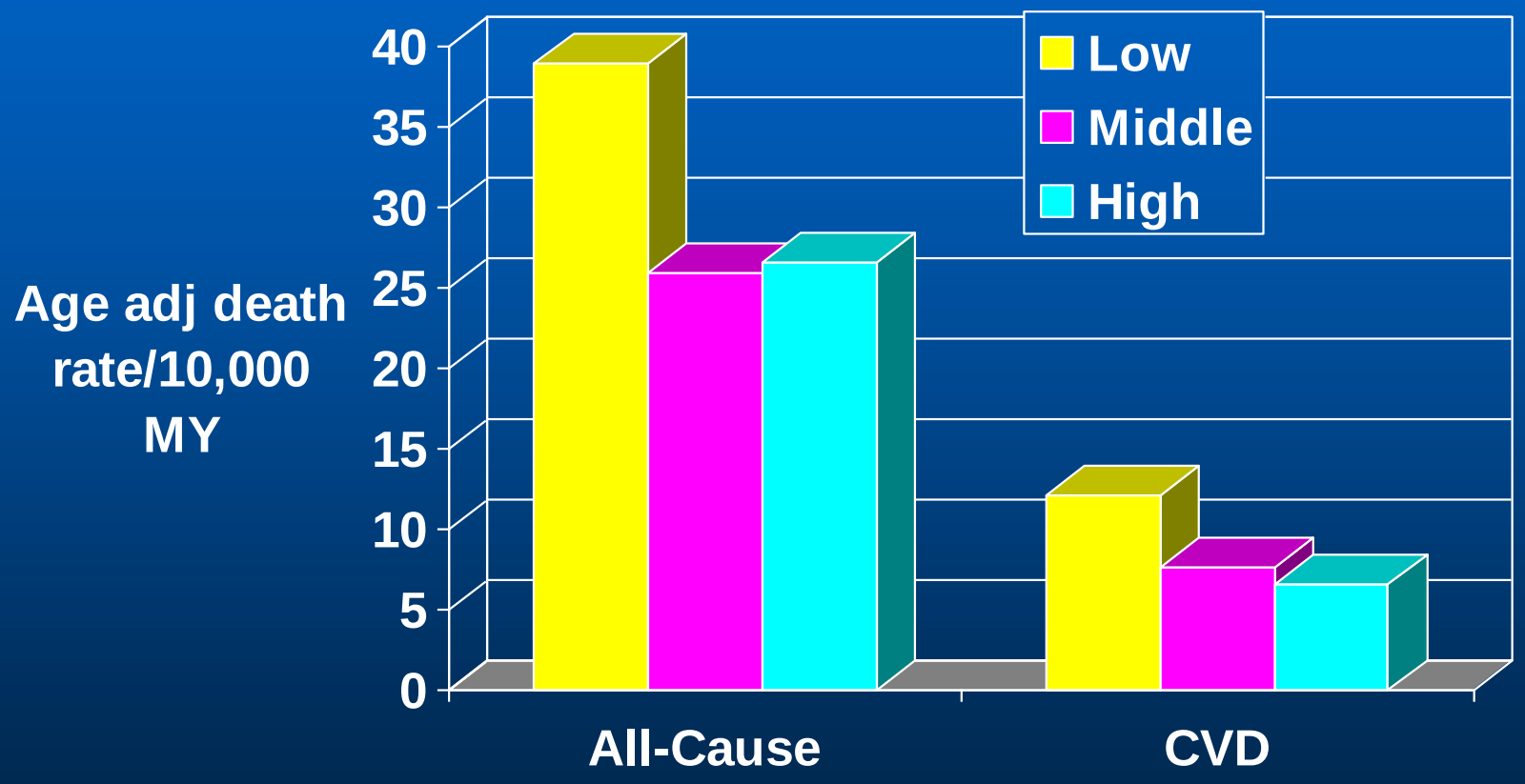
- 59,960 women and men
- Followed for 16.9 years after clinic exam
- 4,108 individuals died
  - 161 with dementia listed on the death certificate
- Hazard ratio adjusted for age, sex, exam yr, BMI, smoking, alcohol, abnormal ECG, history of hypertension, diabetes, abnormal lipids, and health status



Lui R et al. In review

Muscular Strength and Mortality

Thirds of Muscle Strength and Mortality, 8762 Men--ACLS



503 deaths (145 CVD) during average follow-up of 18.9 years

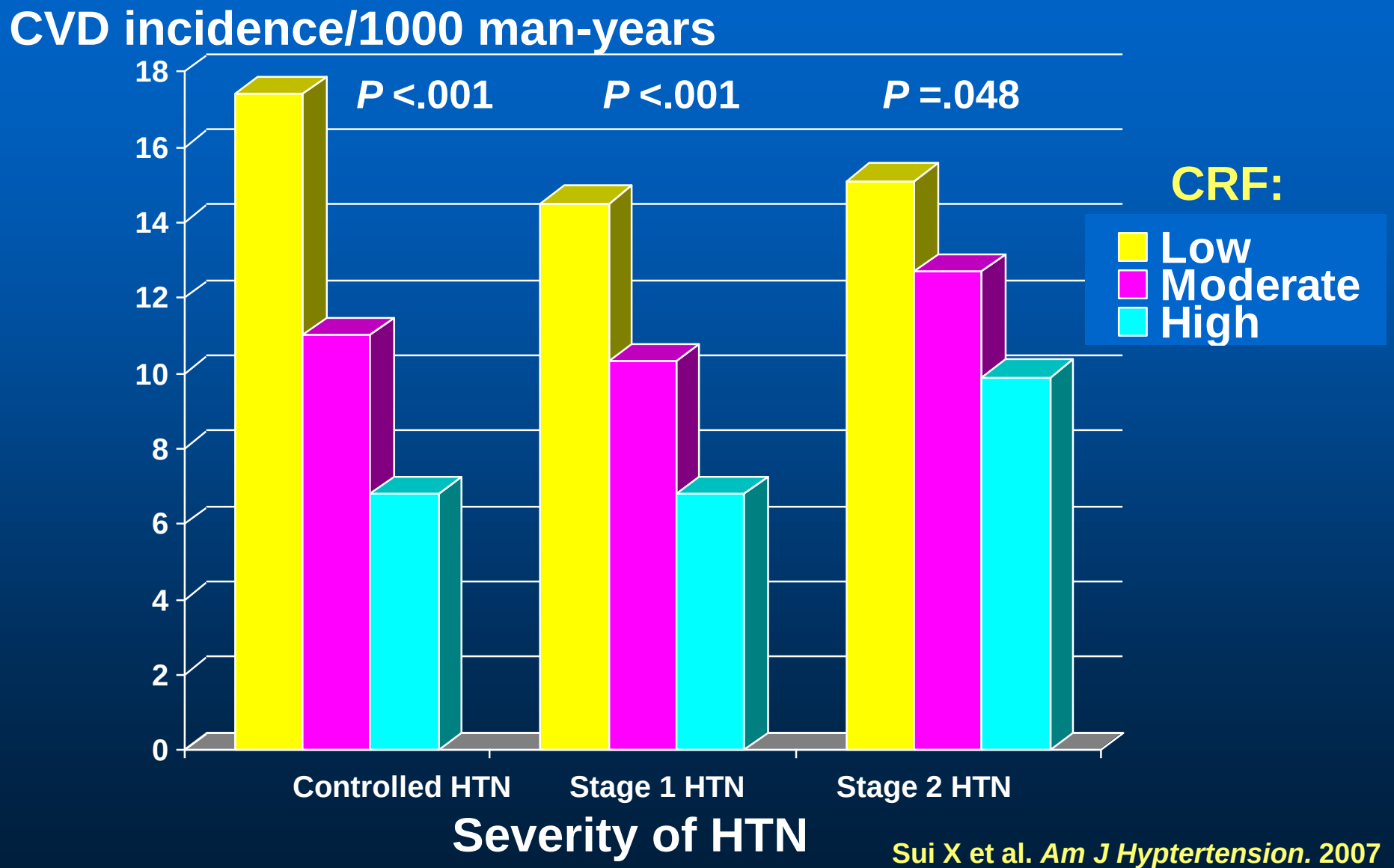
Ruiz J et al. *BMJ 2008*

Exercise Is Medicine

Cardiorespiratory Fitness and Health Outcomes in Various Population Subgroups

Such as People Who Are Overweight or Obese or Those with Chronic Disease

Age and exam year adjusted rates of total CVD events by levels of CRF and severity of HTN in 8147 hypertensive men



Sui X et al. *Am J Hyptertension.* 2007

Fitness, Fatness, and Health

Obesity and Diabetes

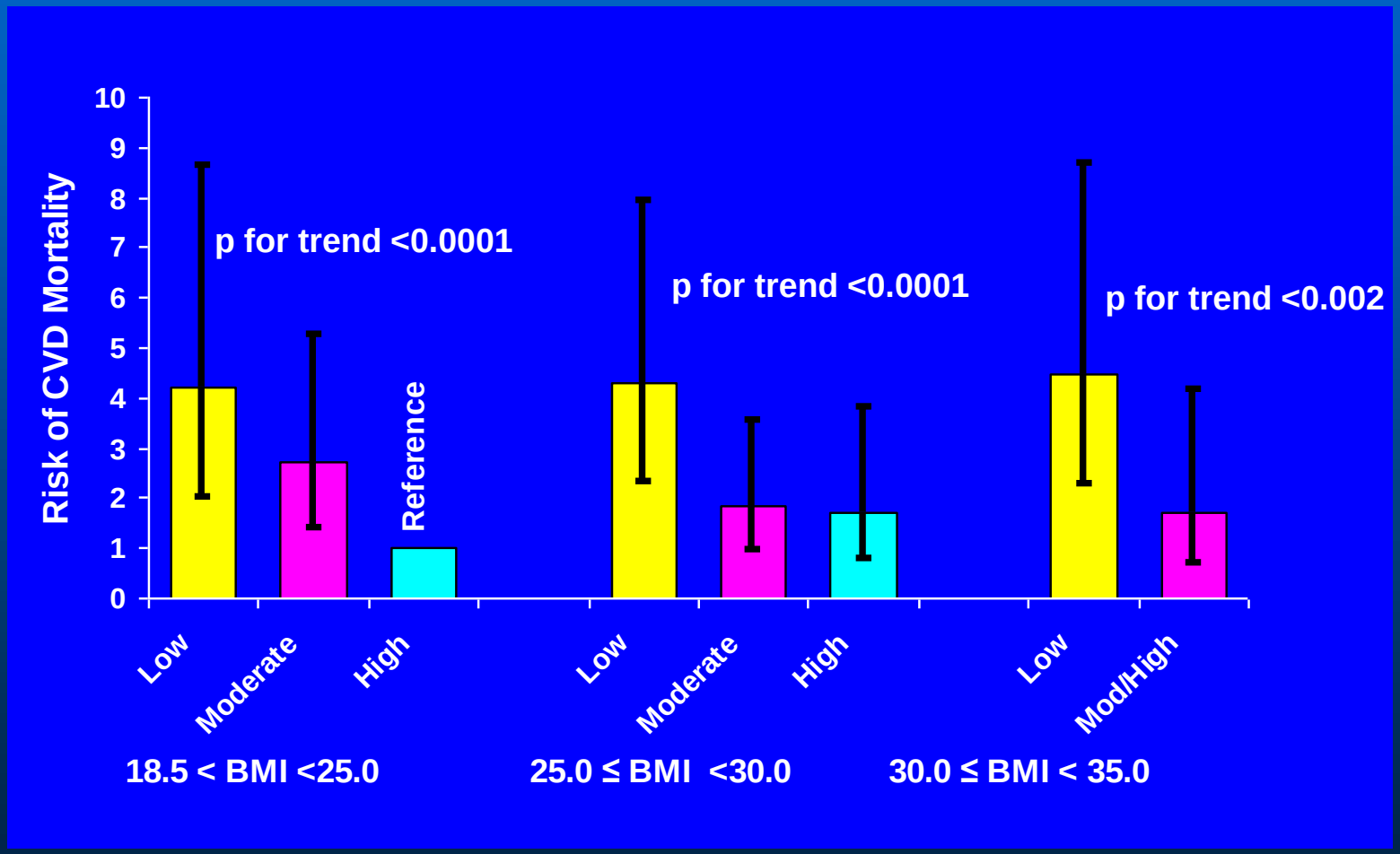
- We hear a great deal, in both the scientific literature and popular press, about the epidemics of obesity and diabetes
  - In fact, some dummies even use the term “diabesity”
- What is the rate of type 2 diabetes in U.S. individuals under 45 years of age?

U.S. Rates of Diagnosed Type 2 Diabetes in Persons under 45 Years of Age in 2010

- 1.4%
- Of course this is higher than it was in 1980
  - 0.6%
- Diagnosed diabetes in those under 20 years of age in the U.S.
  - 0.26%

Source: CDC website--

CVD Mortality Risk* by Fitness and BMI Categories, 2316 Men with Diabetes, 179 CVD Deaths

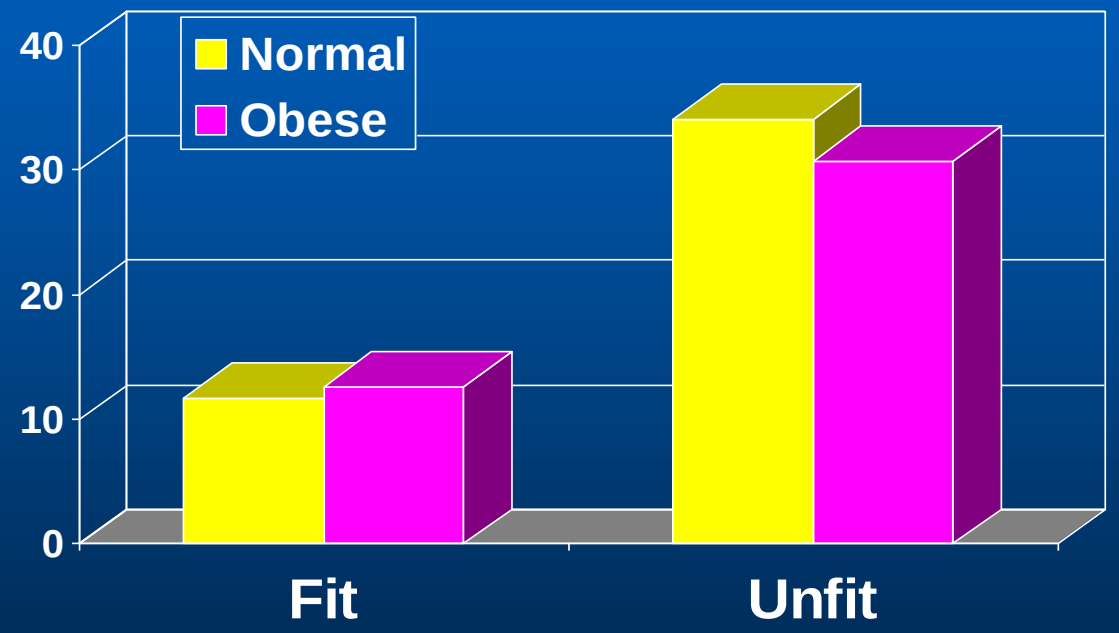


*Adj for age and examination year

Church TS et al. *Arch Int Med* 2005; 165:2114

Joint Associations of CRF and % Body Fat with All-cause Mortality, ACLS Adults 60+

Death rate/1,000 person-years

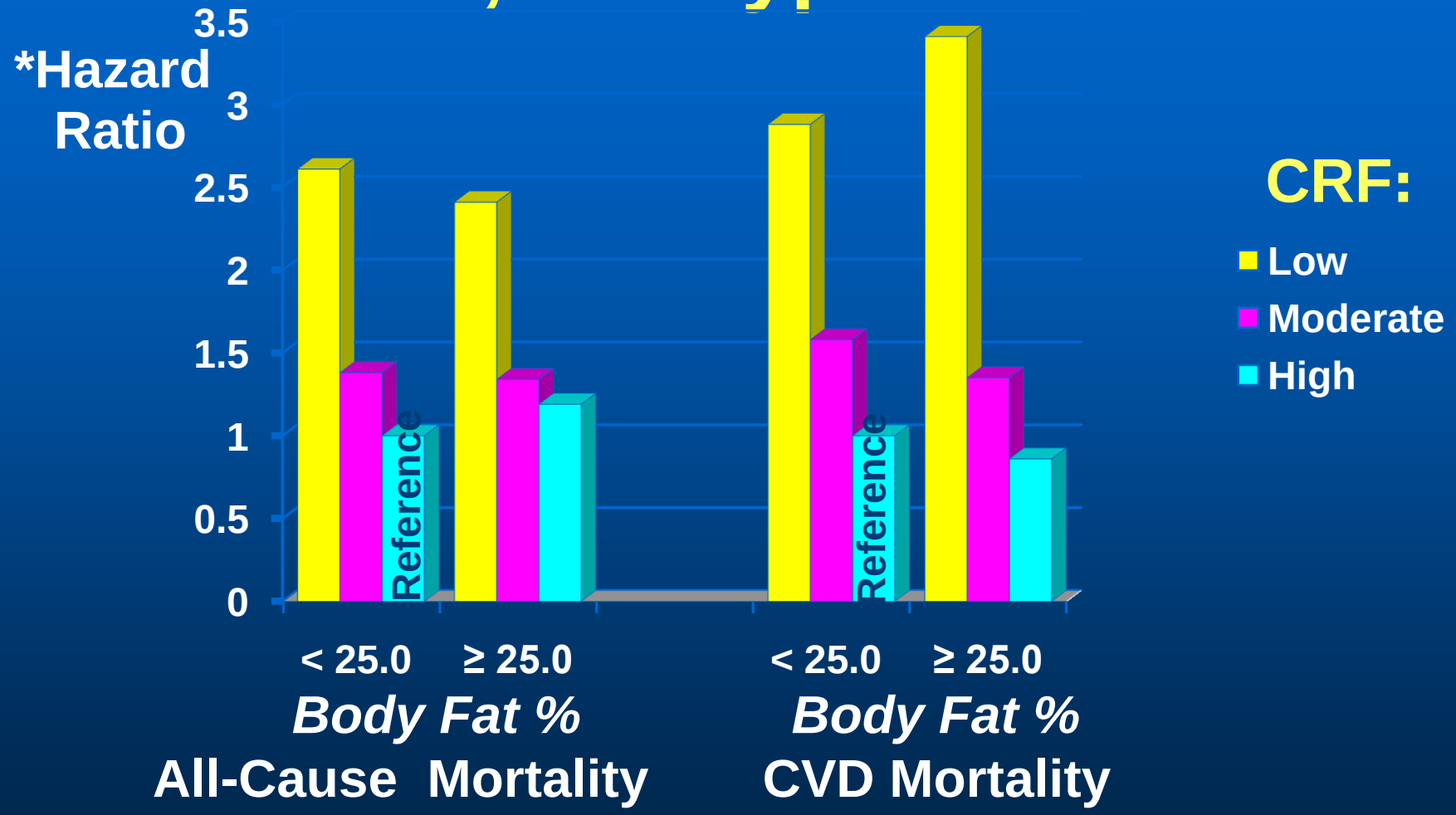


	Fit		Unfit	
Deaths	151	190	29	72

Rates adjusted for age, sex and exam year

Sui M et al. *JAMA* 2007; 298:2507-16

CRF and %Body Fat on Mortality Risk in 13,155 Hypertensive Men



* Adjusted for age, exam year, physically inactive, family history, smoking, alcohol, resting SBP and DBP, & diabetes and hypercholesterolemia

McAuley et al. Am J Hypertension 2009; 22: 1062-69

Summary

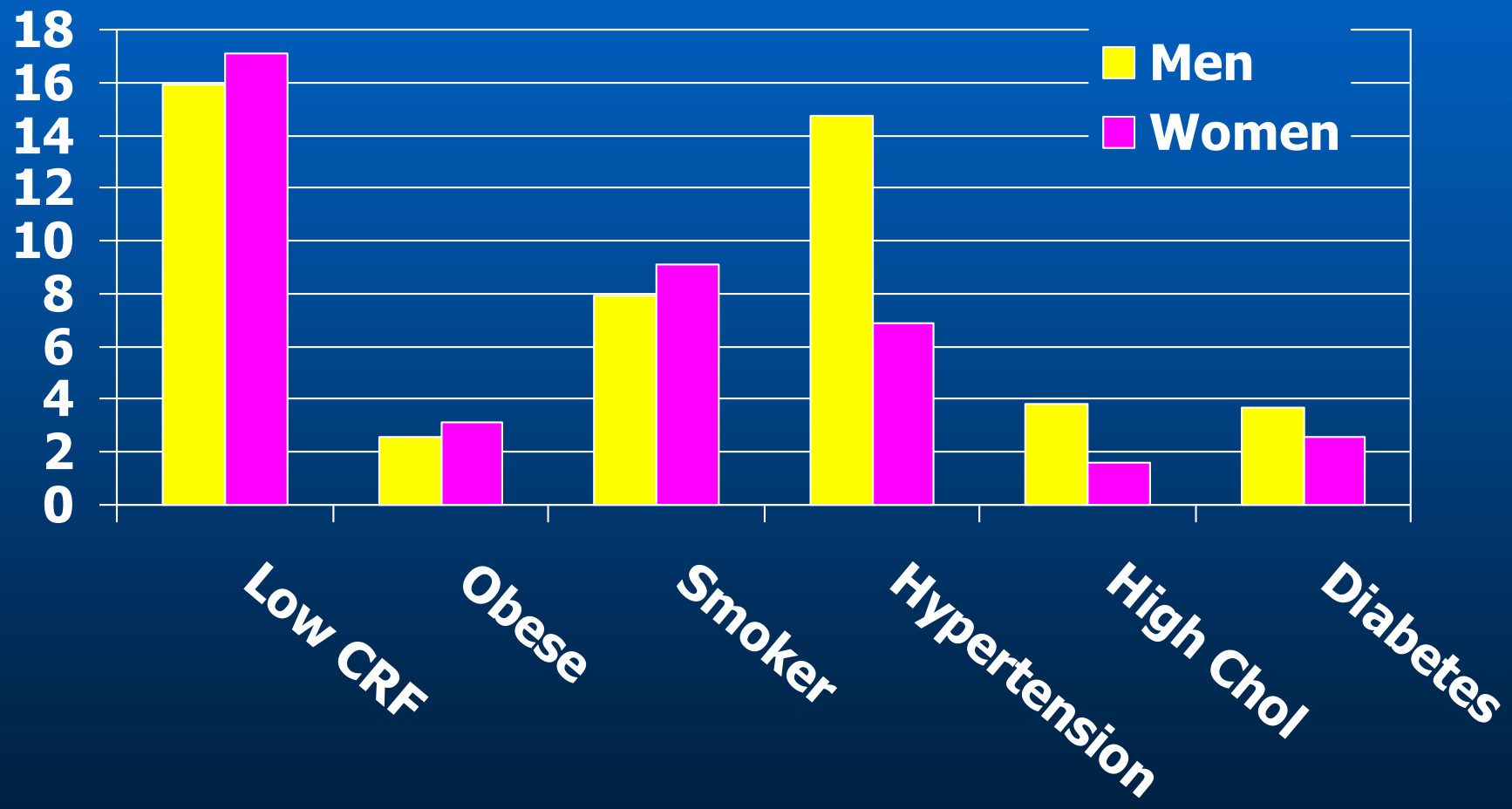
Attributable Fractions of Health Outcomes For Low Cardiorespiratory Fitness and Other Predictors, ACLS

- Attributable fraction (%) is the estimated number of deaths due to a specific characteristic
- Based on strength of association
- Prevalence of the condition

Aerobics Center Longitudinal Study, 1970-2004. In progress

Attributable Fractions (%) for All-Cause Deaths

40,842 Men & 12,943 Women, ACLS



Blair SN. *Br J Sports Med* 2009; 43:1-2.

What should we do about this major public health problem?

Help people become and stay more physically active

2008 Physical Activity Guidelines for Americans

At-A-Glance

http://www.health.gov/paguidelines

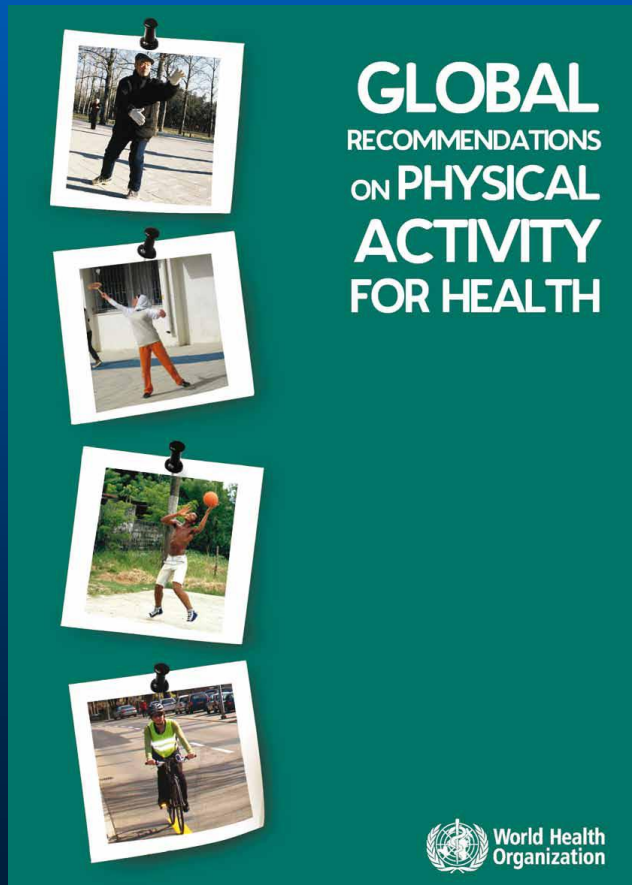
U.S. Department of Health and Human Services

4 Key Adult Guidelines

- Avoid inactivity
- Substantial health benefits from medium amounts of aerobic activity
- More health benefits from high amounts of aerobic activity
- Muscle-strengthening activities provide additional health benefits

WHO PA Recommendation

- Released by WHO in December 2010
- PA recommendations
  - 5-17 yr—60 min MVPA/day, vigorous intensity, including muscle and bone strengthening 3 X week
  - 18-64 yr—each week accumulate in bouts of at least 10 min, 150 min moderate intensity, 75 min vigorous intensity, or combination of both; and resistance training 2 X week
  - 65 yr & older—same as 18-64 yr, those with poor mobility should also do balance exercises, and take health conditions into account



Get Involved

www.physicalactivityplan.org

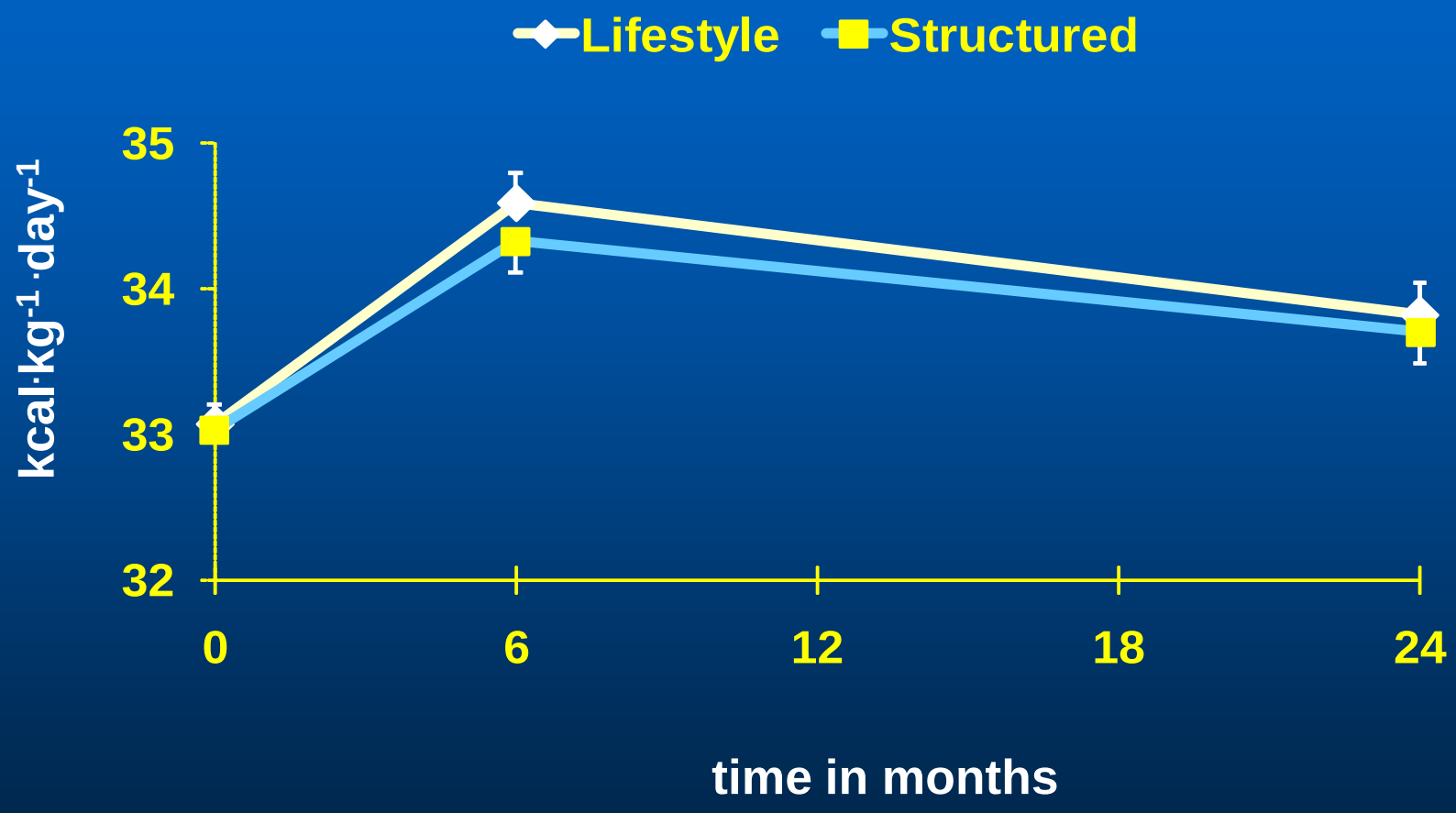
e-mail: info@physicalactivityplan.org

How Can We Get Sedentary Adults to Become and Stay More Physically Active?

Behavioral Approaches to Physical Activity Interventions

- Theoretical foundations
  - Social Learning Theory
  - Stages of Change Model
  - Environmental/Ecological Model
- Methods
  - Problem solving
  - Self-monitoring
  - Goal setting
  - Social support
  - Cognitive restructuring
  - Incremental changes
  - Manipulating the environment

Mean Energy Expenditure



Project Active

Dunn et al. *JAMA 1999; 281:327*

Track Record of Lifestyle PA Interventions

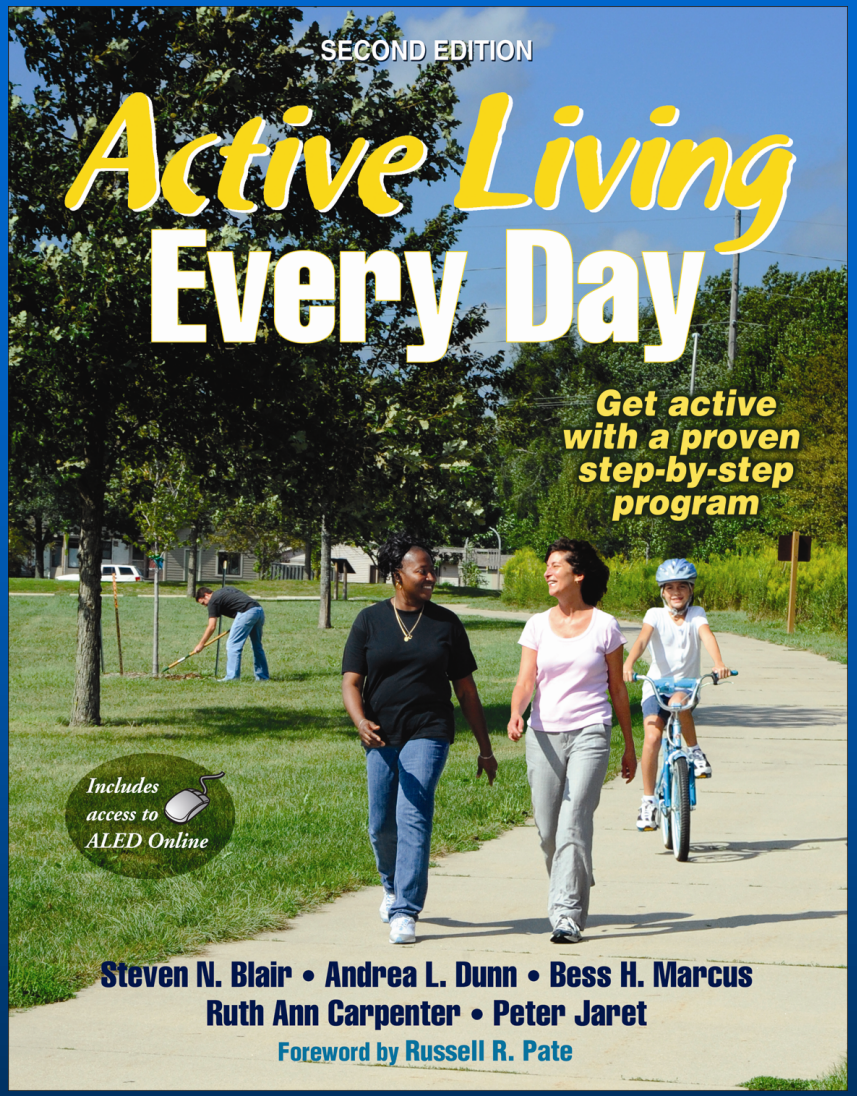
- Successfully implemented in many different populations and settings
  - Men and women of all ages
  - African-American men and women, Hispanic women
  - Prostate cancer survivors
  - Worksites, YMCA's, public heath departments, recreation facilities, senior centers, churches

Lessons Learned from Physical Activity Intervention Studies

- Individuals who use cognitive and behavioral strategies are more likely to be active at 24 months than individuals who do not use these strategies

- Approximately 25-30% of initially sedentary persons who participate in Active Living will be meeting consensus public health guidelines for physical activity at 24 months

The *Active Living Every Day* (*ALED*) Program



Active Living Every Day

S Blair takes no personal royalties from the *ALED* book

ALED Program

Participant Resources

- Active Living Every Day book
- Online study guide
  - Tracks the ALED book
  - Stage-based “buddy”
  - Interactive (quizzes, links, forms)

Active Living Every Day program philosophy

- Moderate physical activity = significant health benefits
- Lifestyle physical activity: an important alternative
- People are more likely to become and stay active when they learn lifestyle skills based on their readiness to change

Flexible delivery options

- Weekly in-person group or individual sessions
- Online or Web-based, with facilitator support
  - Hybrid: online participation with periodic group sessions (either in-person, teleconference, or Web conference)

Behavior change topics

- Identifying and overcoming barriers
- Enlisting social support
- Setting realistic goals
- Coping with lapses
- Rewarding yourself
- Positive self-talk
- Self-monitoring

How to Achieve Lifestyle Change

- Counseling by a PhD level behavioral psychologist
- Counseling by B.A. level health educators
- Counseling by mail and telephone
- Counseling by electronic communications

Final Message

- Focus on
  - Healthful eating habits
    - Fruits and vegetables
    - Whole grain
  - Regular physical activity
    - Three 10 minute walks/day

Thank you.
Questions?

Please join us for our next webinar

Is the environment causing obesity?

In this free hour-long webinar, we will look at the aspects of our modern environment that lead people to become obese, including the built environment, food accessibility and technology, public policy, sociocultural influences, and media and marketing. We will also share practical ideas to help you start making the first important steps toward change in your own community. The webinar will be conducted by Dr. Rebecca Lee, founding director of the Texas Obesity Research Center and author of *Reversing the Obesogenic Environment*.

Thursday, April 21 at 1:00 eastern (12:00 Central)

Visit www.HumanKinetics.com/Webinars to register.