Role of Exercise in Modulation of Nontraditional CHD Risk Factors

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Role of Exercise in Modulation of Nontraditional CHD Risk Factors

- Physical Inactivity
- Cardiorespiratory Fitness
- Insulin Sensitivity
- Glucose Intolerance
- Ectopic Adipose Tissue
- Metabolic Syndrome
- hsCRP

Physical Activity and CHD Risk Factors

Occupational Physical Activity

THE LANCET] ORIGINAL ARTICLES [NOV. 21, 1953

CORONARY HEART-DISEASE AND PHYSICAL ACTIVITY OF WORK

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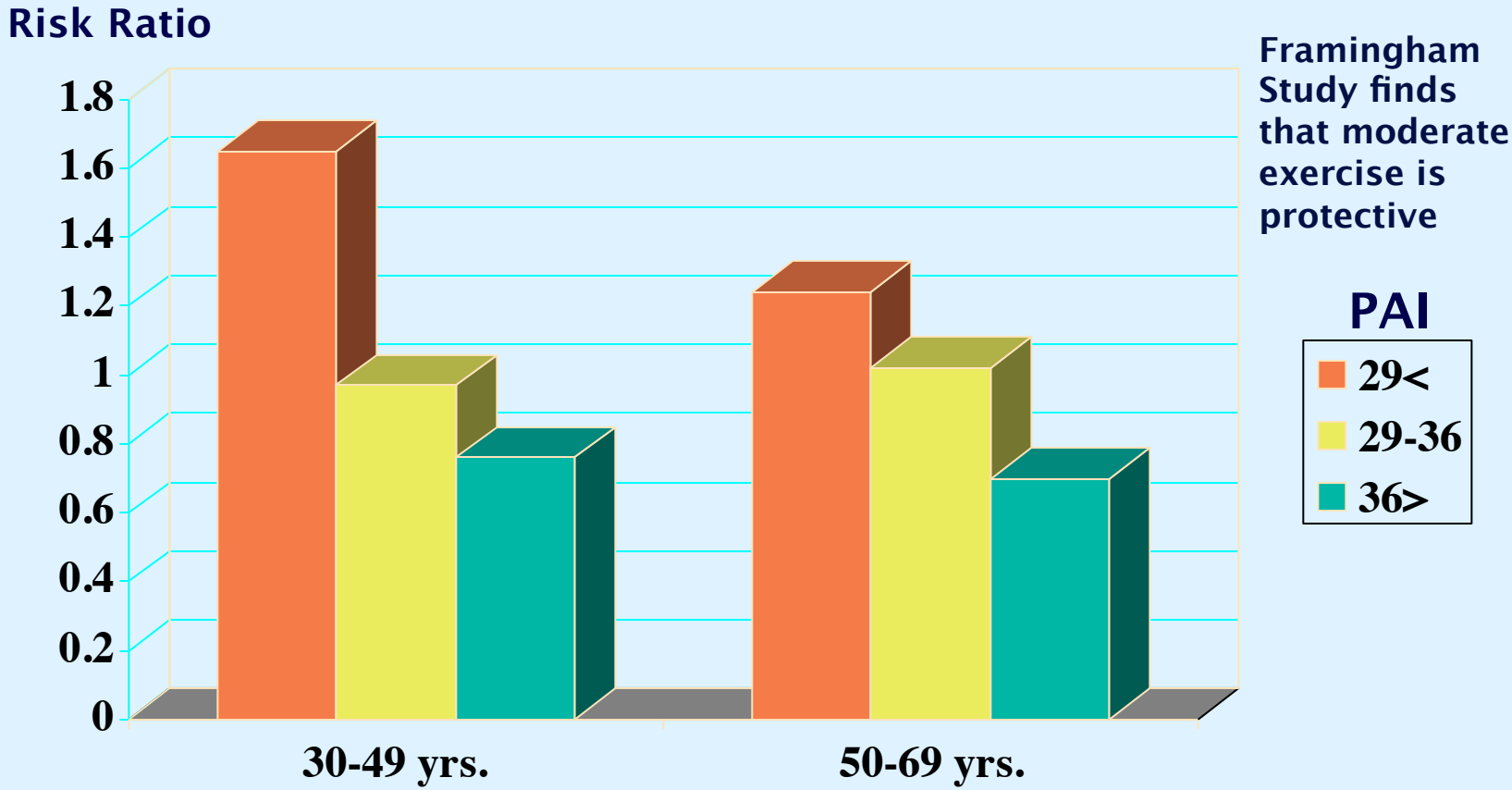
absences of any duration are so examined. All diagnoses are coded by the international three-figure code.[8] Details of all deaths and of all retirements due to ill health are also recorded and the medical causes are similarly coded. Copies of the death certificates were available, as were the diagnoses of the London Transport medical officers for ill-health retirements. Routine checks are imposed in the Central Record of Staff Statistics to ensure accuracy of data.

By special arrangement for the present inquiry, all absences, ill-health retirements, and deaths, the diagnoses of which were assigned to any code number from 420 to 434 (inclusive) were reported to the medical department for detailed scrutiny; and cases of coronary heart-disease, presumptively atherosclerotic, and doubtful cases for consideration, were then "notified" to the unit. (It is, of course, to be appreciated that all clinical presentations of the disease, whether occurring on or off duty, were included.)

From the Central Record of Staff Statistics population

Age-adjusted Risk of CHD by Physical Activity Index. Framingham Study

Men 30-69 y



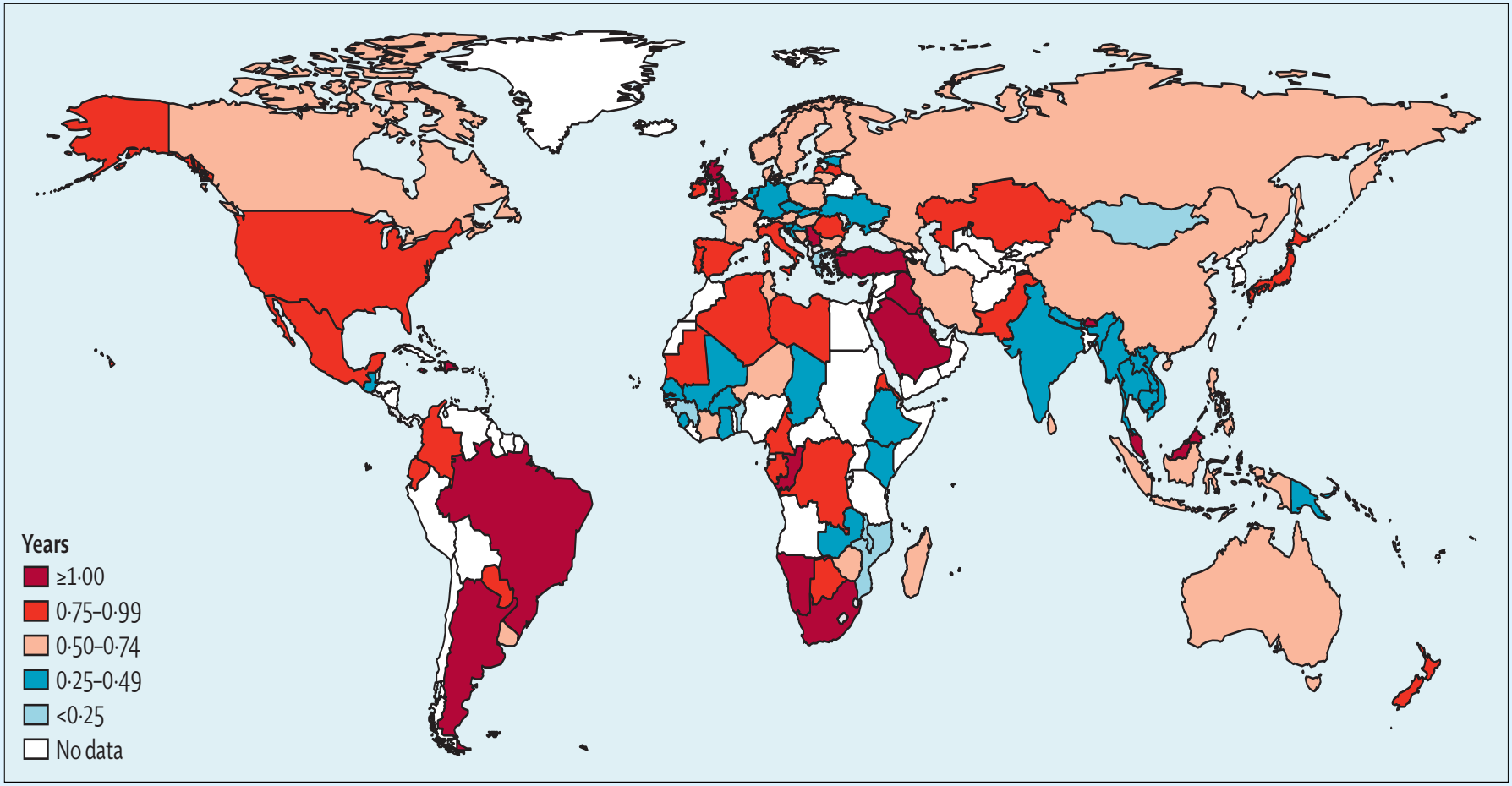
Framingham Study finds that moderate exercise is protective

PAI= Physical Activity Index

Kannel. Can. Med Assoc J 1967; 96: 811-12.

Physical Inactivity and Sedentary Activity as Nontraditional CHD Risk Factors

Estimated Gains in Life Expectancy Worldwide with Elimination of Physical Inactivity



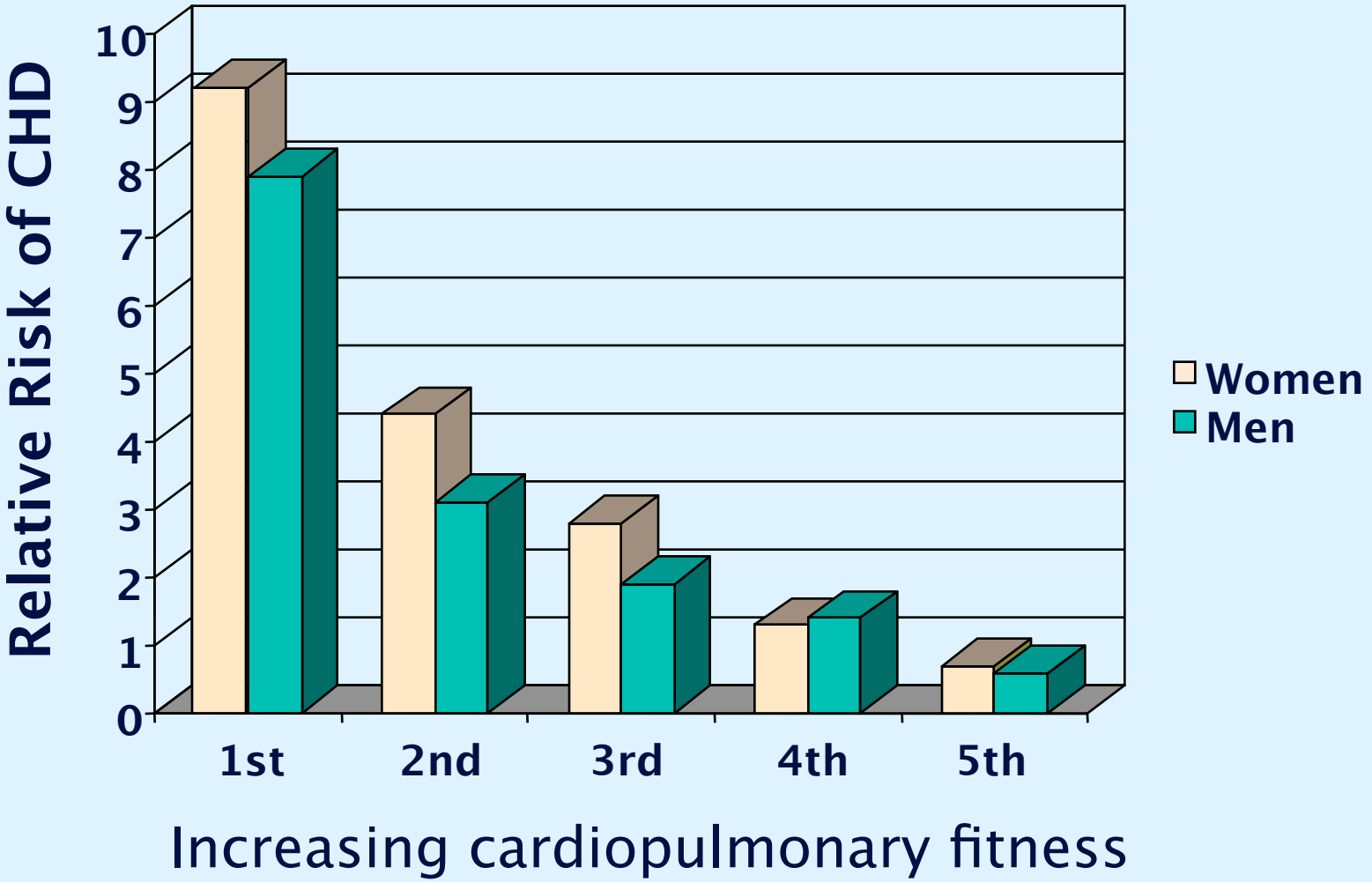
The Chinese Solution for Sitting

Physical Fitness as a Nontraditional CHD Risk Factor

Aerobics Center Longitudinal Study Database

- PI: Dr. Steve Blair
- NIA funded for 18 years
- Consists of Cooper Clinic patients
  - > 70,000 individuals enrolled
- Follow-up to 30 years
- Almost all patients have had a fitness test
  - Treadmill-based assessment of fitness
- Follow-up for mortality and morbidity every 3-4 years

Physical Activity and Cardiovascular Health: Aerobic Center Longitudinal Study



Blair et al. JAMA. 1989;262:2395-401.

Cooper Follow-up Study

- Relative to men who remained unfit (lowest 20%), those who improved had a RR of 0.48
- For each minute of improvement, adjusted CV risk = 8.6%
- How much to improve from lowest to next lowest quintile? ACSM/CDC Recommendations: 30 minutes or more of brisk walking most, if not all, days of the week.

Blair et al.. JAMA. 1995;273:1093-98.

STRRIDE

Studies of a Targeted Risk Reduction Intervention with Defined Exercise

STRRIDE I	**NHLBI: HL-57453**	**NCT00200993**
STRRIDE AT/RT	**NHLBI: HL-57453**	**NCT00275145**
STRRIDE-PD	**NIDDK: DK-081559**	**NCT00962962**

STRRIDE: Eligibility Criteria

Age: 40 – 65
Body Composition: 25 ≤ BMI ≤ 35
Lipids: 130 ≤ LDL ≤ 190 or HDL ≤ 40 M and ≤ 45 W
Glucose: fasting ≤ 140 mg%; fasting insulin ≥ 10 IU/ml
Blood pressure: ≤ 160/90 mmHg
Menstrual status: postmenopausal (FSH ≥ 40) ± HRT ≥ 6 months
Demographics: equal genders, 30% minority
Activity: sedentary, peak VO_2 ≤ 40 ml/kg/min (11 METS)
Medications: nothing that is known to influence skeletal muscle or exercise training responses

STRRIDE – Training Protocols*

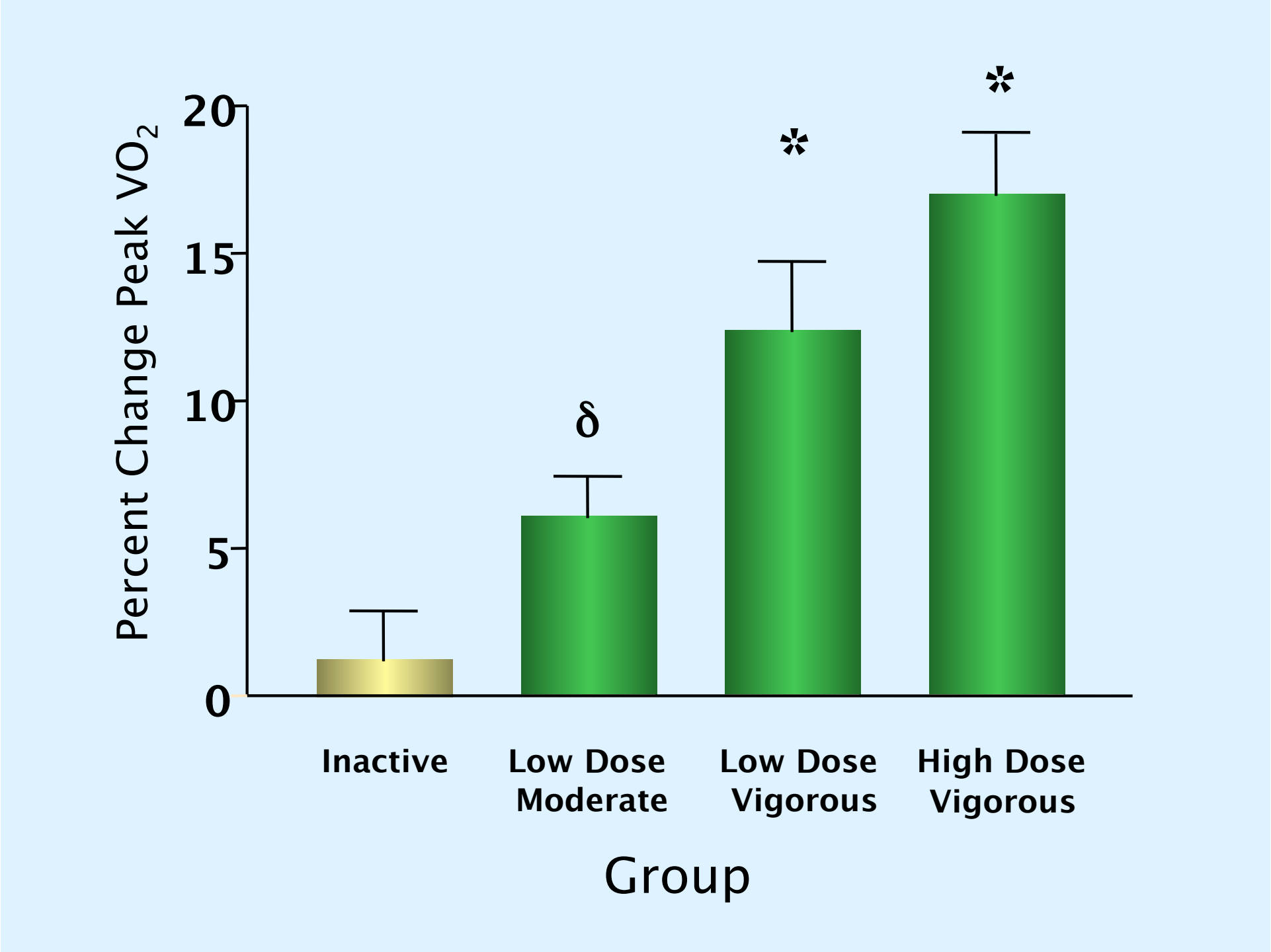
Intensity	Amount	Time/wk
(peak VO_2) per wk)	(kcal/wk)	(min
Brisk Walking	13 miles/week	170
Jogging	13 miles/week	120
Jogging	22 miles/week	170
Inactive	None	None

Int

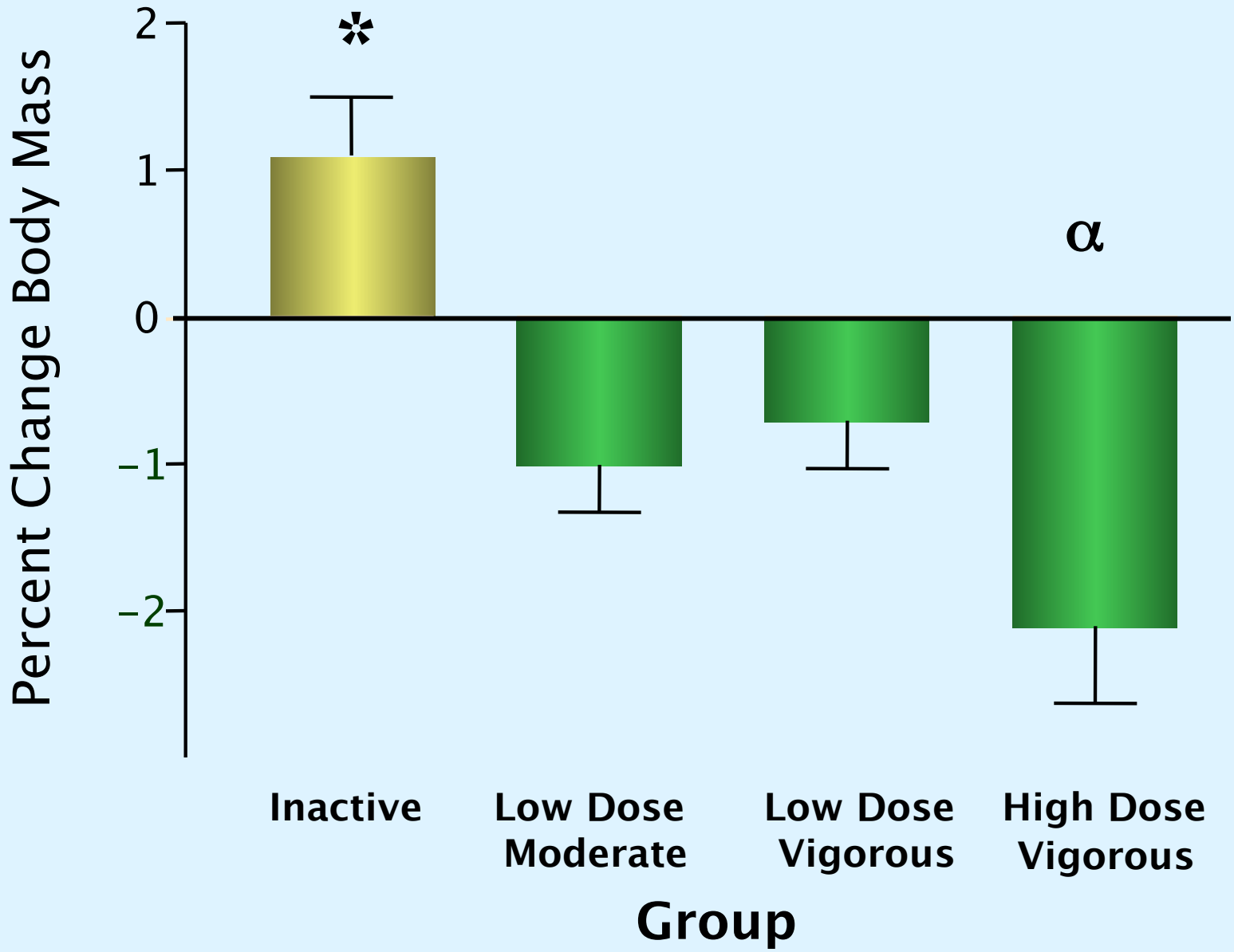
Amt

Freq

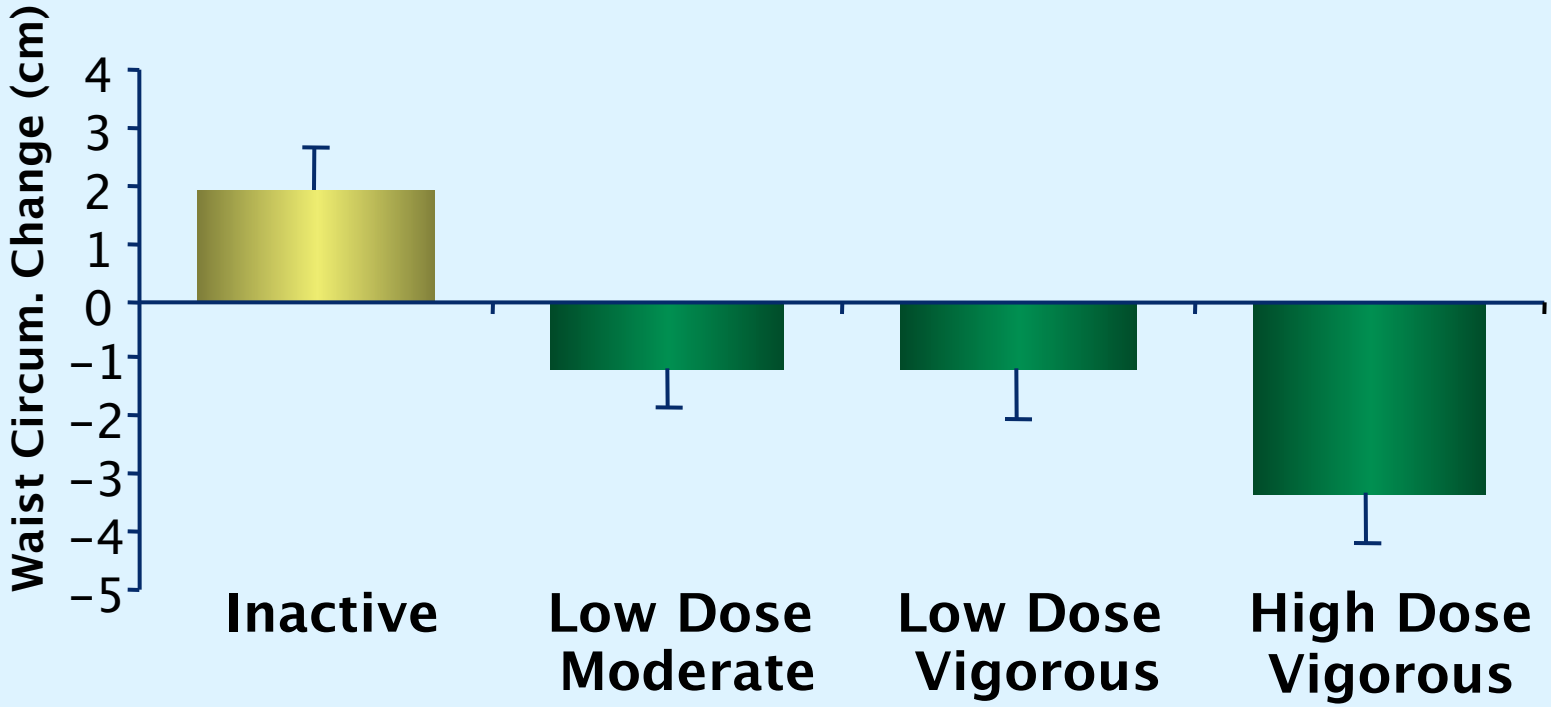
*No Dietary Intervention


Percent Change Peak VO_2
20
15
10
5
0
δ
*
*
Inactive
Low Dose Moderate
Low Dose Vigorous
High Dose Vigorous
Group

Body Composition as a Nontraditional CHD Risk Factor


Percent Change Body Mass
2
1
0
−1
−2
*
α
Inactive
Low Dose Moderate
Low Dose Vigorous
High Dose Vigorous
Group

Responses of Waist Circumference to Various Exercise Regimens

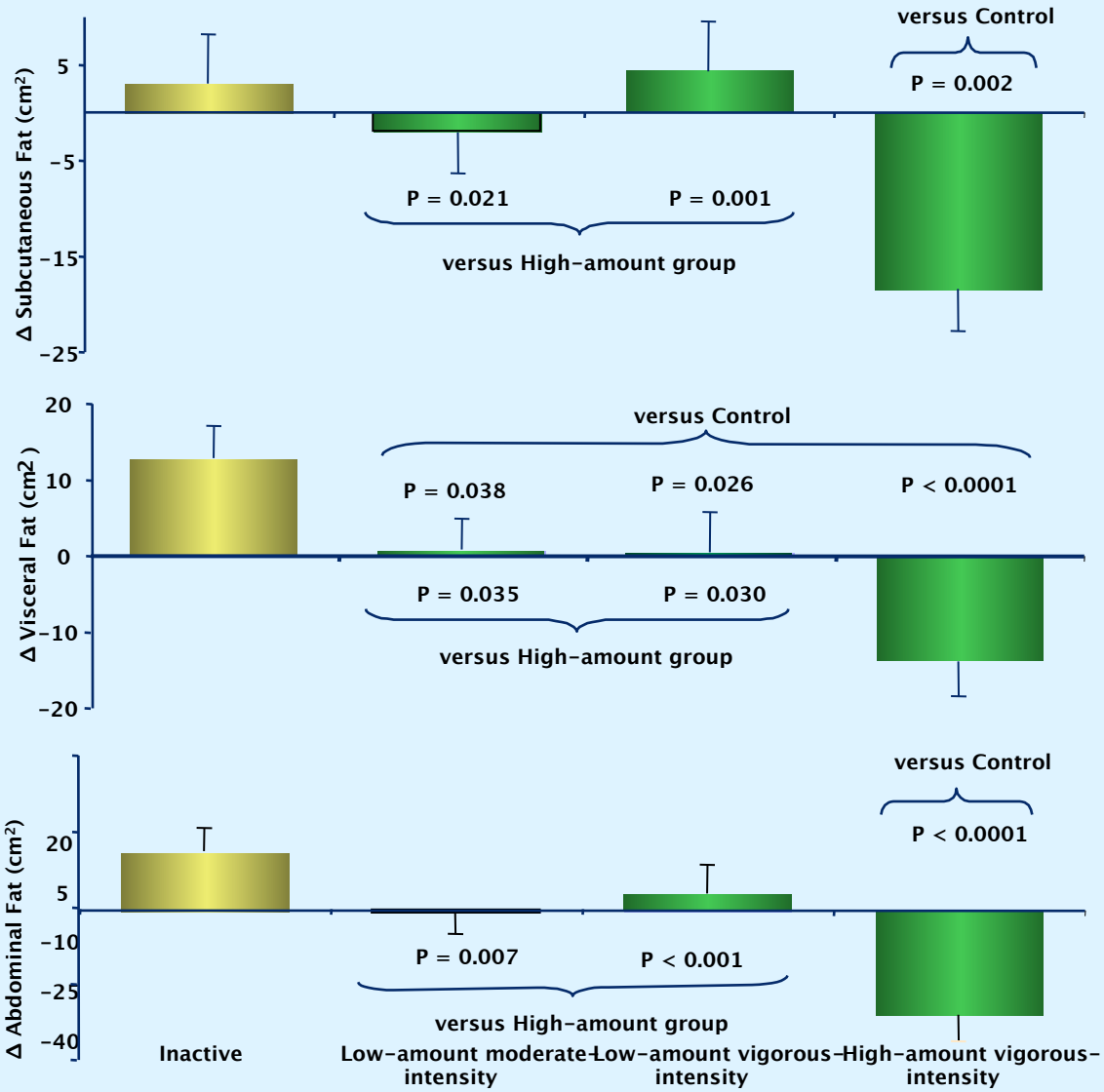


Changes in Body Fat Stores with Exercise

SAT

VAT

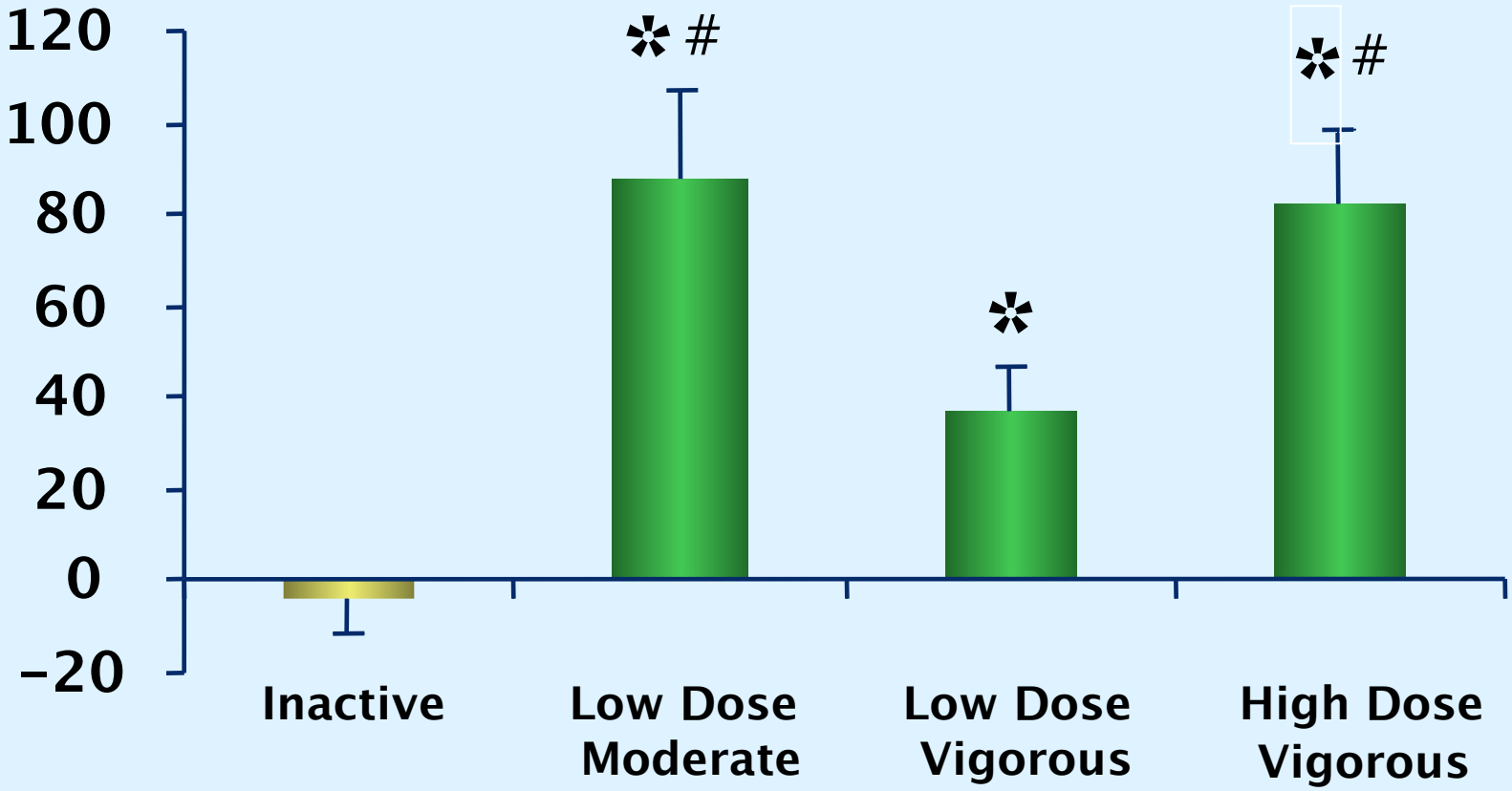
TAT

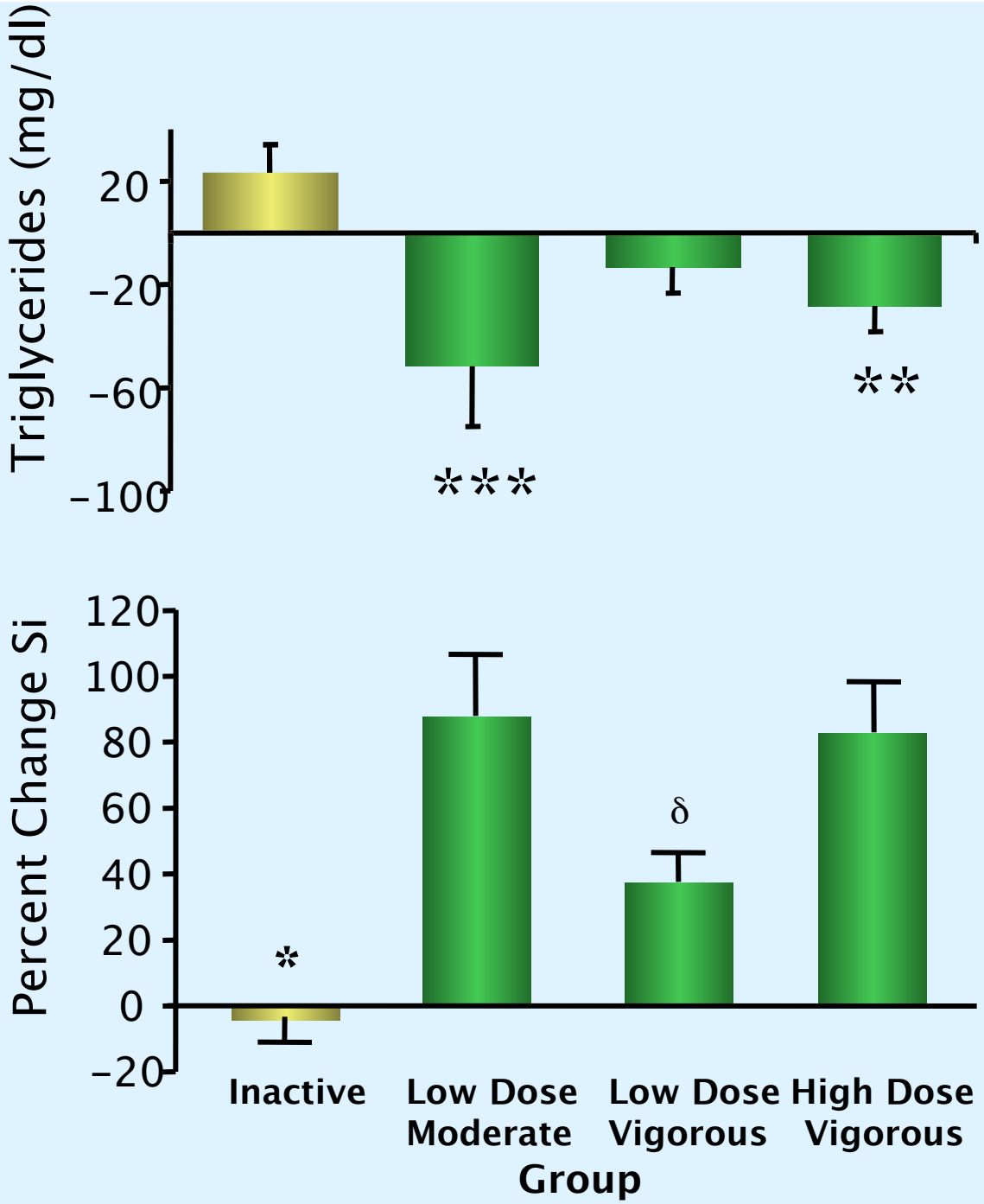


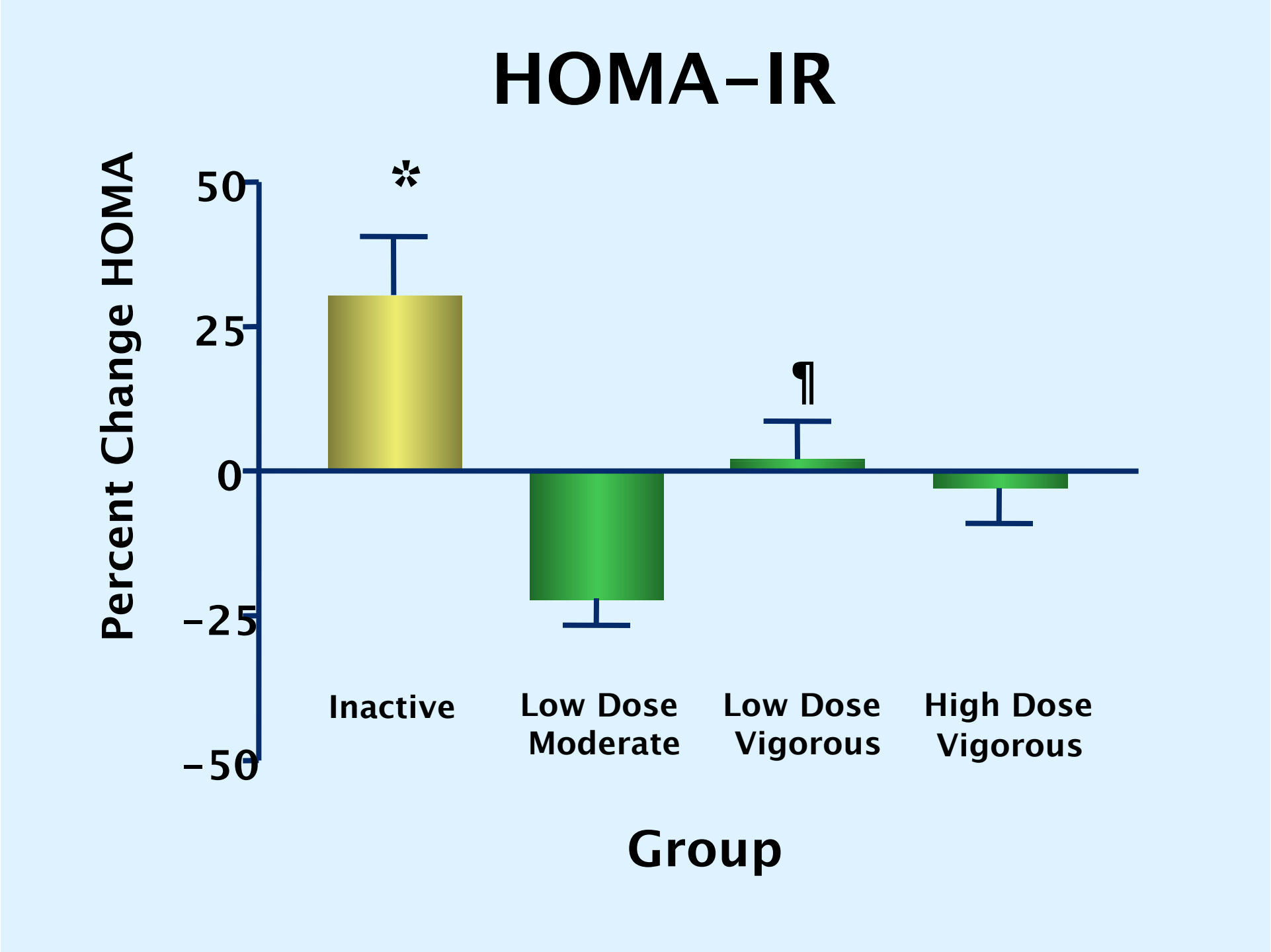
SAT=subcutaneous adipose tissue; VAT=visceral adipose tissue; TAT=total adipose tissue

Insulin Sensitivity and Glucose Intolerance as Nontraditional CHD Risk Factors

Change S_i (%) with Exercise Training




Triglycerides (mg/dl)
20
-20
-60
-100
***
**
Percent Change Si
120
100
80
60
40
20
0
-20
*
δ
Inactive
Low Dose Moderate
Low Dose Vigorous
High Dose Vigorous
Group


HOMA-IR
Percent Change HOMA
50
25
0
-25
-50
*
¶
Inactive
Low Dose Moderate
Low Dose Vigorous
High Dose Vigorous
Group

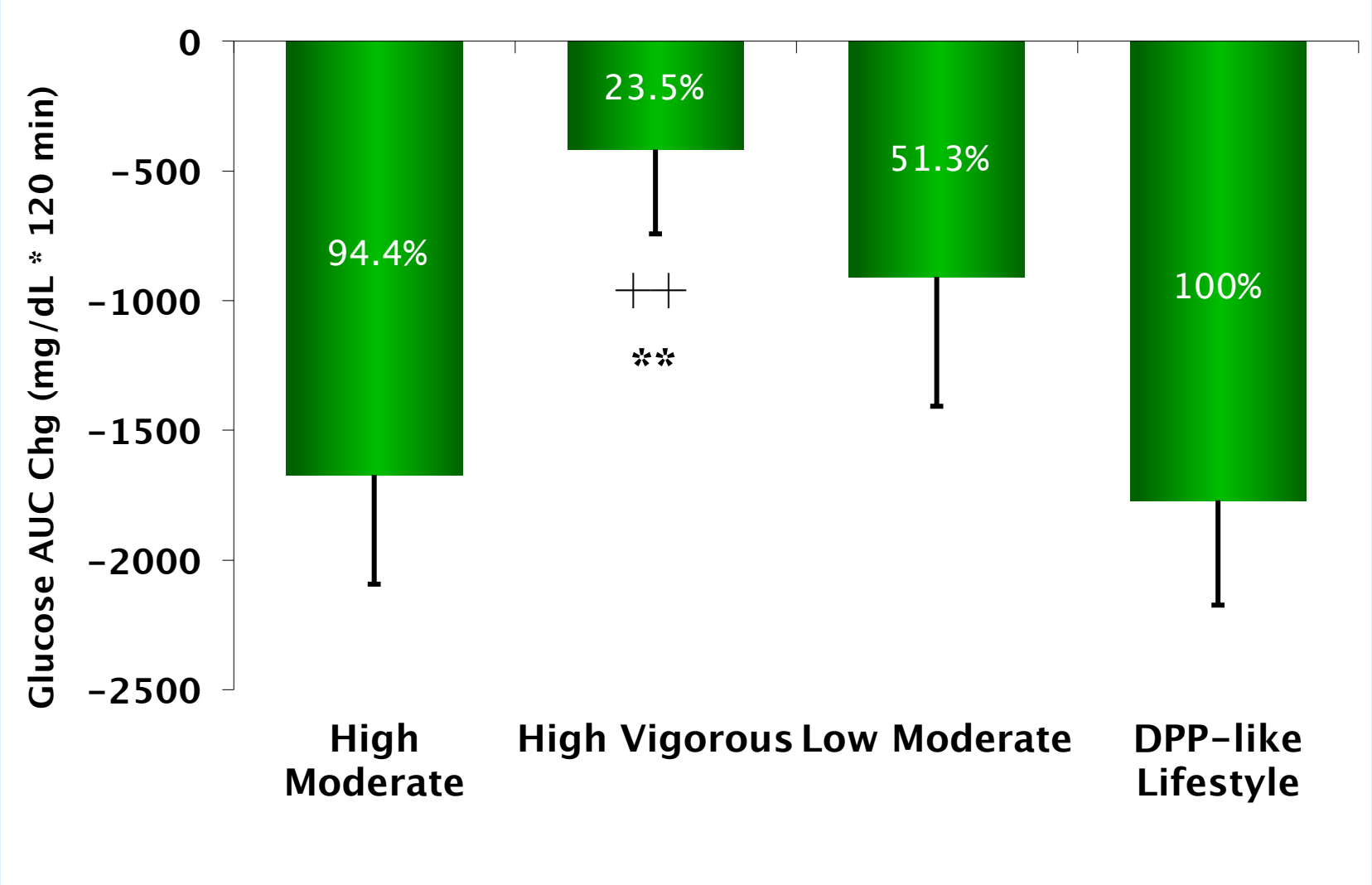
STRRIDE – Training Protocols

Intensity Loss (peak VO_2)	Amount (kcal/wk)	Presc Wt.
Brisk Walking	16 miles/week	None
Jogging	16 miles/week	None
Brisk Walking	10 miles/week	None

Int

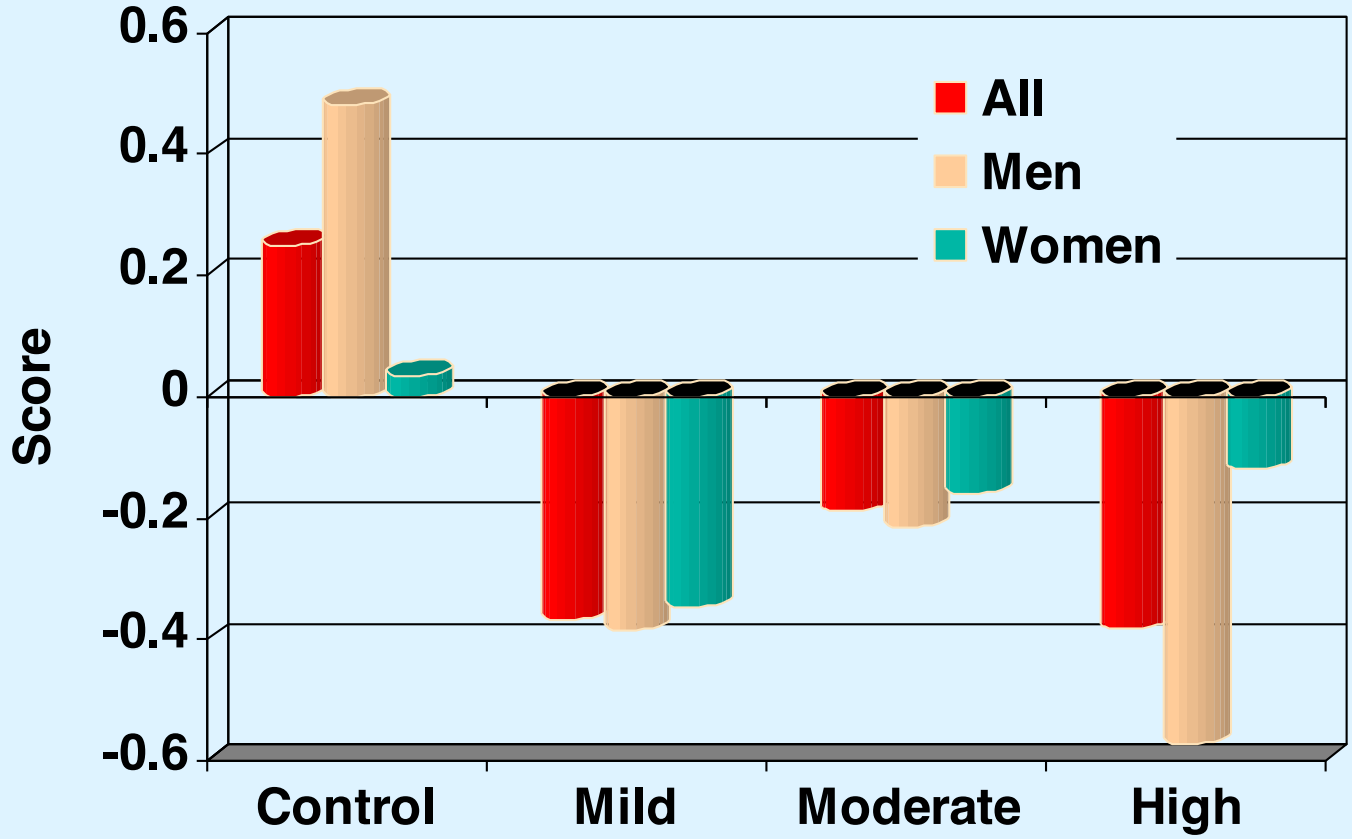
Amt

AUC Glucose by Group

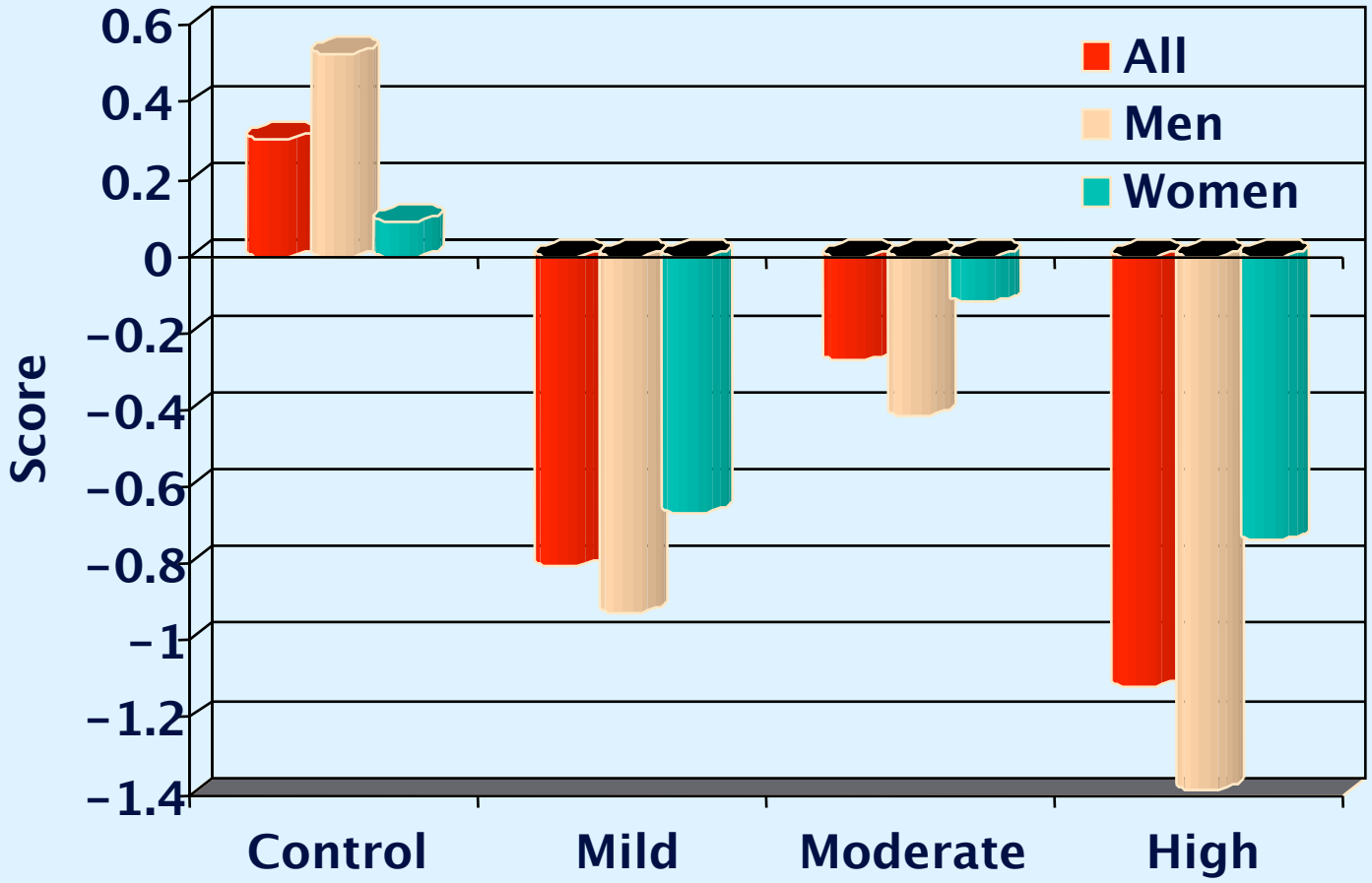


Metabolic Syndrome as a Nontraditional CHD Risk Factor

ATP III Score

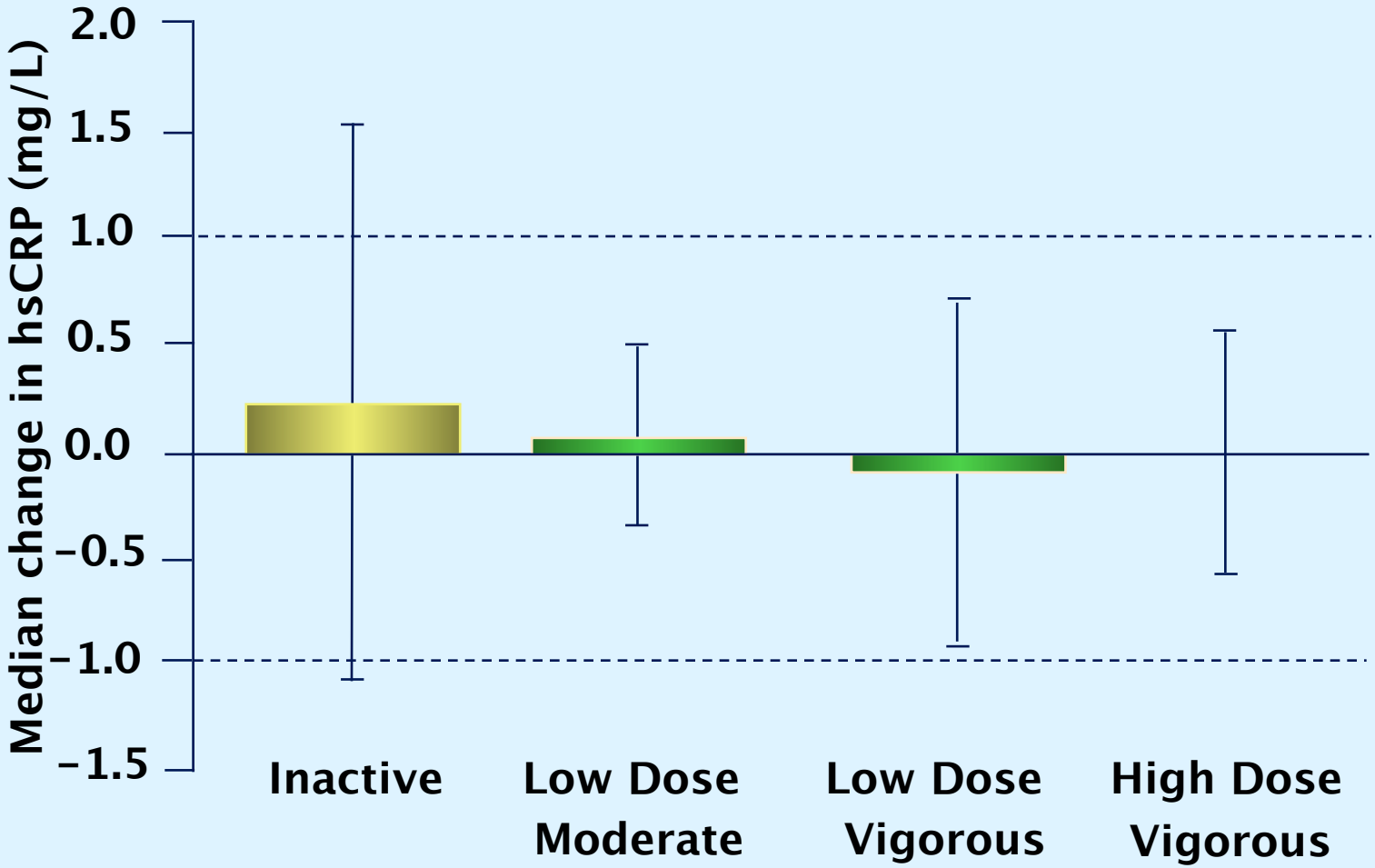


Metabolic Syndrome Score

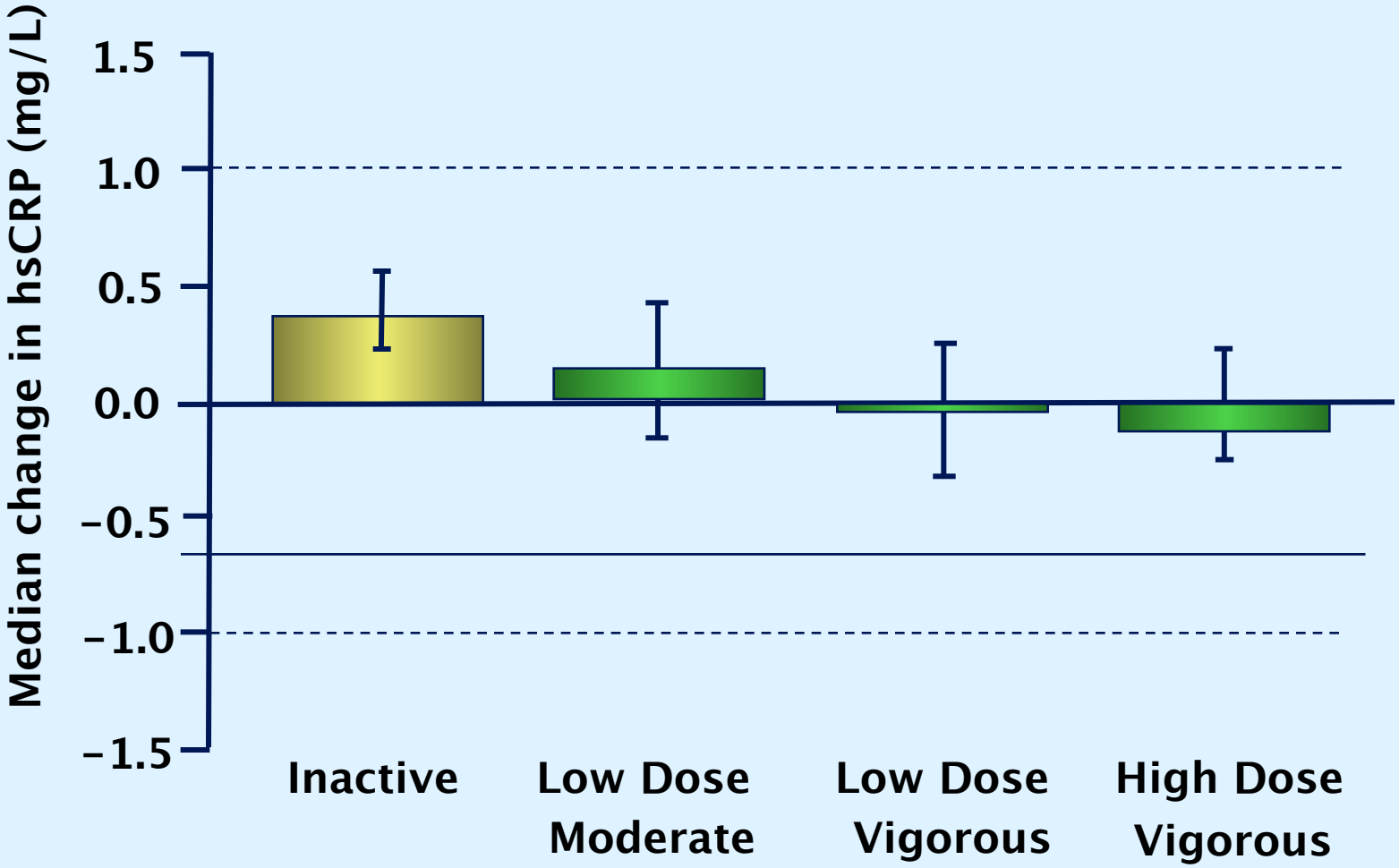


hsCRP as a Nontraditional CHD Risk Factor

Exercise Response in hsCRP (2 weeks after exercise)



Exercise Response in hsCRP (only values ≤ 10mg/L)



Summary of Exercise Effects on …

- Physical Inactivity
- Cardiorespiratory Fitness
- Insulin Sensitivity
- Glucose Intolerance
- Ectopic Adipose Tissue
- Metabolic Syndrome
- hsCRP

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What our subjects do at the end of our studies?