I Benefici Cardiovascolari dell'Esercizio

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CARDIOLOGY PATIENT PAGE

Exercise and Cardiovascular Health

Jonathan Myers, PhD

RECOMMENDATION FOR PHYSICAL ACTIVITY FROM THE CDC/ACSM CONSENSUS STATEMENT AND SURGEON GENERAL'S REPORT

Every American adult should participate in 30 minutes or more of moderate intensity activity on most, and preferably all, days of the week.

- Moderate activities: activities comparable to walking briskly at about 3 to 4 miles per hour; may include wide variety of occupational or recreational activities, including yard work, household tasks, cycling, swimming, etc.
- Thirty minutes of moderate activity daily equates to 600 to 1200 calories of energy expended per week.

BENEFITS OF REGULAR EXERCISE ON CARDIOVASCULAR RISK FACTORS

- Increase in exercise tolerance
- Reduction in body weight
- Reduction in blood pressure
- Reduction in bad (LDL and total) cholesterol
- Increase in good (HDL) cholesterol
- Increase in insulin sensitivity

Estimation of Exercise Intensity Using Heart Rate Reserve

(Maximal heart rate* − resting heart rate) × desired exercise intensity† + resting heart rate

Example:

Maximal heart rate	=	150 beats/min
− Resting heart rate	=	70 beats/min
	=	80 beats/min
× Desired intensity	=	60% (0.60)
	=	48 beats/min
+ Resting heart rate	=	70 beats/min
= Training heart rate		118 beats/min

A reasonable training heart rate for this individual would be 115 to 120 beats/min

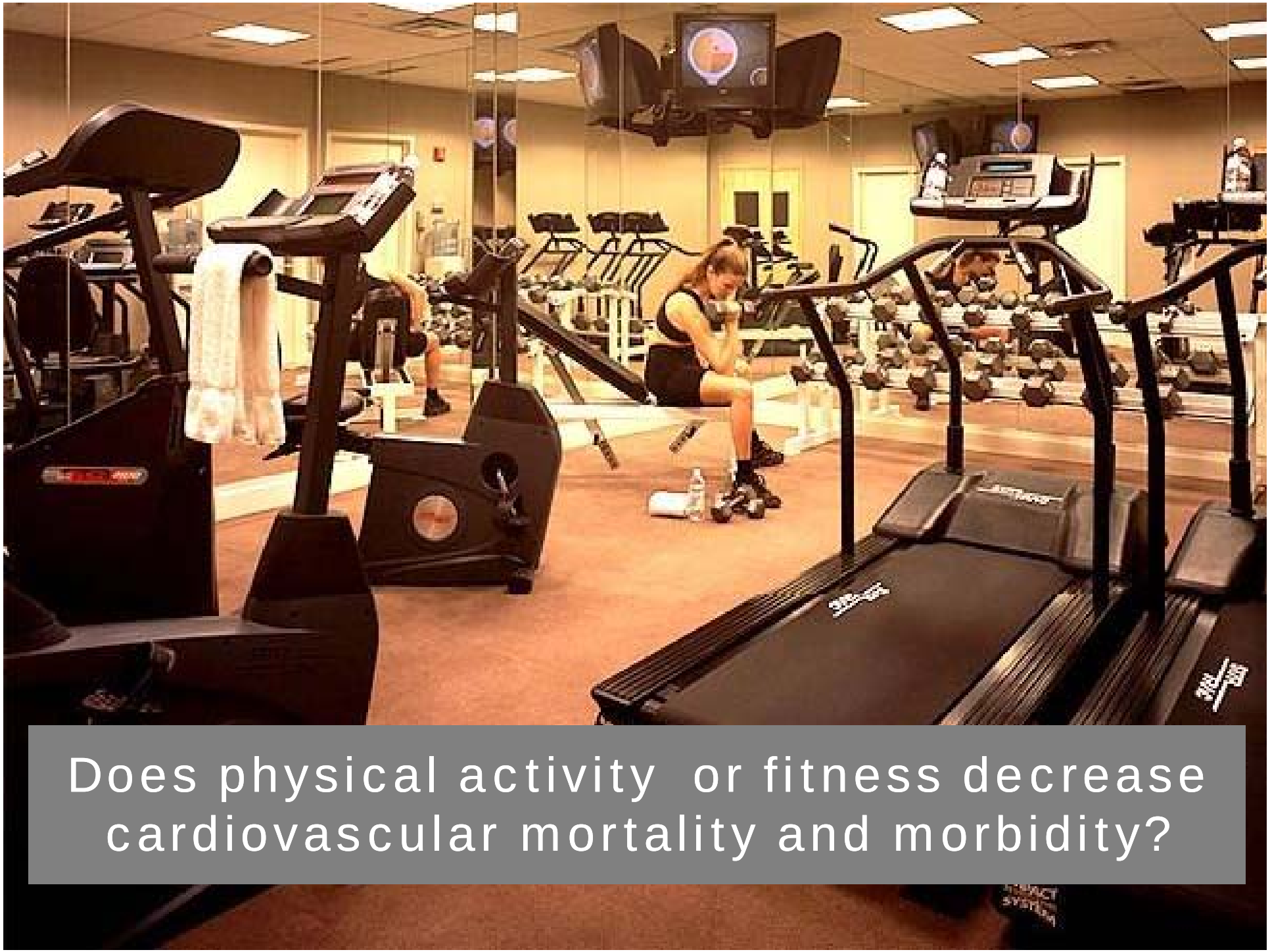
*Although maximal heart rate range is commonly determined by a formula such as 220-age, such estimates are not very accurate; maximal heart rate can only be determined accurately from a maximal exercise test.

†Desired exercise intensity is usually 60% to 80%.

Average MET Levels and Caloric Costs for Common Activities

Activity	METs	Calories/ Hour
Walking 2.0 mph	2.5	175
Walking 3.0 mph	3.5	245
Golf (with cart)	2.5	175
Golf (without cart)	4.9	340
Calisthenics (no weights)	4.0	280
Gardening	4.4	310
Cycling (leisurely)	4.0	280
Cycling (moderately)	5.7	400
Swimming (slowly)	4.5	315
Swimming (fast)	7.0	490
Climbing hills		
No load	6.9	480
With 5 kg load	7.5	525
Tennis (singles)	7.5	525
Tennis (doubles)	6.0	420
Running (10 min mile)	10.2	710
Running (7.5 min/mile)	13.2	930

Circulation January 7/14, 2003


Does physical activity or fitness decrease cardiovascular mortality and morbidity?

Association of physical inactivity with components of metabolic syndrome and coronary artery disease The Chennai Urban Population Study

V. Mohan, K. Gokulakrishnan, R. Deepa, C. S. Shanthirani and M. Datta*

Madras Diabetes Research Foundation,Gopalapuram, Chennai, and *Department of Epidemiology, The Tamil Nadu Dr M.G.R. Medical, University, Chennai, India

Physical inactivity is associated with the components of MS and CAD in this urban south-Indian population.

Lifestyle changes focusing on increasing physical activity could help to prevent the exploding epidemic of MS and CAD in India.

Diabet. Med. 22, 1206–1211 (2005)

J Appl Physiol 99: 1613–1618, 2005.
First published July 7, 2005

HIGHLIGHTED TOPIC *Role of Exercise in Reducing the Risk of Diabetes and Obesity*

Inactivity, exercise, and visceral fat. STRRIDE: a randomized, controlled study of exercise intensity and amount

Cris A. Slentz,1 Lori B. Aiken,3 Joseph A. Houmard,5 Connie W. Bales,2,4 Johanna L. Johnson,3Charles J. Tanner,5 Brian D. Duscha,1 and William E. Kraus3

1*Divisions of Cardiology and* 2*Geriatrics,* 3*Duke Center for Living, Duke University Medical Center, Durham;* 4*GeriatricResearch, Education, and Clinical Center, Durham Veterans Administration Medical Center, and* 5*Department of Exerciseand Sports Science and Human Performance Laboratory, East Carolina University, Greenville, North Carolina*

The Harvard Alumni Health Study

Age-adjusted incidence rates and relative risks of first heart attack in men according to physical activity

Physical Activity (Kcal per week)	Number of events	Incidence rate (per 10.000)	Relative risk
≤ 2000	307	57.9	1.64
≥ 2000	122	35.3	1.00 (ref)

The Aerobics Center Longitudinal Study

Age-adjusted rates and relative risks of cardiovascular disease mortality in men and women according to physical fitness

Physical fitness	Mortality rates (10.000)	Relative risk
Men		
1	24.6	1.00 (referent)
2 and 3	7.8	0.32
4 and 5	3.1	0.13
Women		
1	7.4	1.00 (referent)
2 and 3	2.9	0.39
4 and 5	0.8	0.11

JAMA 262:2395-2401, 1989

The Lipid Research Clinics

Mortality Follow-up Study

Rates and relative risks of cardiovascular disease mortality in men according to physical fitness

Physical Fitness	Mortality rates (x 100)	Relative risk
1	221	8.5
2	156	6.0
3	130	5.0
4	26	1.00 (referent)

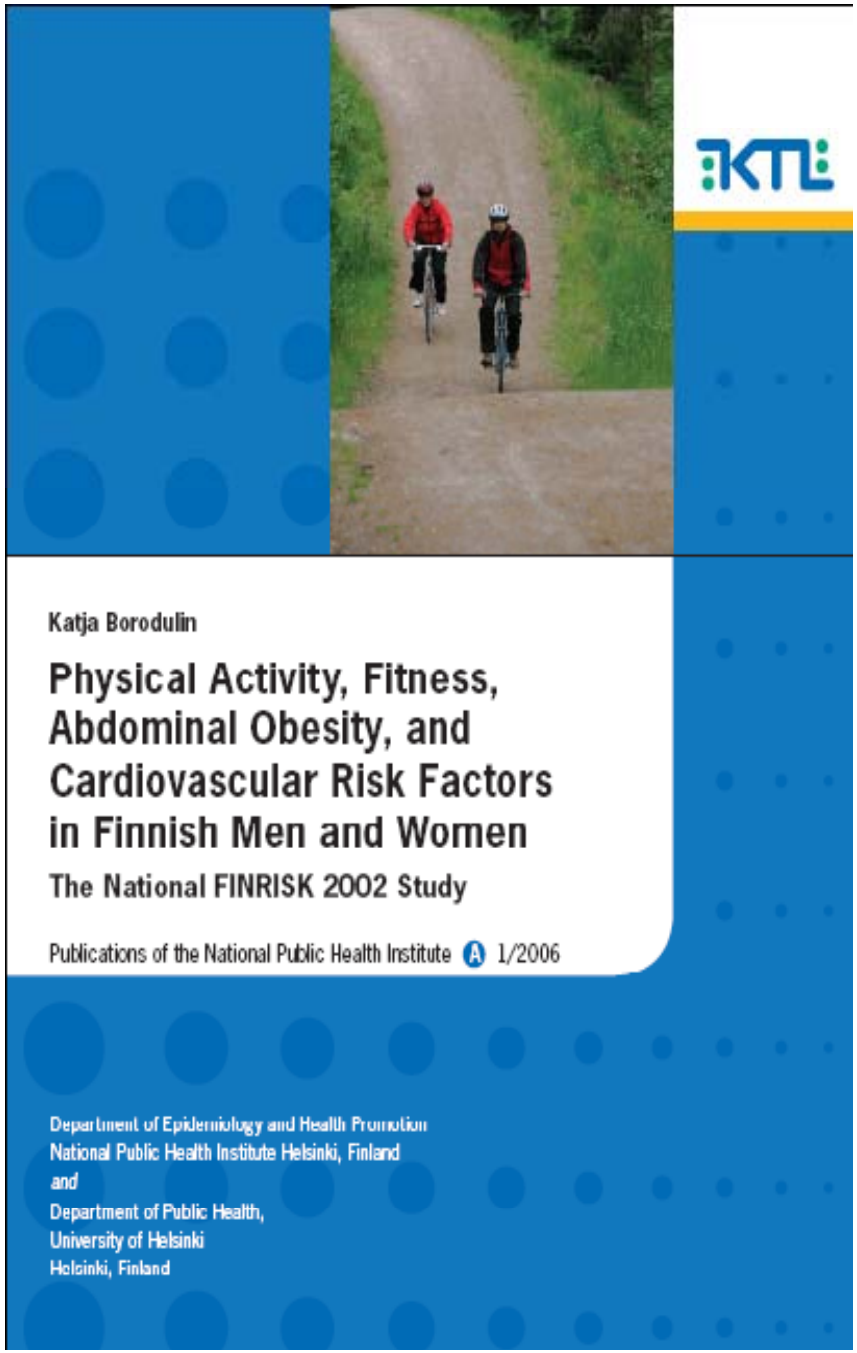
N Engl J Med 319:1379-1384, 1988

Mortality amongst participants in Vasaloppet: a classical long-distance ski race in Sweden

B. Y. Farahmand1, A. Ahlbom1, Ö. Ekblom2, B. Ekblom2, U. Hållmarker3, D. Aronson3, &G. Persson Brobert4

Conclusions. We conclude that participants in long-distance skiing races, which demand prolonged regular physical training, have low mortality.
The extent to which this is due to physical activity, related lifestyle factors, genetics or selection bias is yet to be assessed.

J Intern Med 2003; 253: 276 283.



This study was part of the National FINRISK Study 2002, which monitors cardiovascular risk factors in a Finnish adult population.
The sample comprised 13437 men and women aged 25 to 74 years and was drawn from the Population Register as a stratified random sample according to 10-year age groups, gender and area.
A separate physical activity study included 9179 subjects, of whom 5980 participated (65%) in the study.

- A good estimated aerobic fitness and a low WHR were independently associated with a better risk factor profile in healthy men and women aged 25 to 64 years. In fit men, the associations with risk factor levels were stronger than in unfit men.
- Self-rated physical fitness and estimated aerobic fitness were associated with decreased levels of CRP among healthy adults aged 25 to 74 years.
- Conditioning, commuting, and non-conditioning physical activity had inverse associations with CRP in women. In men, the associations of conditioning and non-conditioning physical activity with CRP were weaker and commuting physical activity was not associated with CRP.
- Estimated aerobic fitness had an inverse association with CRP across the WHR thirds, showing that even obese individuals benefit from good aerobic fitness.

- Higher levels of leisure time physical activity and estimated aerobic fitness were associated with improved glucose tolerance and reduced fasting serum insulin levels in healthy adults aged 45 to 74 years.
- Physical activity was inversely associated with 2-hour glucose and fasting insulin at all levels of abdominal obesity. The risk of impaired glucose tolerance and type 2 diabetes was significantly higher among individuals who did not undertake 30 minutes of moderate intensity physical activity on five days per week in comparison with physically more active persons at all levels of WHR.


Physical fitness relates to primary prevention
Moderate amount of exercise may be protective
More active persons appear to be at lower risk

Possible Biological Mechanisms for Exercise-Induced Reductions in All-Causes and Cardiac Mortality

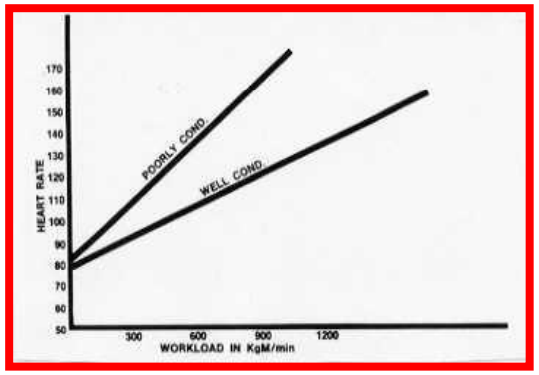
- *Cardiovascular Influence*
- *Metabolic Influence*
- *Lifestyle Influence*

Possible Biological Mechanisms for Exercise-Induced Reductions in All-Causes and Cardiac Mortality

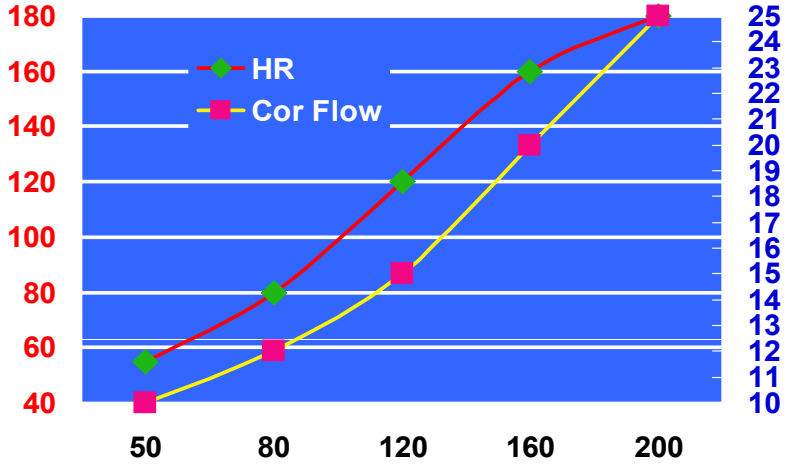
Cardiovascular Influence

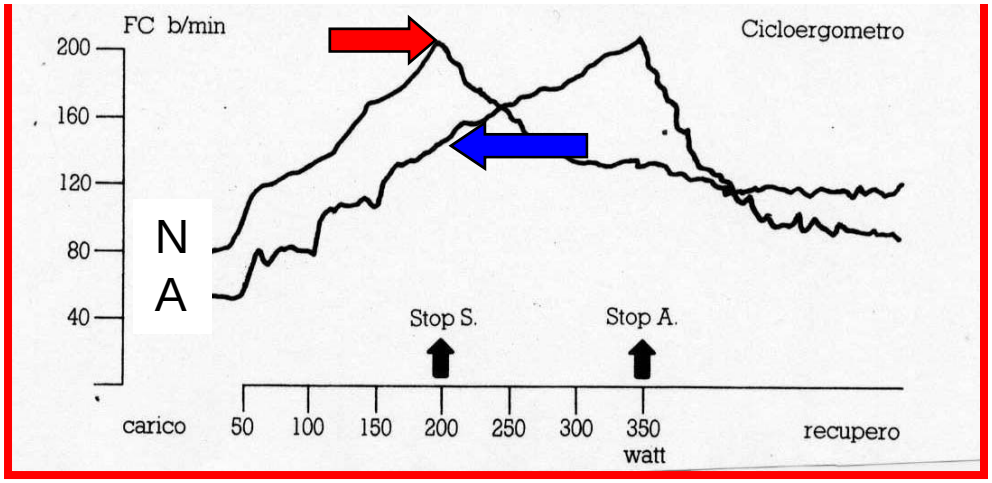
- Reduction of resting and exercise heart rate
- Reduction of resting and exercise blood pressure
- Reduction of myocardial oxigen demand at submaximal levels of physical activity
- Espansion of plasma volume
- Increase of myocardial contractility
- Increase in peripheral venous tone
- Favorable changes in fibrinolytic system
- Increased endothelium-dependent vasodilation
- Increase gene expression for nitric oxide synthase
- Enhanced parasympathetic tone
- Possible increase in coronary blood flow,coronary collateral vessel, and myocardial capillary density

Reduction of resting and exercise heart rate



Reduction of myocardial oxigen demand at maximal levels of physical activity





Increase of myocardial contractility

LaPlace Formulation for Wall Stress

$$S \cong \frac{P \times r^2}{h}$$

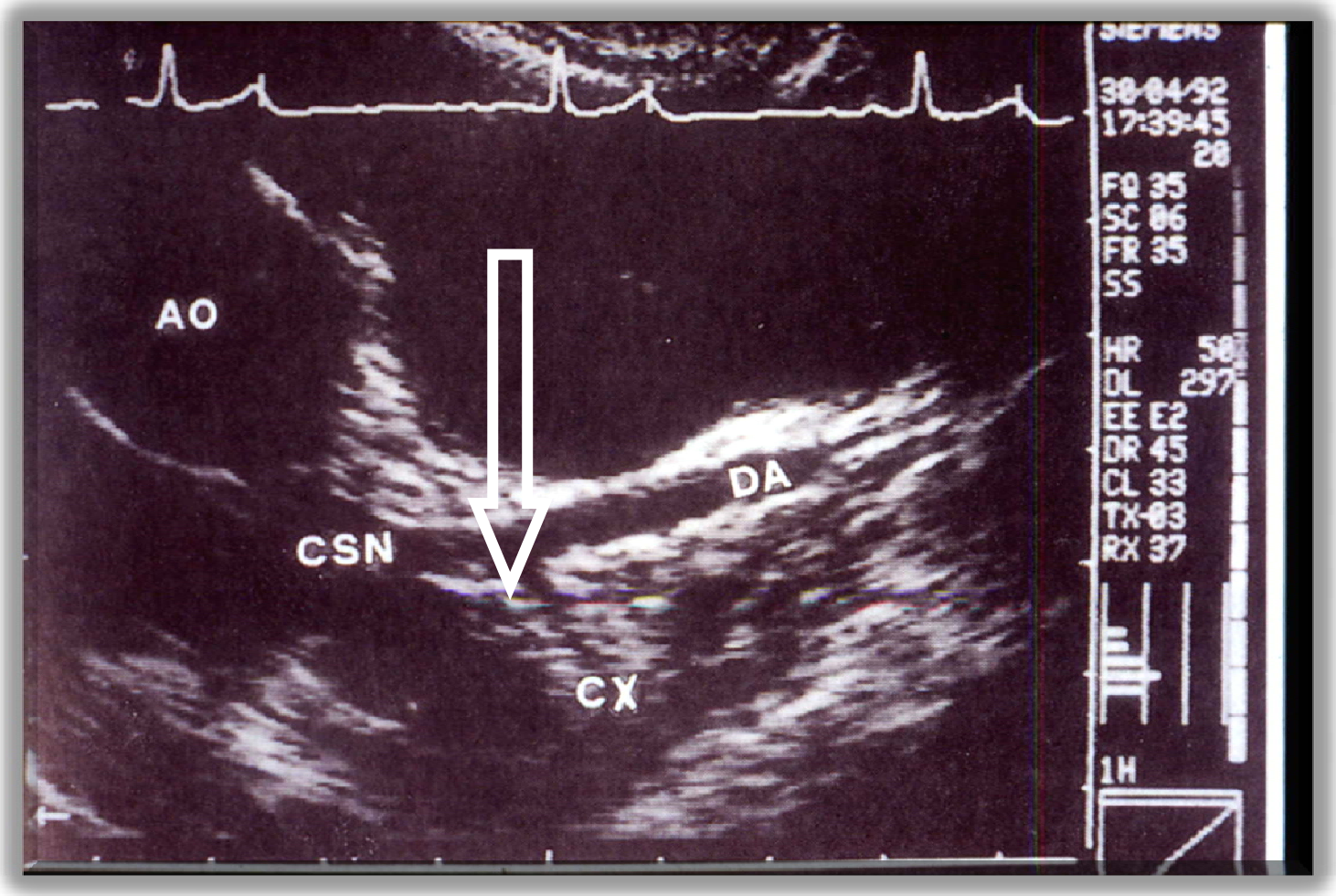
S = wall stress
P = ventricular systolic pressure
r = ventricular radius
h = ventricular wall thickness

Conditioned Heart

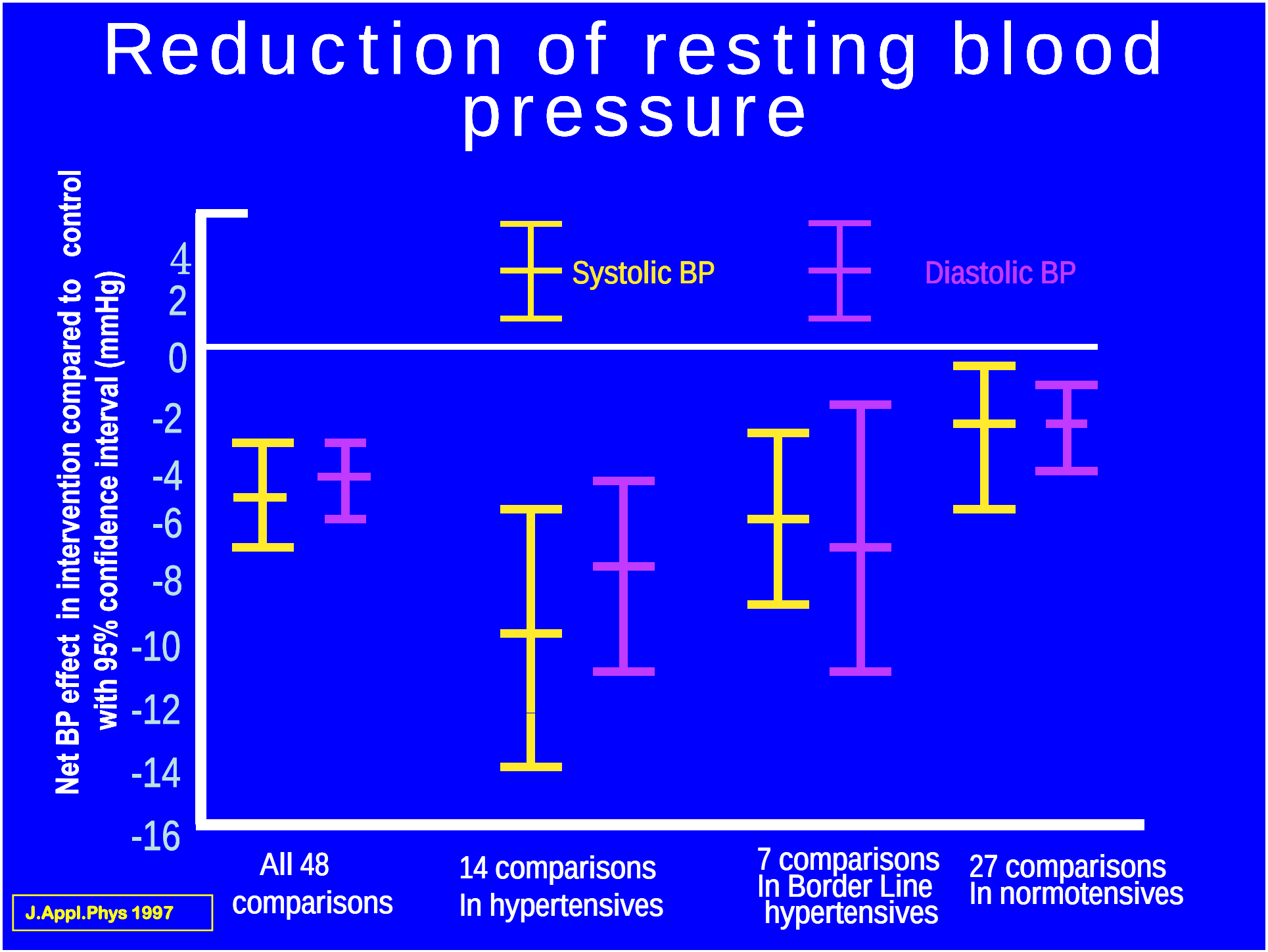
Diastolic Vol. 160 ml. Systolic Vol. 30 ml.
Stroke Vol. 130 ml.
Ejection Frac. 84%

AMS

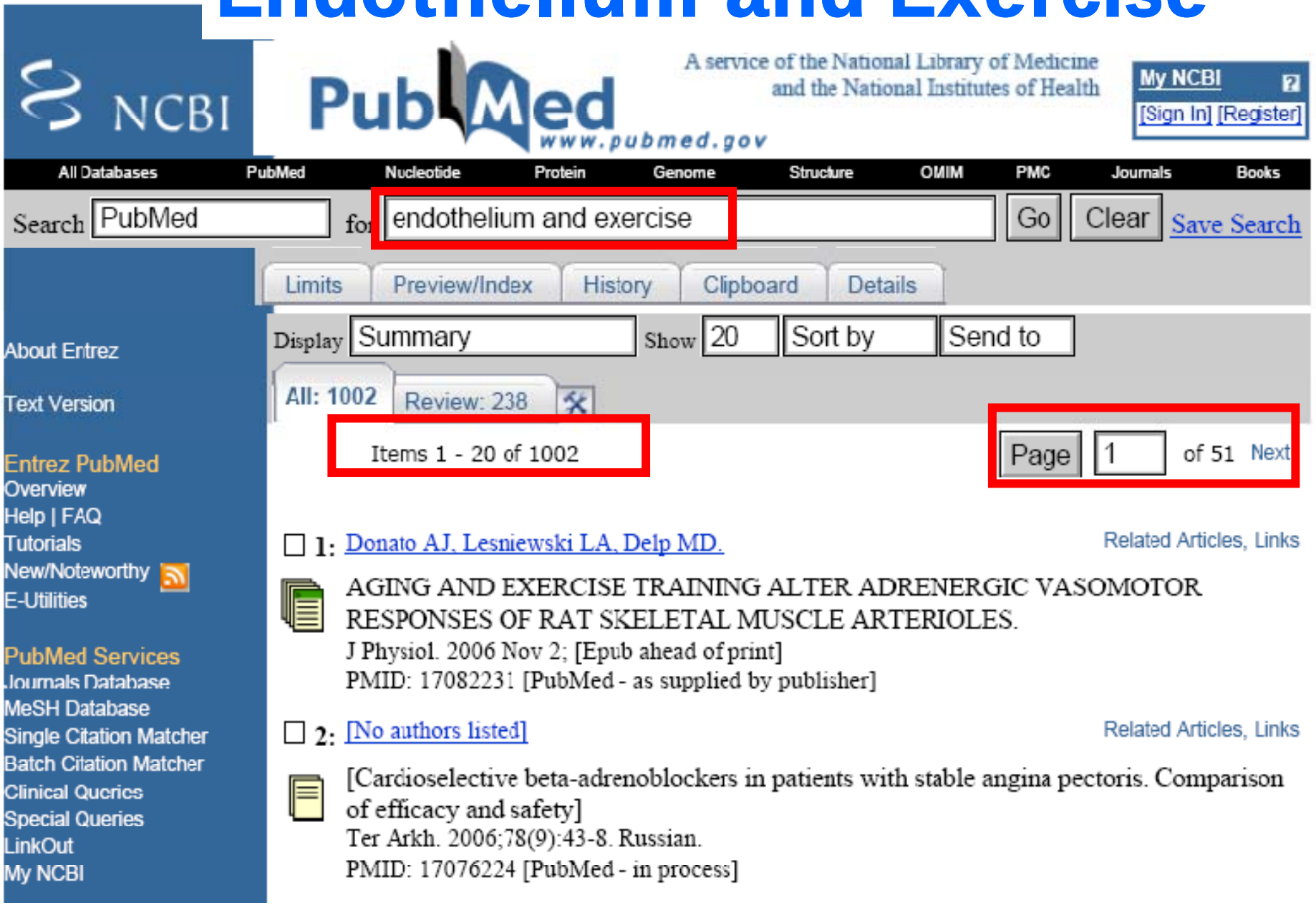
Possible increase in coronary blood flow

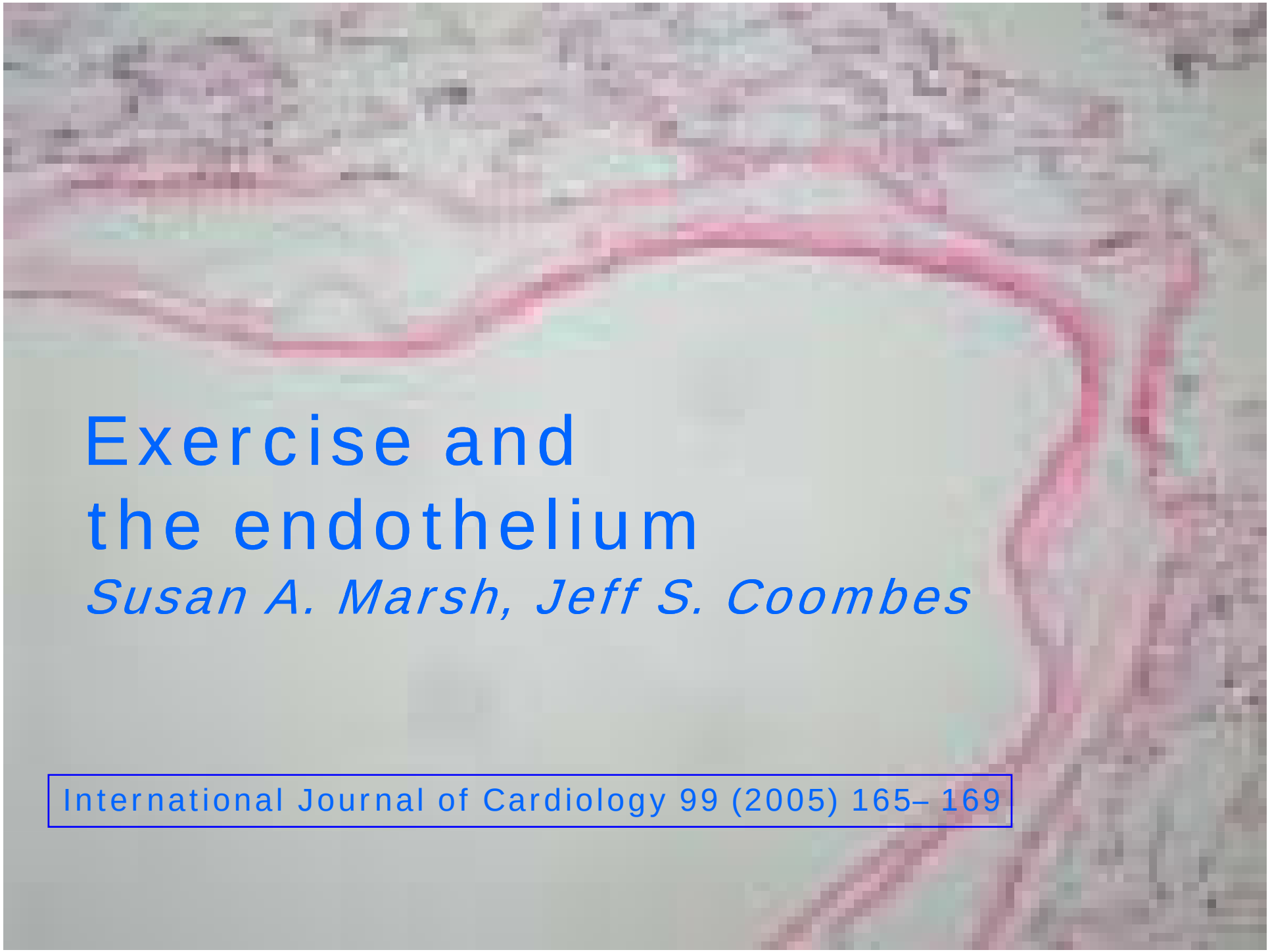


Reduction of resting blood pressure



Endothelium and Exercise



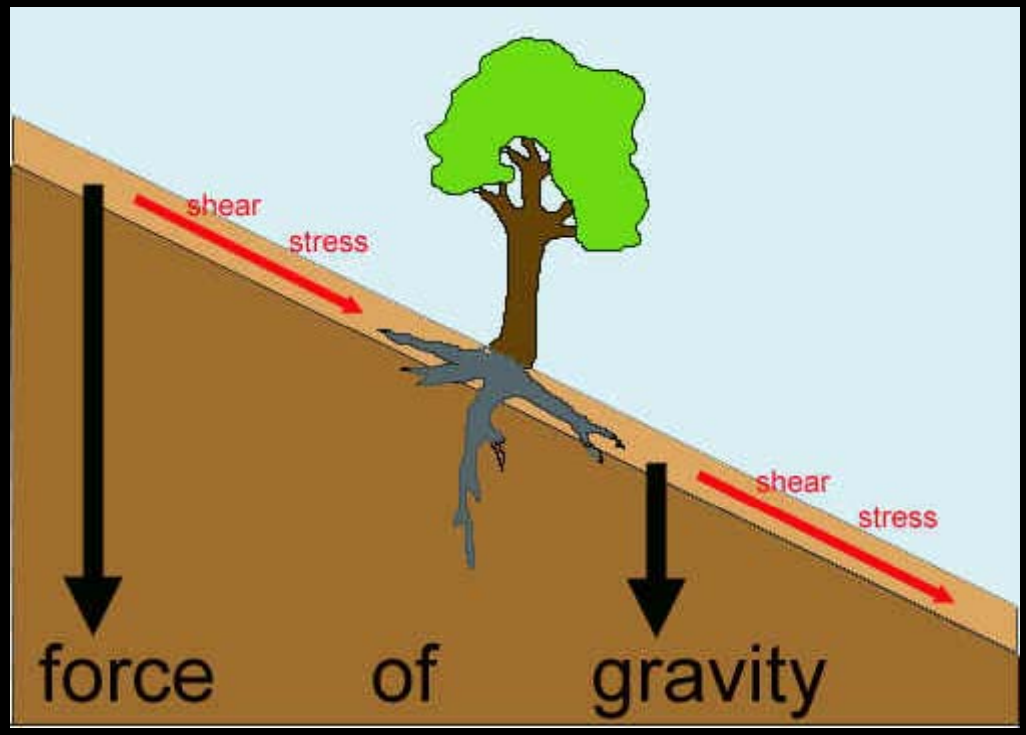


Exercise and the endothelium

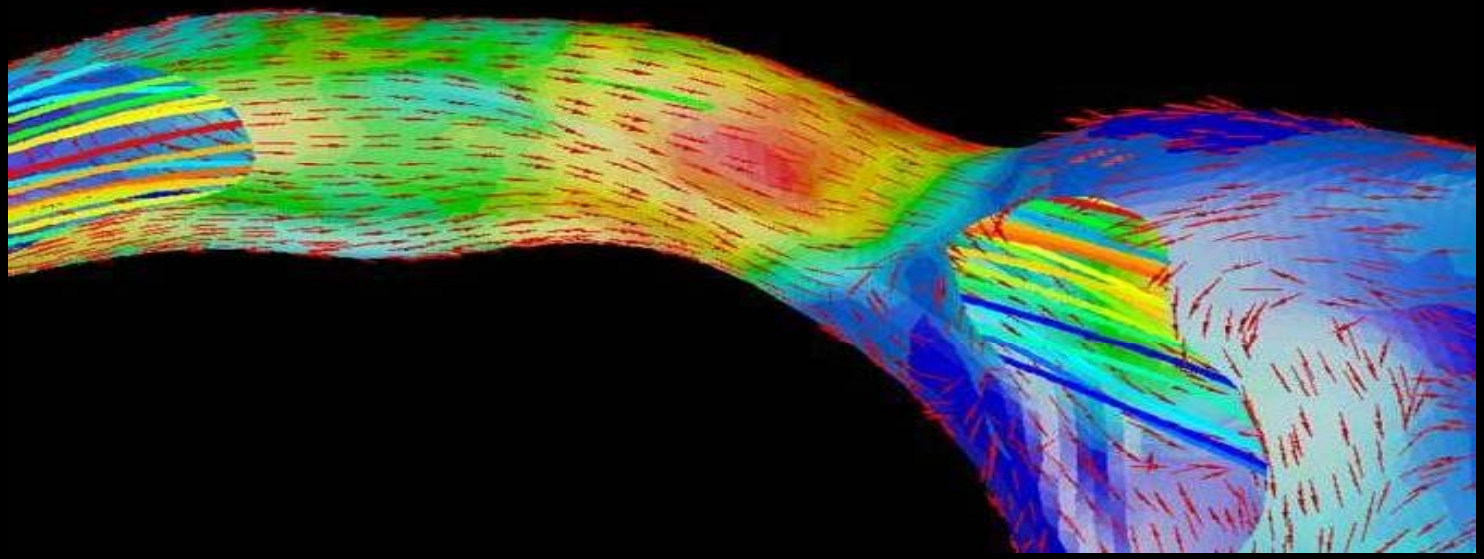
Susan A. Marsh, Jeff S. Coombes

International Journal of Cardiology 99 (2005) 165– 169

- Among the cardioprotectant mechanisms influenced by exercise, the endothelium is becoming recognised as a major target.
- Preservation of endothelial cell structure is vital for frictionless blood flow, prevention of macrophage and lipid infiltration and, ultimately, optimal vascular function.
- Exercise causes various kinds of mechanical, chemical and thermal stresses, and repeated exposure to these stresses may precondition the endothelial cell to future stresses through a number of different mechanisms.



- In vitro application of physiological levels of shear stress to cultured endothelial cells causes changes with elongation of the cells and alignment longitudinally to the flow
- These morphological changes are due to an alignment of F-actin filaments that is both time- and dose-dependent



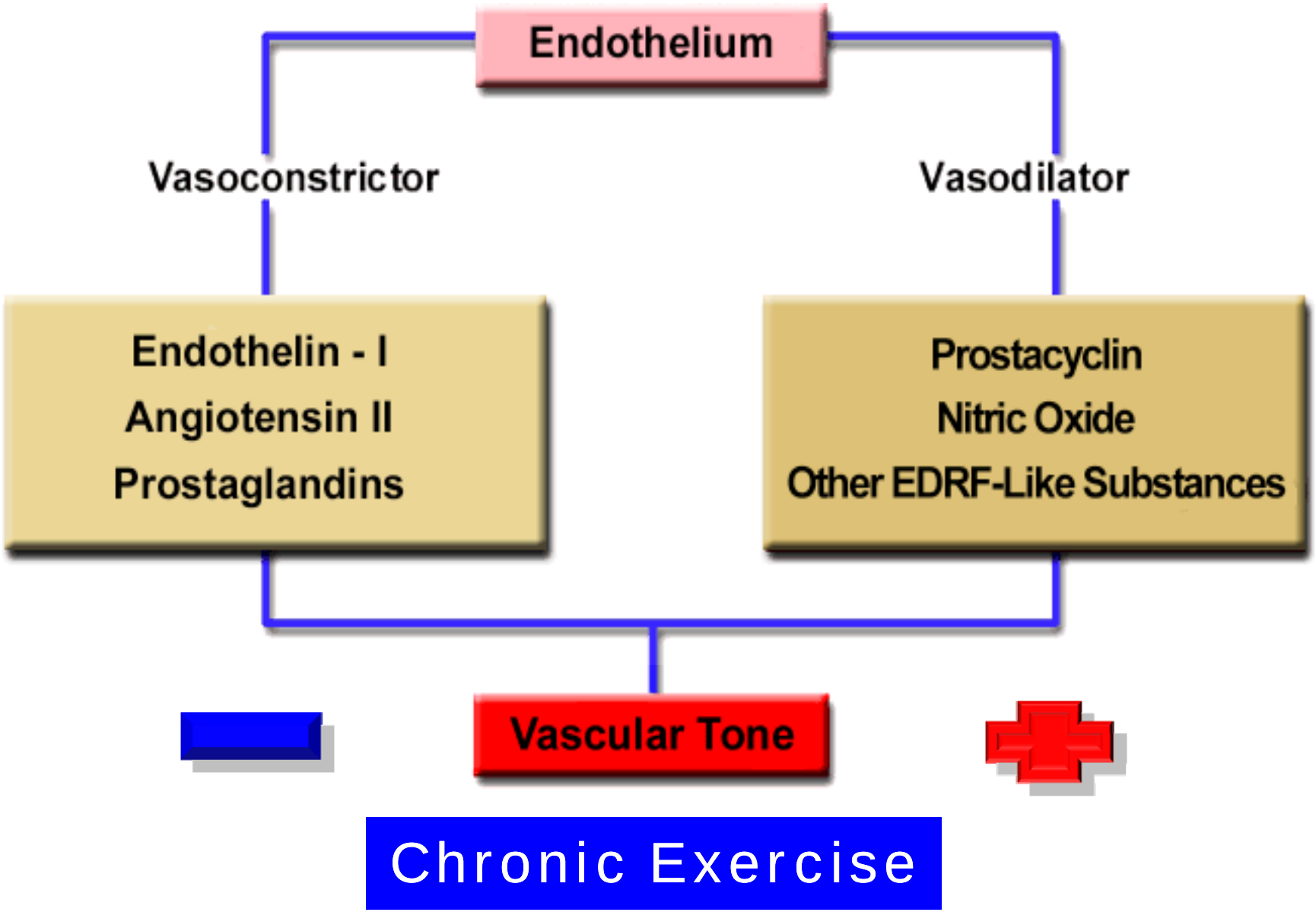
In vitro application of laminar shear stress to cultured endothelial cells:

1)elevates free radical production,

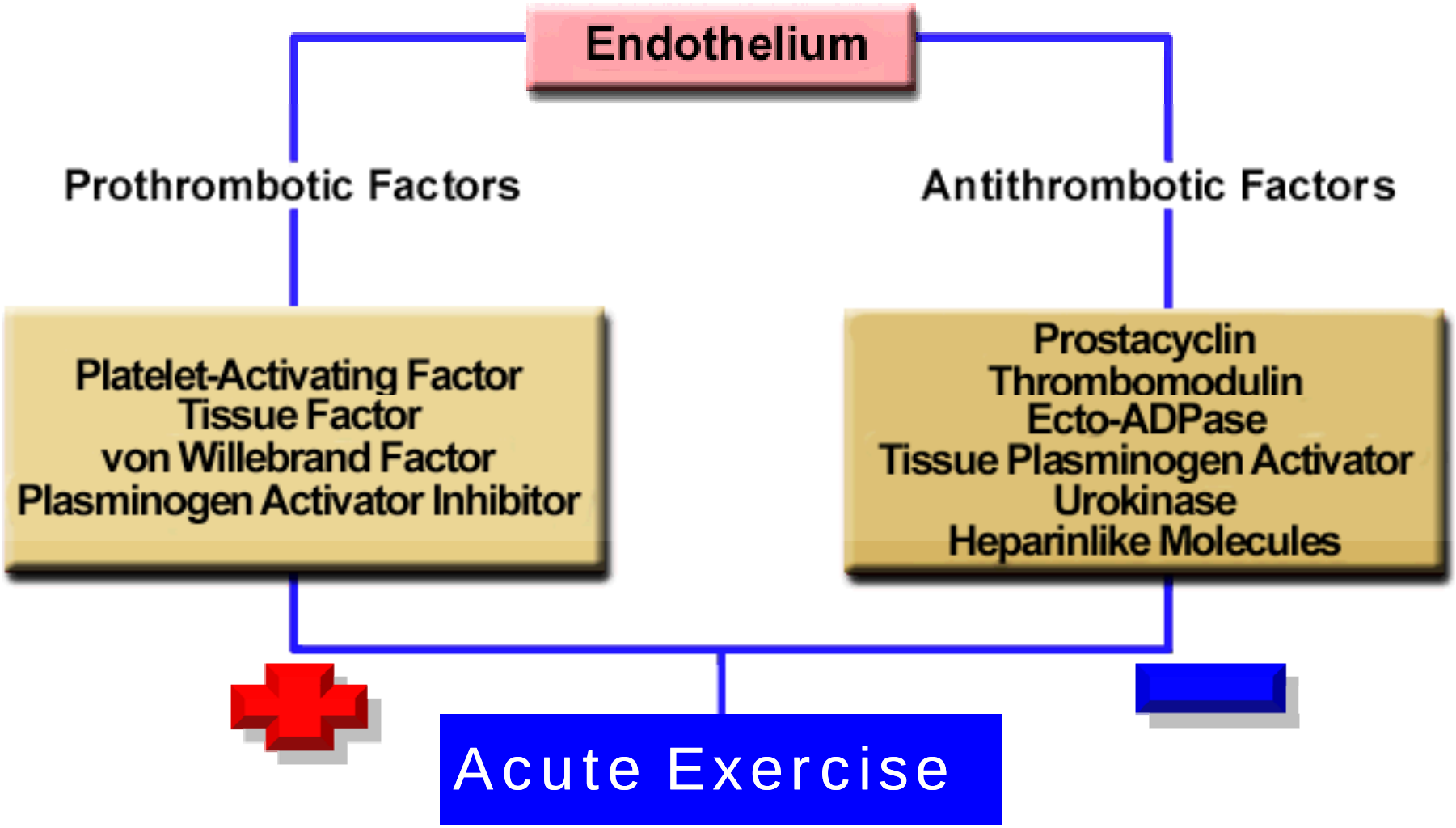
2)up-regulates protective mechanisms such as antioxidant enzymes and heat-shock proteins

3)down-regulates proapoptotic factors

Endothelium and Exercise



Endothelium and Exercise



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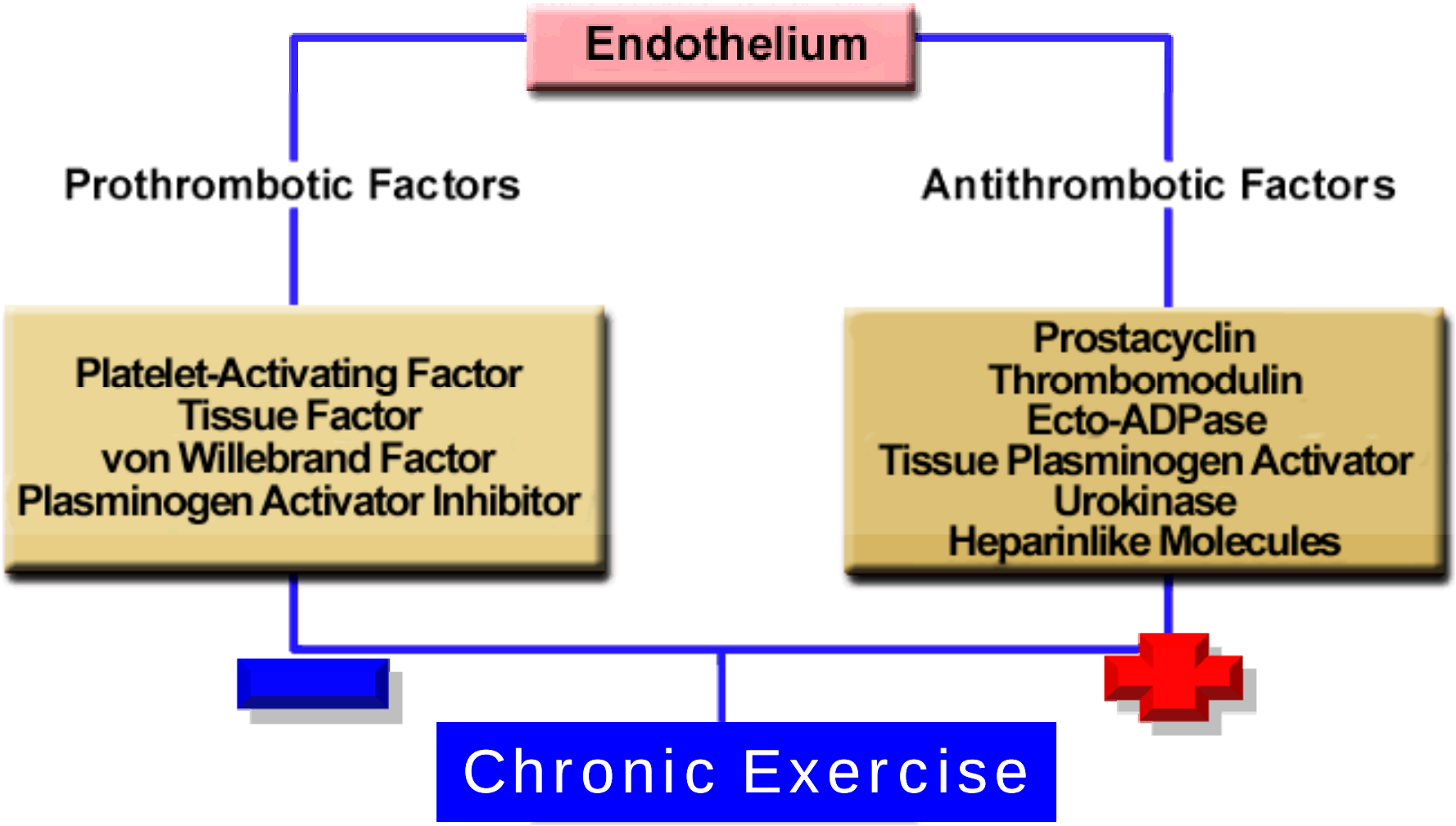


Possible Biological Mechanisms for Exercise-Induced Reductions in All-Causes and Cardiac Mortality

Metabolic Influence

- Reduction of obesity
- Enhanced glucose tolerance
- Improved lipid profile

Lifestyle Influence

- Decreaded likelihood of smoking
- Possible reduction of stress
- Short term reduction of appetite

Mechanisms for Exercise-Induced Reductions in All-Causes & Cardiac Mortality

Metabolic Influence

- Reduction of obesity
- Enhanced glucose tolerance
- Improved lipid profile

Renoir “Le Grandi Bagnanti.1887

Obesity

Obesity is a surplus of adipose tissue-containing fat stored in triglyceride form,resulting from excess energy intake relative to energy expenditure.
The point at which excess fat constitutes obesity is somewhat arbitrary.

ACSM's Resource Manual 1998

Obesità

- Grasso essenziale (bruno)
- Grasso di deposito (bianco)

IMC = Peso / qAltezza

La composizione corporea varia in rapporto all'età e al sesso.
Nel giovane adulto i valori di normalità per la massa grassa sono:
- fino al 20 % nell'uomo
- fino al 30 % nella donna

IMC
Sottopeso <20
Normale 20 - 25
Sovrappeso 25-30
Obesità >30
Obesità grave >40

AMS

Prevalenza di sovrappeso e obesità nella CEE

	SOVRAPPESO		OBESI	
	M	F	M	F
Unione Europea	50%	35%	13%	19%
Austria	48%	9%	12%	17%
Belgio	49%	36%	15%	20%
Danimarca	44%	25%	11%	10%
Finlandia	50%	38%	18%	20%
Francia	49%	30%	12%	7%
G.Bretagna	46%	36%	11%	15%
Germania	53%	35%	17%	20%
Grecia	50%	40%	13%	22%
Irlanda	47%	32%	11%	17%
ITALIA	48%	36%	15%	21%
Lussemburgo	45%	33%	14%	18%
Paesi Bassi	45%	31%	11%	11%
Portogallo	45%	39%	14%	21%
Spagna	57%	44%	9%	24%
Svezia	45%	29%	10%	12%

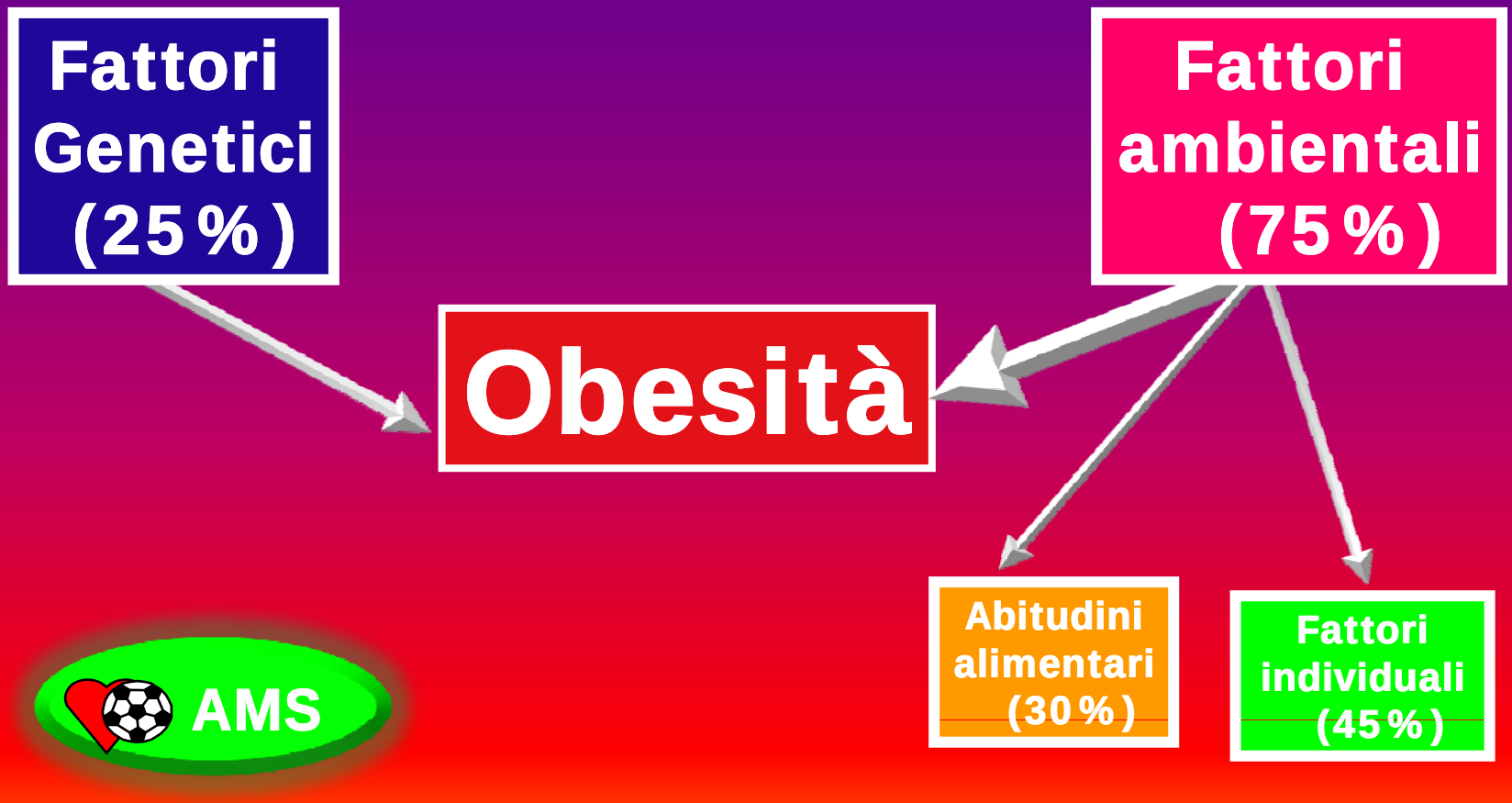
Despite the known seriousness of obesity,increase public concern,and record rates of dieting,obesity remains a common problem.It is associated with numerous disease and conditions.

The obesity epidemic is attributed to enviromental factors and food intake.In England, in the period between1980-97, whereas the housefold intake decreased of 20%, obesity increased of 150%.

It appears that the significant increase in obesity worldwide is due to the greater declines in physical activity and increases in sedentary behaviour than increase in energy intake.

D.MacAuley,T.B Best 2002

Obesità: patogenesi



Esiste il gene dell'obesità?

Tessuto adiposo

Ipotalamo

LEPTINA

–

Teoria del punto di equilibrio

Rischi legati all'obesità

Obesità androide
↑rapporto vita/fianchi

- Ipertensione
- iperglicemia
- dislipidemie
-Malattie cardiovascolari
- malattie polmonari

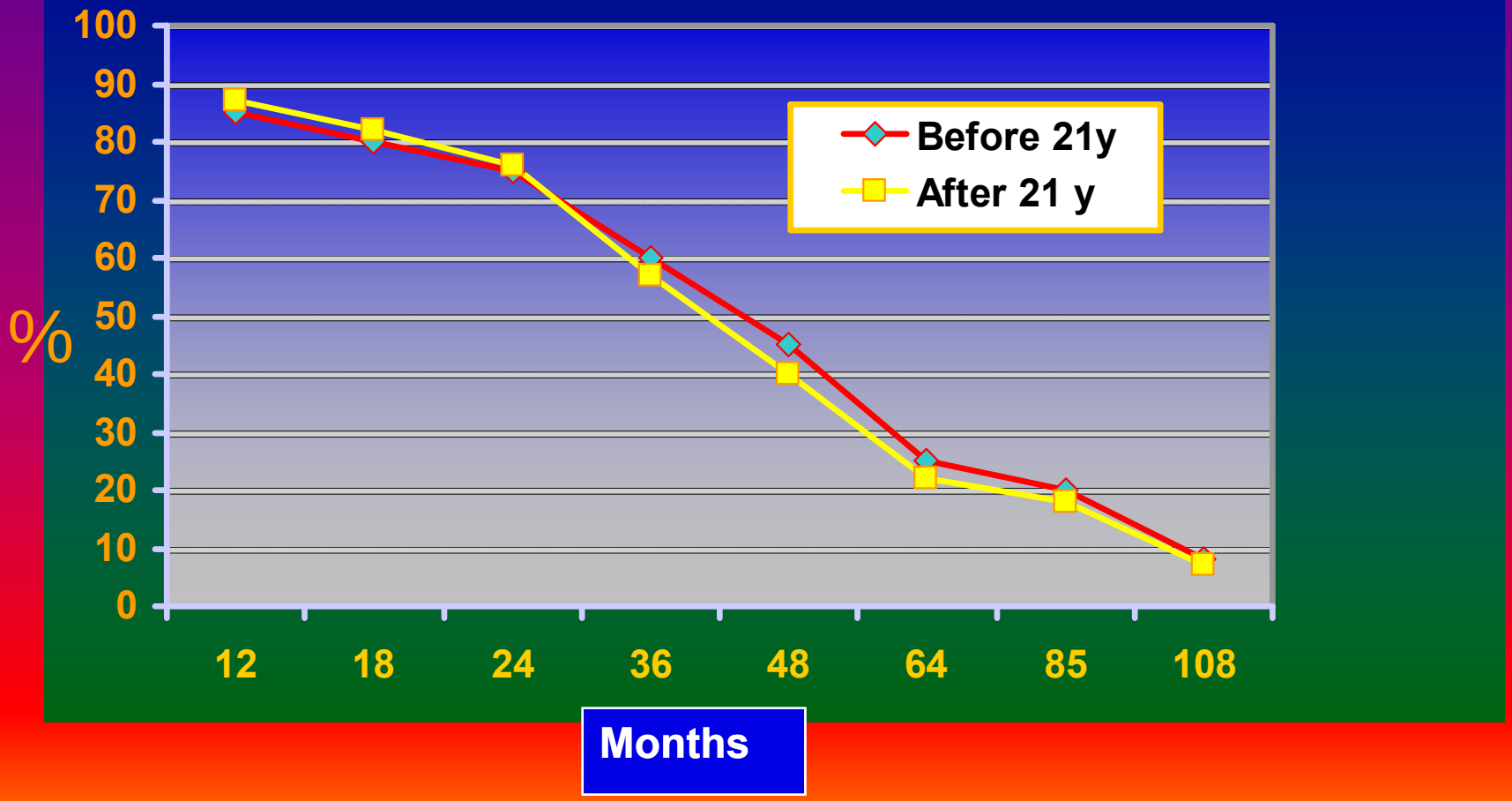
Obesità ginoide
↓ rapporto vita/fianchi

-malattie osteoarticolari
- tumori (utero, mammella)
- calcoli colecisti
- epatopatie

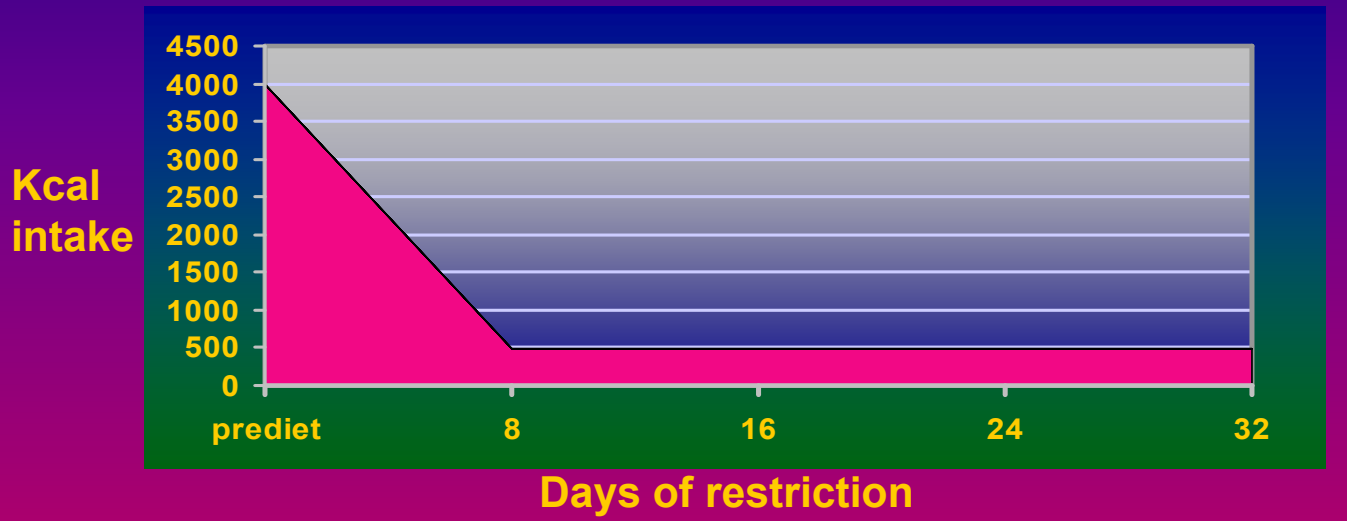
Aumentata morbilità e mortalità

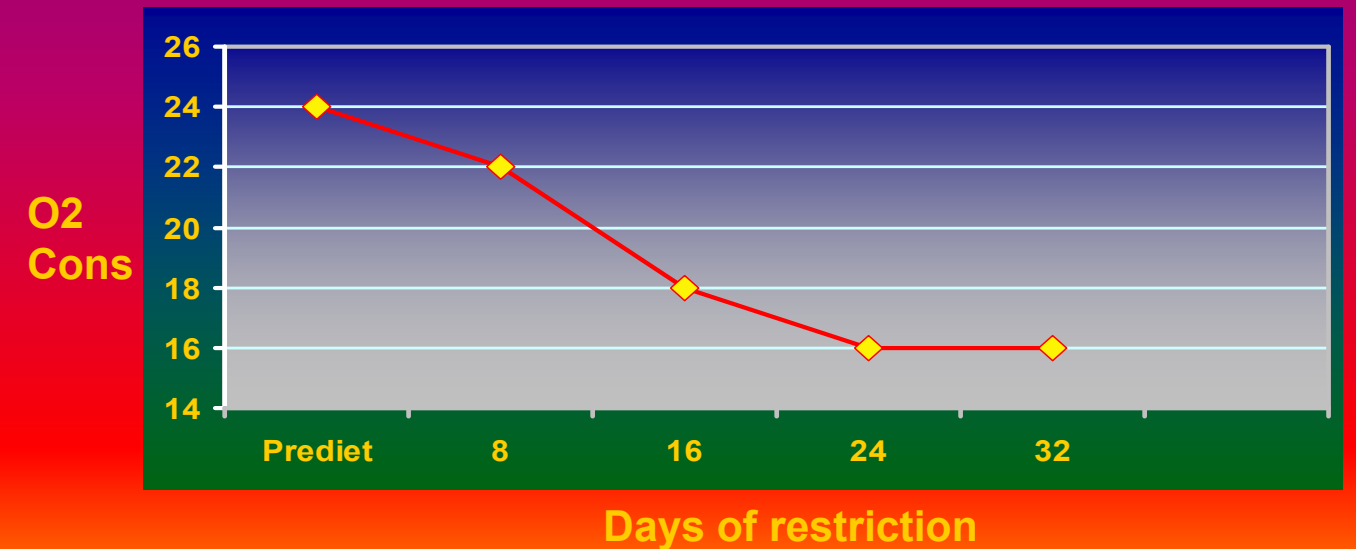
Quale strategia usare?

Percent of patients remaining at reduced weigth without exercise



Effects of two levels of caloric intake on changes in O2 resting consumption

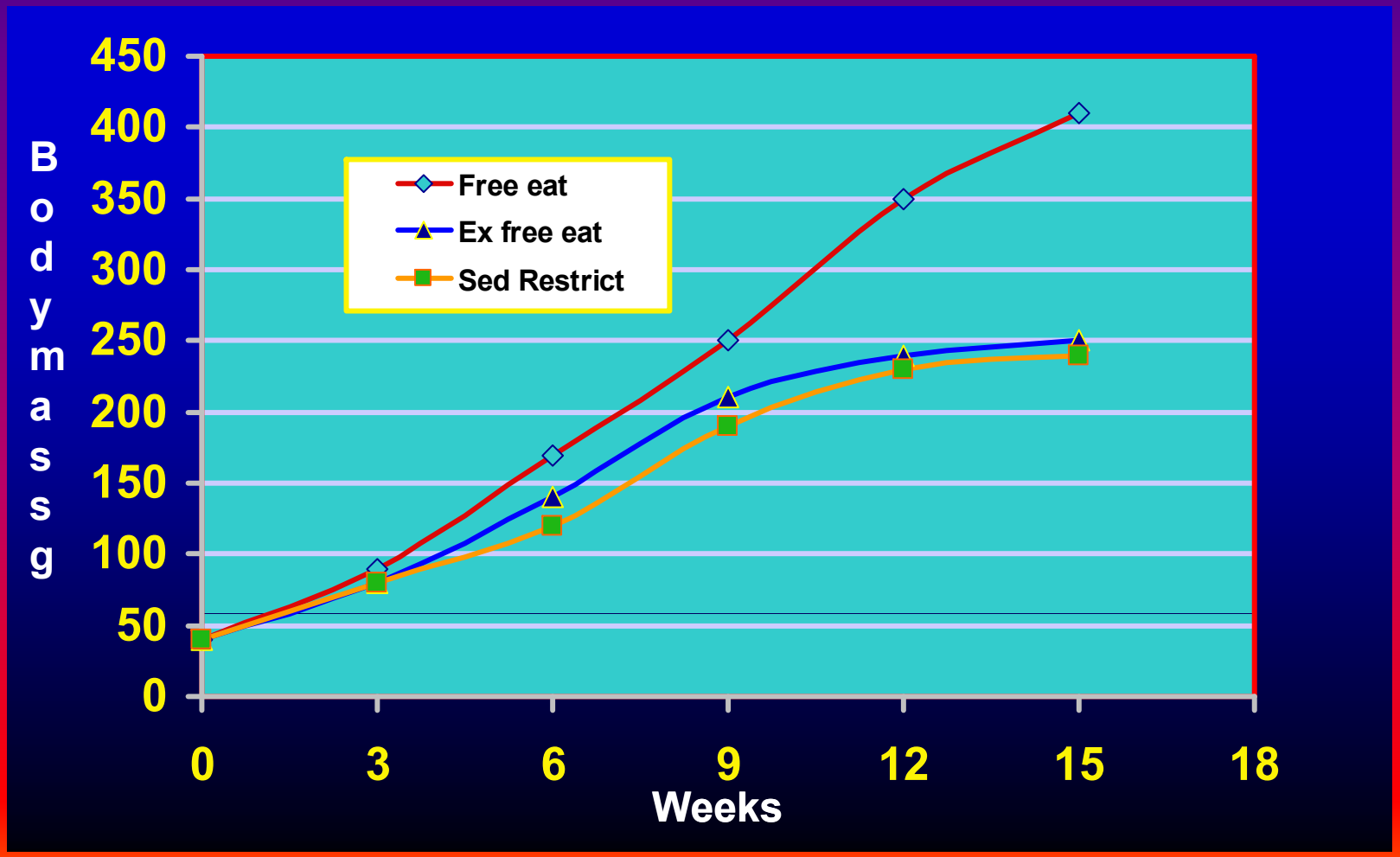




"Early prevention of obesity through exercise and food restriction,rather than correction of obesity once it is present,may be the most effective method to curb the grossly "overfat"condition so common in teenagers and adults."

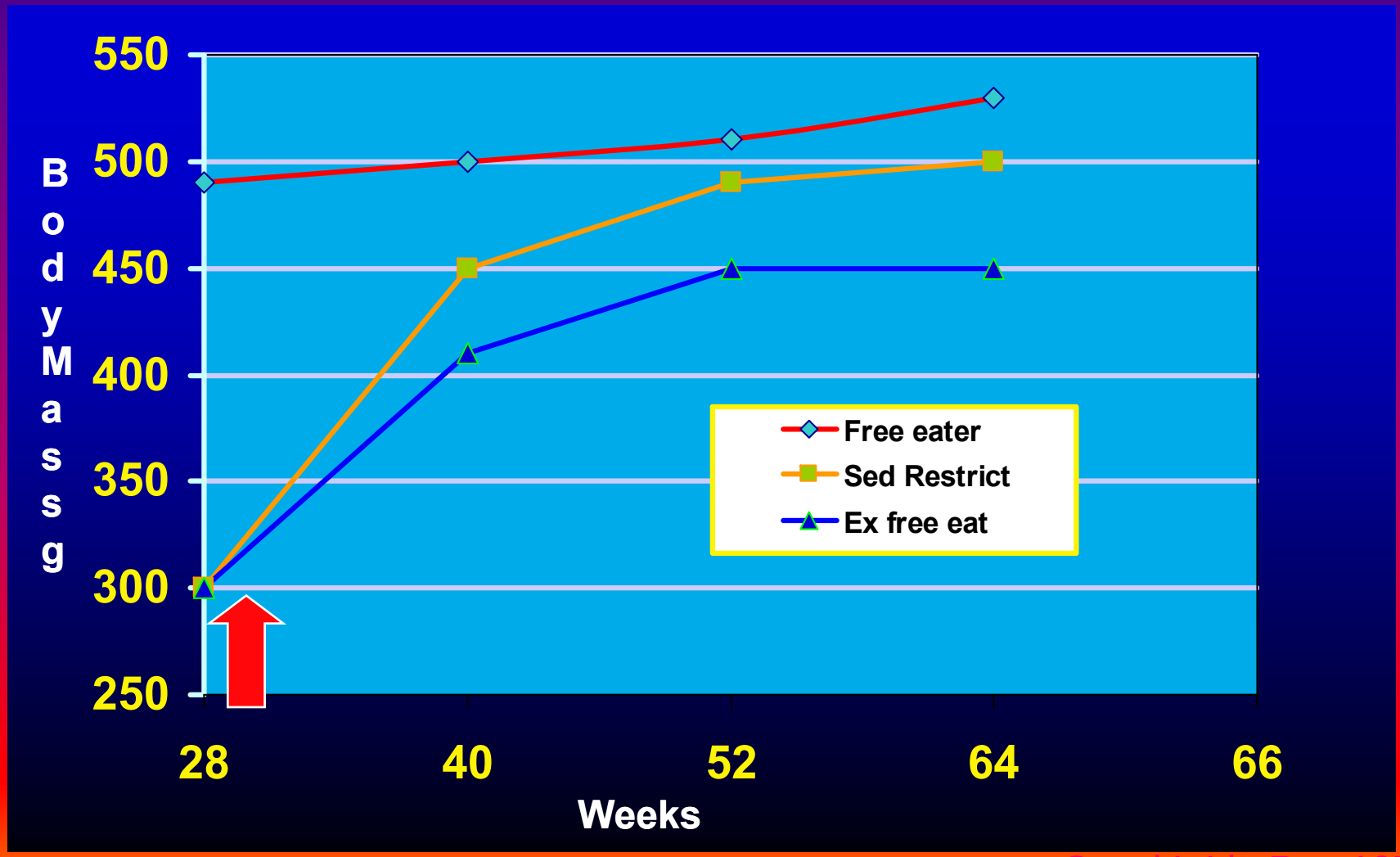
Mc Ardle W. Exercise Physiology 1996

Effects Of Exercise and Food Restriction on Body Mass in Rats



Oscai L,Lip Res 1972

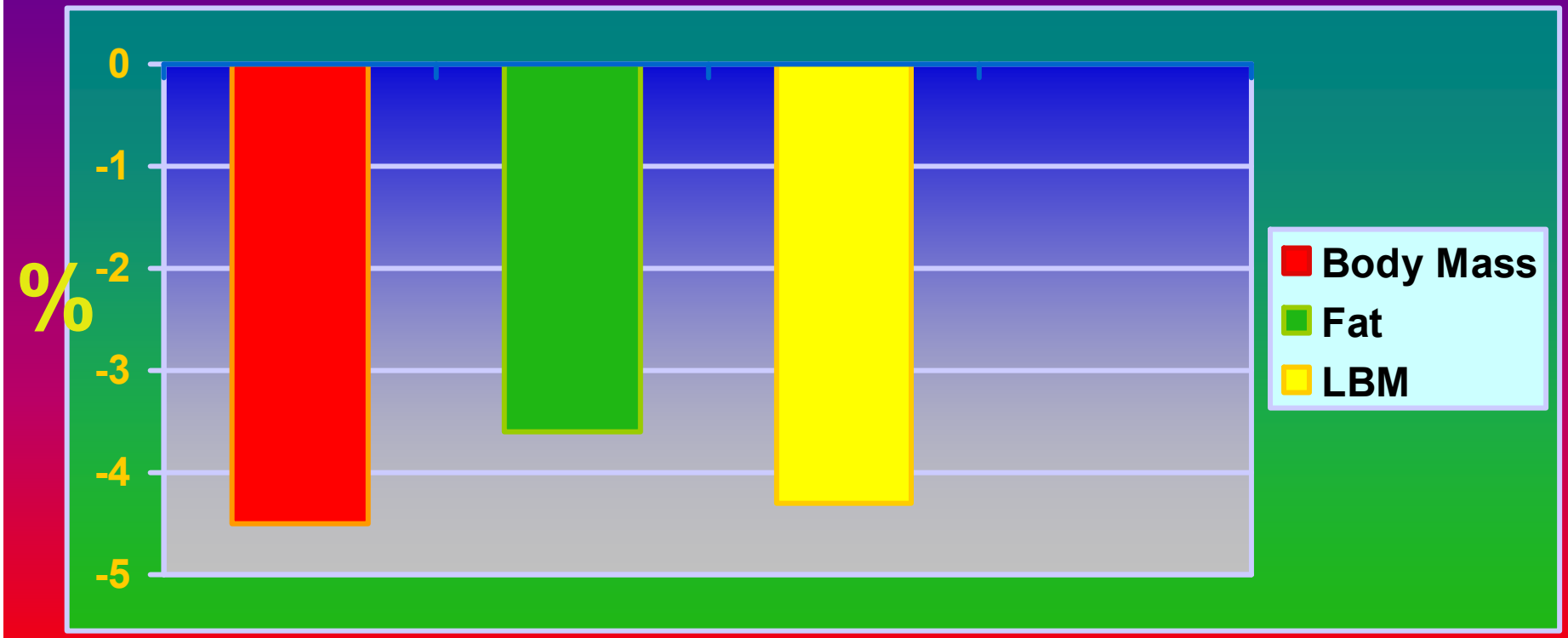
Effects Of Exercise and Food Restriction on Body Mass in Rats



Oscai L,Lip Res 1972

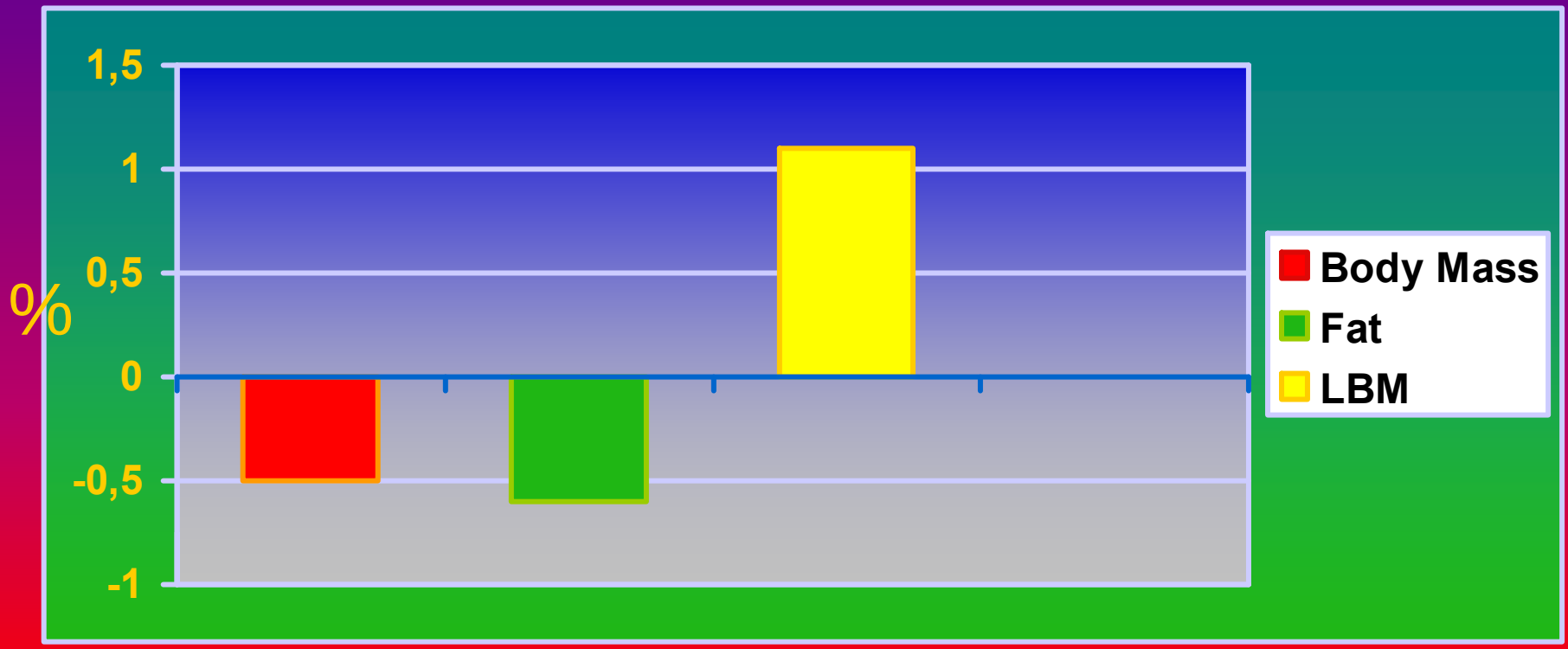
... la dieta è sufficiente?

Changes in body composition with diet in obese females



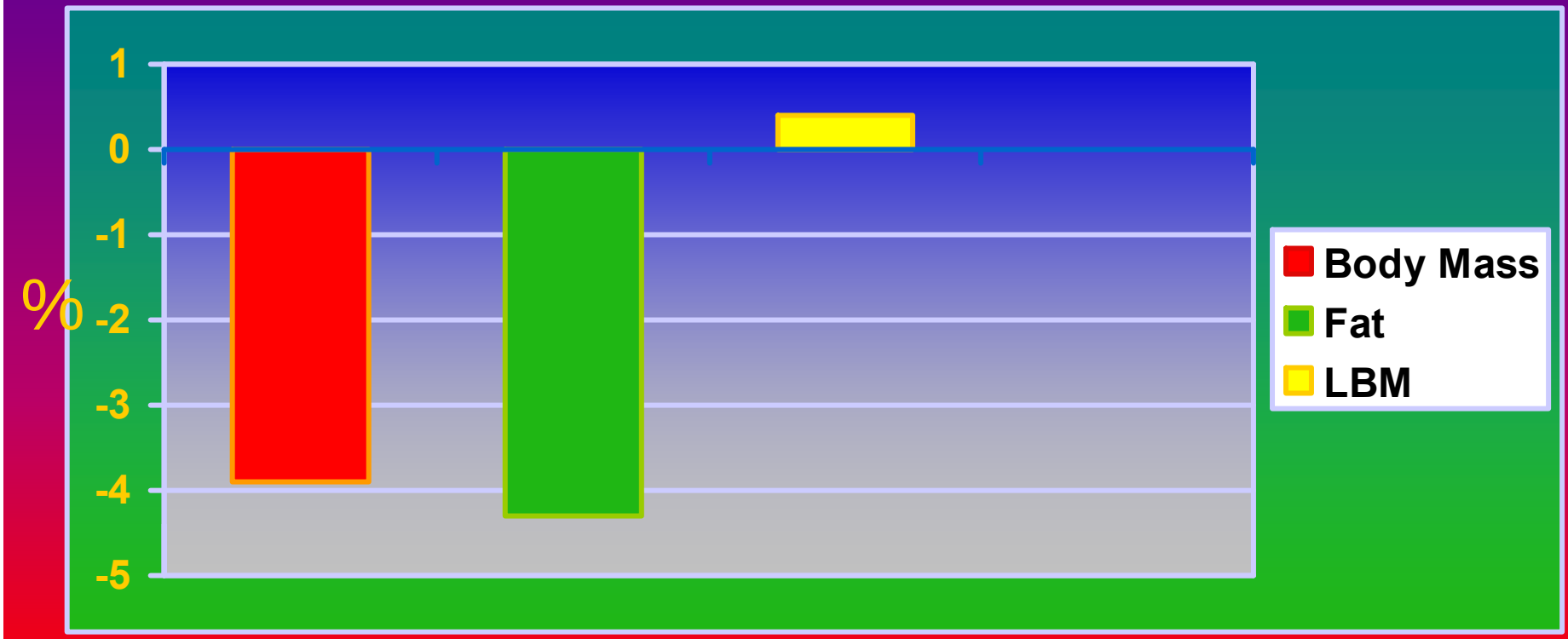
Am.J.Clin.Nutr. 1988

Changes in body composition with exercise in obese females



Am.J.Clin.Nutr. 1988

Changes in body composition with diet and exercise in obese females



Am.J.Clin.Nutr. 1988

Recommended Weigth loss Program

Guidelines for Exercise Tesing and Prescription. ACSM 1995

- **Includes the use of behavior modification techniques to identify and eliminate diet habits that contribute to improper nutrition.**
- **Includes an exercise program that provides a daily caloric expenditure of 300 or more Kcal.For many participants this may be accomplished with exercise of low intensity but long durarion,such as walking.**
- **Provides that the new eating and physical activity habits can be continuated for life in order to mantain the achieved lower body weigth.**

L’inattività nella Sindrome Metabolica

AMS

Metabolic Syndrome

Metabolic Syndrome is characterised by abdominal adiposity,dyslipidemia, hypertension,hyperinsulinemia and glucose intolerance.

Overweight and obese persons, especially those with excess of abdominal adiposity,are predisposed to this disorder

L.Pescatello 2003

Syndrome

A complex of signs and symptoms resulting from a common cause of appearing,in combination,to present a clinical picture of a disease or inherited abnormality.

The term Cardiometabolic Disease was formulated to link the disorders of Metabolic Syndrome that are predictive of cardiovascular disease and diabetes mellitus type 2

D.MacAuley,T.B Best 2002

Prevalence of the metabolic syndrome in men and women without diabetes in Europe [7]

	Prevalence (%)	
	Men	Women
≥2 of the components[a]	35.3	29.9
≥3 of the components[a]	12.4	10.7
Hyperinsulinemia plus any two or more of the other components[a]	15.7	14.2
Hyperinsulinemia plus any three or more of the other components[a]	7.7	6.3

Reproduced and adapted with permission from the American Medical Association.

[a] Components are obesity, dyslipidemia, impaired glucose regulation and hypertension.

Diabetes Research and Clinical Practice 68S2 (2005) S28–S3515 April 2005

Abnormalities in patients with Metabolic Syndrome:

- Waist circumference >88 cm (35 inches) in women and >102 cm (40 inches) in men.
- Fasting glucose levels >110 mg/dl.
- Systolic blood pressure >130 mm Hg and/or diastolic blood pressure >85 mm Hg.
- High-density lipoprotein (HDL) cholesterol levels <40 mg/dl in men and <50 mg/dl in women.
- Fasting triglyceride levels >150 mg/d.

The presence of at least three of these traits is diagnostic for metabolic syndrome.

(ATP III)

American College of Cardiology & Elsevier

cardiosource

2004 - a Review of Notable Cardiovascular Trends

Alfred A. Bove, M.D., Ph.D, F.A.C.C.

Obesity and Metabolic Syndrome

This area has become another pervasive and very important topic for cardiologists. Because of the associated hypertension, diabetes, and now established risk for cardiovascular disease (CVD) caused by the metabolic syndrome, we must pay attention to managing patients with obesity as they have slipped into our portfolio of diseases that should be managed by a cardiologist. In 2004 we saw data indicating that obesity increases CRP, and that bariatric surgery not only reverses obesity but also restores markers of the metabolic syndrome to normal 5. The understanding of insulin resistance has further elucidated the interactions involved in progression of vascular disease. The metabolic syndrome involves hypertension and hyperlipidemia, both of which require the care of a cardiologist to reduce risk for vascular disease. In spite of the many medications available for management of hypertension and for lowering lipids, reducing obesity is still difficult to achieve. In my personal experience I have found very few patients who can achieve substantial weight reduction in spite of dietary advice, formal consultation with a dietitian, encouragement through numerous social groups, and formal weight reduction programs. With the continuing increase in incidence of obesity, including children, efforts by one physician with one patient at a time are destined to be unsuccessful in reducing the number of obese patients. Without substantial changes in public behavior and perhaps public policy, we will be busy managing coronary disease, and other complications of diabetes and hypertension in an ever-increasing population of patients, with an ever increasing workload in our office practice. At present, the problem is not being solved; even more frustrating is the lack of an organized structure at the public health level for weight reduction or obesity prevention.

Mechanisms for Exercise-Induced Reductions in All-Causes & Cardiac Mortality

Metabolic Influence

- Reduction of obesity
- Enhanced glucose tolerance
- Improved lipid profile

•Enhanced glucose tolerance

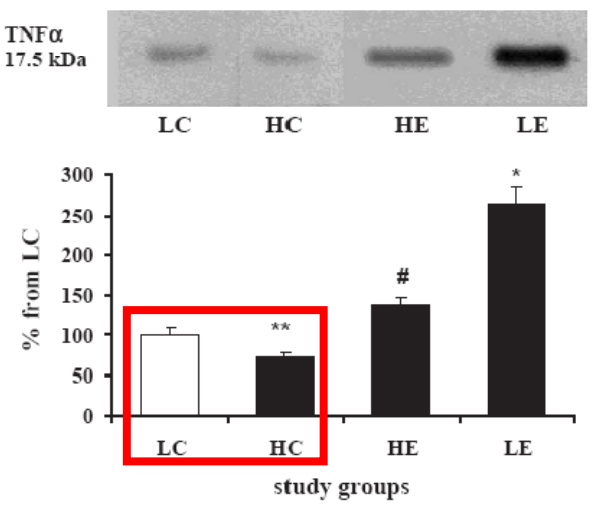
Physical exercise increases the expression of TNFa and GLUT 1 in muscle tissue of diabetes prone Psammomys obesus

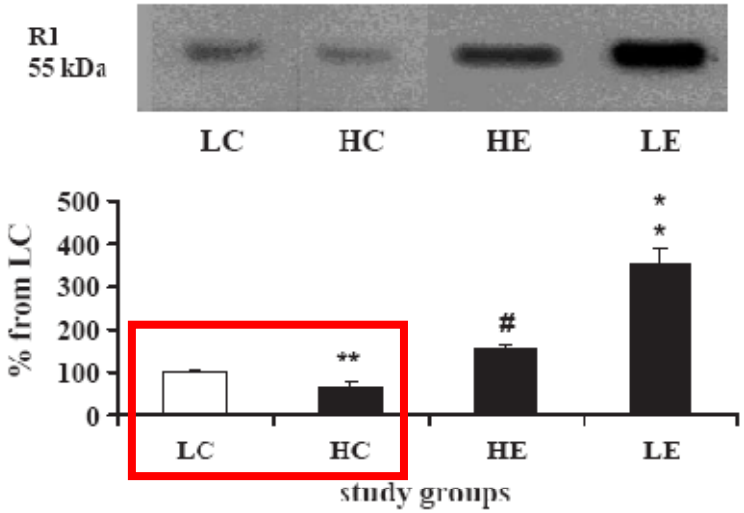
The aim of the present study was to characterize the influence of physical exercise on the expression of TNFa, its receptor R1 and GLUT 1 in muscle tissue of this animal model.

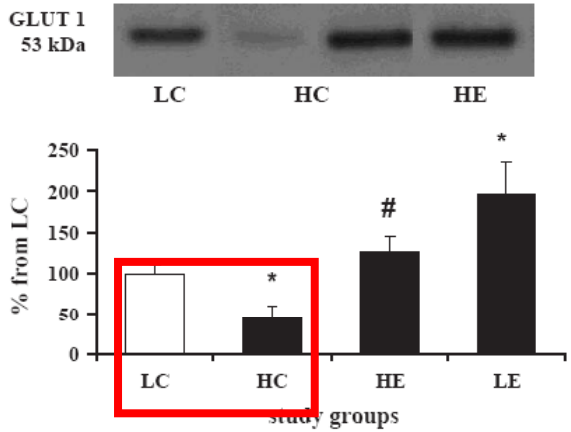
Animals were assigned for 4 weeks to four groups: high-energy diet (HC), high-energy diet and exercise (HE), low-energy diet (LC), low-energy diet and exercise (LE). TNFa, R1 and GLUT 1 expression were analyzed using Western blot technique.

Life Sciences 77 (2005) 2977–2985

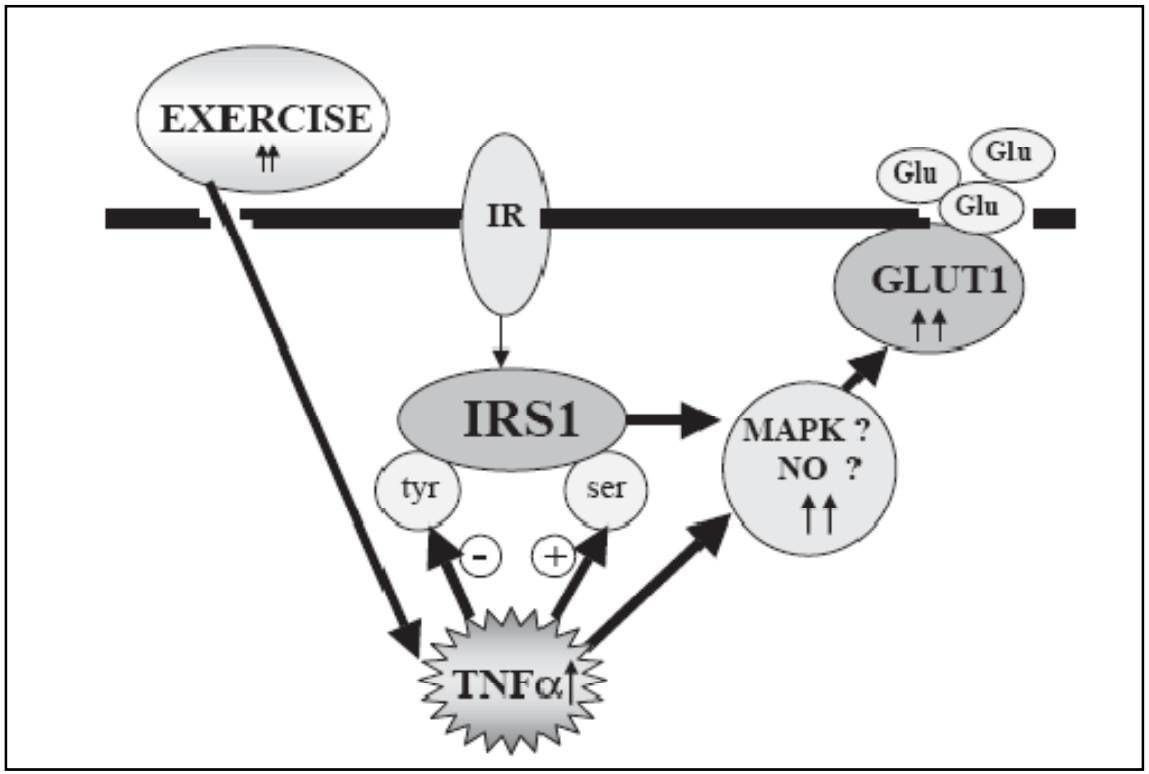
Muscle TNFa,R1,Glut1 protein expression in the HC, HE and LE experimental groups compared to the LC group







A suggested mechanism through which exercise induced TNFa protein expression may facilitate glucose entrance into the muscle cell



. A suggested mechanism through which exercise induced TNFα protein expression may facilitate glucose entrance into the muscle cell; Exercise cause over expression of TNFα in muscle tissue. TNFα on one hand may be connected to the classical course of insulin resistance (among other factors), but in parallel may facilitate glucose entrance into the muscle cell through a mechanism bypassing the insulin signaling mechanism. This mechanism includes the augmentation of GLUT 1 expression, possibly by other connecting factors such as MAPK or NO, which in turn facilitates glucose uptake by the muscle tissue. This mechanism, probably among others, may preserve the normal blood glucose levels after exercise despite the insulin resistance state.

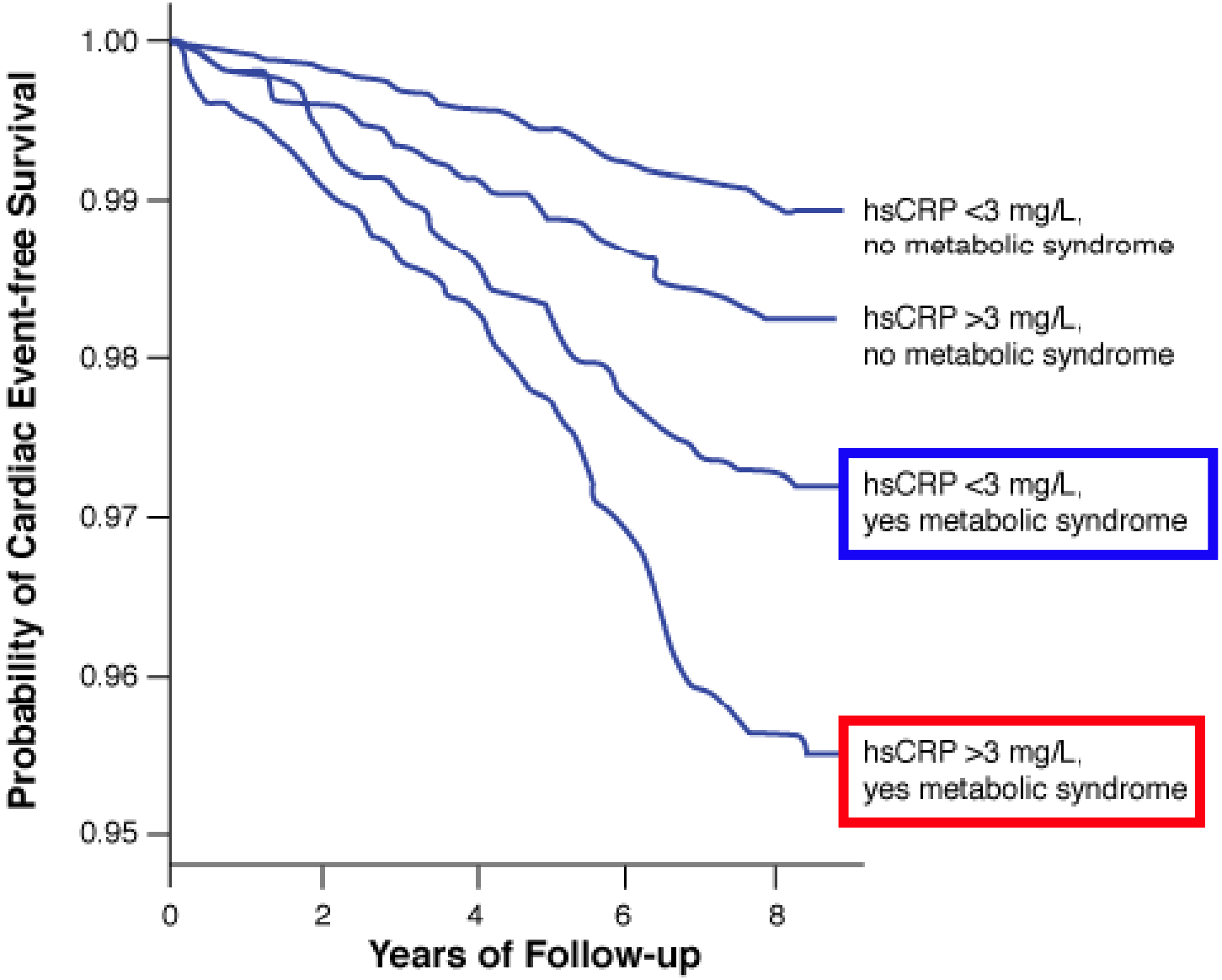
....in Humans

- Increased physical activity with or without weigth reduction,improves insulin action and reduces insulin resistance in obese persons. *(evidence A)*
- Endurance exercise training when combined with weigth loss of > 4-5 Kg improves the lipid-lipoprotein profil by raising HDL cholesterol and lowering trigliceridis among overweigth and obese men and women. *(evidence A)*
- Dynamic aorobic physical activity with or without weigth loss,reduces blood pressure among overweigth and obese with the greatest effect seen among persons with hypertension. *(evidence A)*

Exercise as Therapy: Evidence Based Sport Medicine D.MacAuley,T.B Best 2002


Infiammatory Markers
and Exercise

Cardiovascular Event-free Survival According to hsCRP Levels Above or Below 3 mg/L Among Individuals With and Without Metabolic Syndrome



Effect of Elevated CRP Levels on CVD Risk

Condition	Odds Ratio	P Value
No disease		
Low CRP	1.0	
High CRP	1.67	0.03
Metabolic Syndrome		
Low CRP	1.69	0.01
High CRP	2.35	<0.0001
Diabetes*		
Low CRP	1.98	0.03
High CRP	5.60	<0.0001

CRP=C-reactive protein; CVD=cardiovascular disease
*Defined as fasting glucose of ≥126 mg/dl

Inflammation, insulin, and endothelial function in overweight children and adolescents: the role of exercise.

Kelly AS, Wetzsteon RJ, Kaiser DR, Steinberger J, Bank AJ, Dengel DR.

University of Minnesota, Minneapolis, and St Paul Heart Clinic, St Paul, Minnesota, USA.

Inflammatory markers and physical function among older adults with knee osteoarthritis.

Penninx BW, Abbas H, Ambrosius W, Nicklas BJ, Davis C, Messier SP, Pahor M.
Sticht Center on Aging, Department of Internal Medicine, Wake Forest University School of Medicine, Wake Forest University, Winston-Salem, North Carolina 27157, USA.

Can exercise training with weight loss lower serum C-reactive protein levels?

Okita K, Nishijima H, Murakami T, Nagai T, Morita N, Yonezawa K, Iizuka K, Kawaguchi H, Kitabatake A.
Department of Cardiovascular Medicine, Hokkaido University Graduate School of Medicine, Kita-15, Nishi-7, Kita-ku, Sapporo 060-8638, Japan

Low cardiorespiratory fitness is associated with elevated C-reactive protein levels in women with type 2 diabetes.

McGavock JM, Mandic S, Vonder Muhll I, Lewanczuk RZ, Quinney HA, Taylor DA, Welsh RC, Haykowsky M.
Faculty of Rehabilitation Medicine, University of Alberta, Edmonton, Alberta, Canada.

Quanto,Quale esercizio?

Exercise

is physical activity that is planned or structured. It involves repetitive bodily movement done to improve or maintain one or more of the components of physical fitness.

Physical fitness

Physical fitness is a set of attributes a person has in regards to a person's ability to perform physical activities that require aerobic fitness, endurance, strength, or flexibility and is determined by a combination of regular activity and genetically inherited ability.

Cardiorespiratory fitness

Cardiorespiratory endurance is the ability of the body's circulatory and respiratory systems to supply fuel and oxygen during sustained physical activity.

Inactivity

Inactivity is not engaging in any regular pattern of physical activity beyond daily functioning.

Physical activity

Physical activity is any bodily movement produced by skeletal muscles that result in an expenditure of energy.

Regular physical activity

A pattern of physical activity is regular if activities are performed most days of the week, preferably daily;

5 or more days of the week if moderate-intensity activities (in bouts of at least 10 minutes for a total of at least 30 minutes per day); or

3 or more days of the week if vigorous-intensity activities (for at least 20-60 minutes per session).

Note: These are minimum recommendations, greater health outcomes can be achieved by doing additional types activities and/or increasing time spent doing activities.

Household physical activity

Household physical activity includes (but is not limited to) activities such as sweeping floors, scrubbing, washing windows, and raking the lawn.

Occupational physical activity

Occupational physical activity is completed regularly as part of one's job. It includes activities such as walking, hauling, lifting, pushing, carpentry, shoveling, and packing boxes.

Leisure-time physical activity

Leisure-time physical activity is exercise, sports, recreation, or hobbies that are not associated with activities as part of one's regular job duties, household, or transportation.

Transportation physical activity

Transportation physical activity is walking, biking or wheeling (for wheelchair users), or similar activities to and from places such as: work, school, place of worship, and stores.

Weight-bearing physical activity

Any physical activity that imparts a load or impact (such as jumping or skipping) on the skeleton.

- Can Fam Physician. 2002 Jan;48:13-4, 21-3.

Physical activity to prevent cardiovascular disease. How much is enough?

Haennel RG, **Lemire F**.

Faculty of Kinesiology and Health Studies, University of Regina, Saskatchewan.

OBJECTIVE: To review the role of physical activity in primary prevention of cardiovascular (CV) diseases with particular attention to the intensity and amount of physical activity needed to benefit health. QUALITY OF EVIDENCE: MEDLINE was searched for articles published in the indexed English literature from January 1991 to December 2000 using key words related to physical activity (e.g., exercise, physical fitness), CV and coronary artery disease (CAD) risk factors (e.g., diabetes, hypertension, hyperlipidemia, obesity). Findings were supplemented by consensus documents and other published literature. Most articles described prospective observational studies. MAIN MESSAGE: Clear evidence indicates an inverse linear dose response between amount of physical activity and all-cause mortality, total CV disease, and CAD incidence and mortality. The minimal effective dose is unclear, but physical activity that results in energy expenditure of approximately 4200 kJ.week-1 appears to be associated with substantial benefits. Physical activity need not be vigorous to benefit health. CONCLUSION: Moderate activity, such as brisk walking for 30 to 60 minutes a day most days of the week, is associated with significant reductions in the incidence and mortality of CV disease.

- The amount of exercise needed for health benefits such as lower blood pressure and reduced abdominal fat is less than needed to improve physical fitness.
- The cardiometabolic heath benefits associated with exercise are more related to exercise volume or total energy expenditure than cardiorespiratory physical fitness per se.

Training effects of short bouts of stair climbing on cardiorespiratory fitness, blood lipids, and homocysteine in sedentary young women

C A G Boreham, R A Kennedy, M H Murphy, M Tully, W F M Wallace, I Young

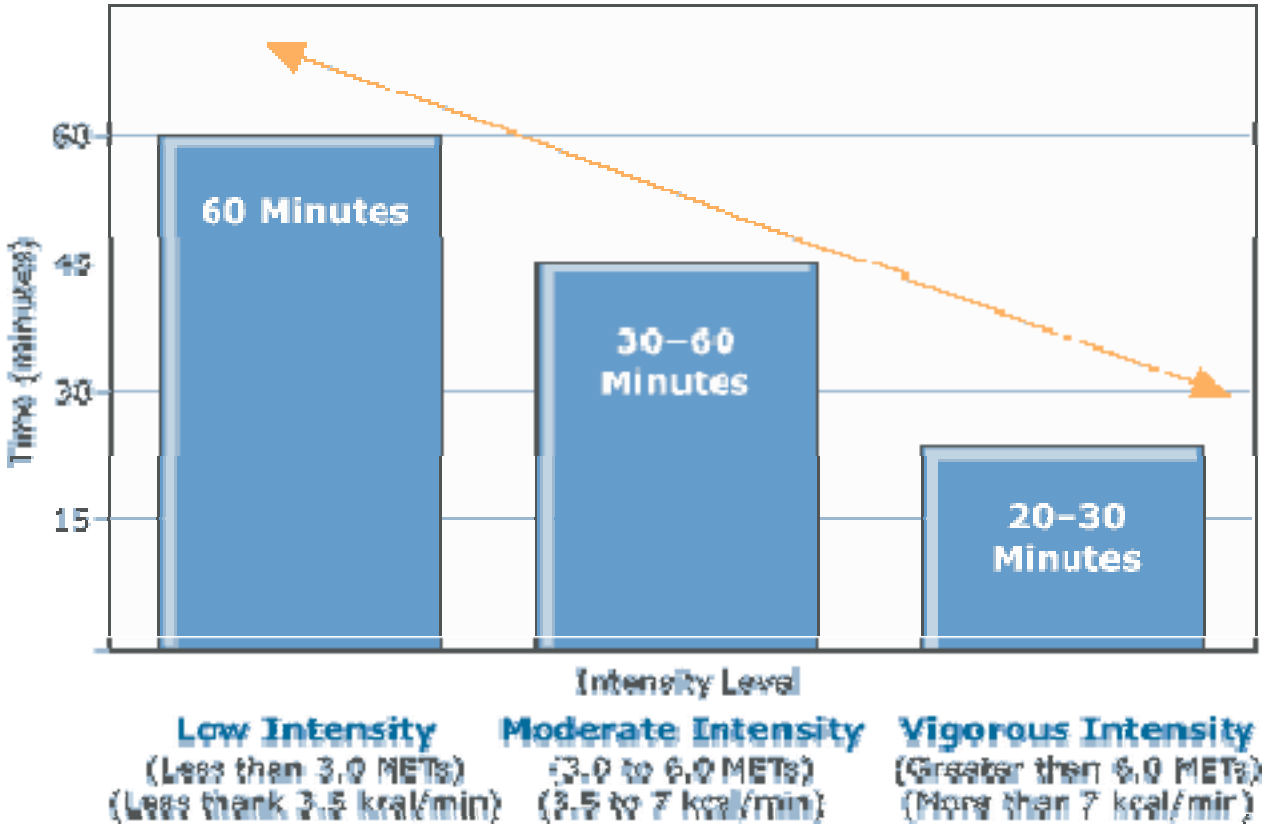
Exercise Science, UlsterUniversity at Jordanstown,Newtownabbey,Northern Ireland, UK

The study confirms that accumulating short bouts of stair climbing activity throughout the day can favourably alter important cardiovascular risk factors in previously sedentary young women. Such exercise may be easily incorporated into the working day and therefore should be promoted by publichealth guidelines.

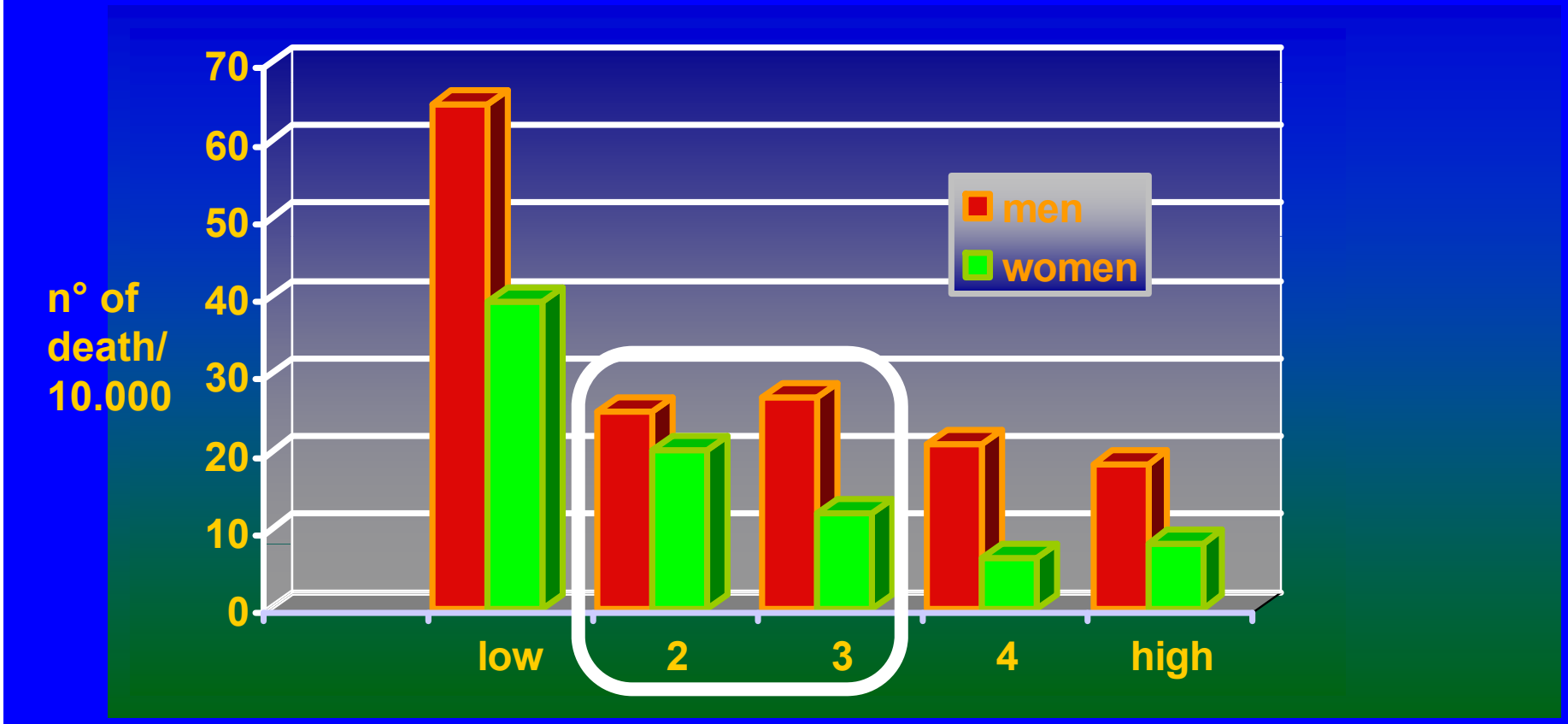
Br J Sports Med 2005;39:590–593.

Exercise and Cardiovascular Health

Jonathan Myers, PhD



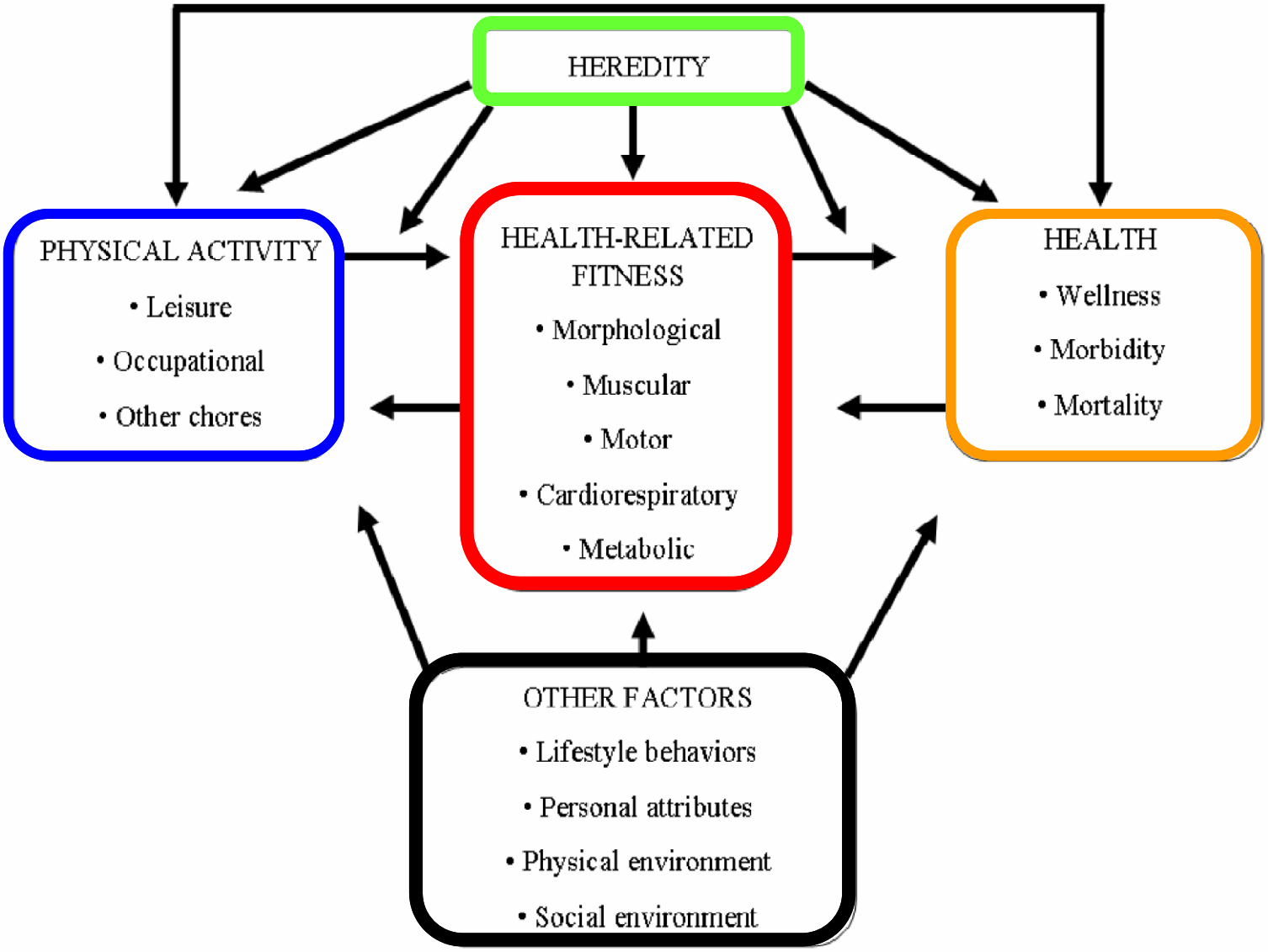
Physical Fitness and longevity: a little goes a long way



JAMA:1989

FUTURE DIRECTIONS

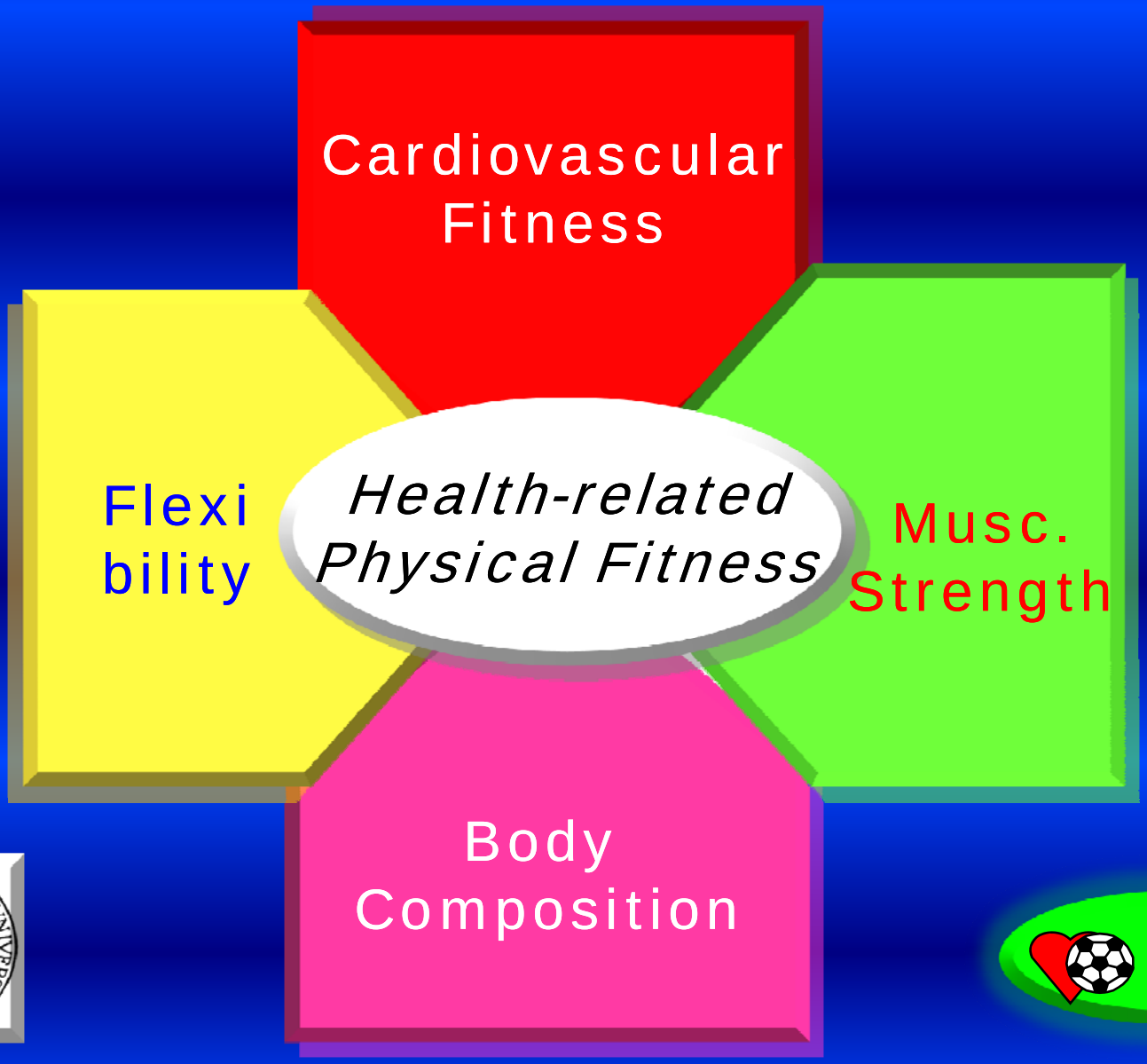
The theoretical model of the relationships among habitual physical activity, health-related fitness, and health status



- The estimated aerobic fitness test uses a novel technique to assess maximal aerobic power without exercise stress test and is inexpensive and safe. More studies are needed to provide information on the usefulness of the test in other populations and how estimated aerobic fitness predicts morbidity and mortality.
- Physical activity behavior and some of its associations with cardiovascular risk factors may be different among men and women. More studies are needed to understand how physical activity behavior differs between the genders and how an unfavorable cardiovascular risk factor profile could be enhanced by physical activity.

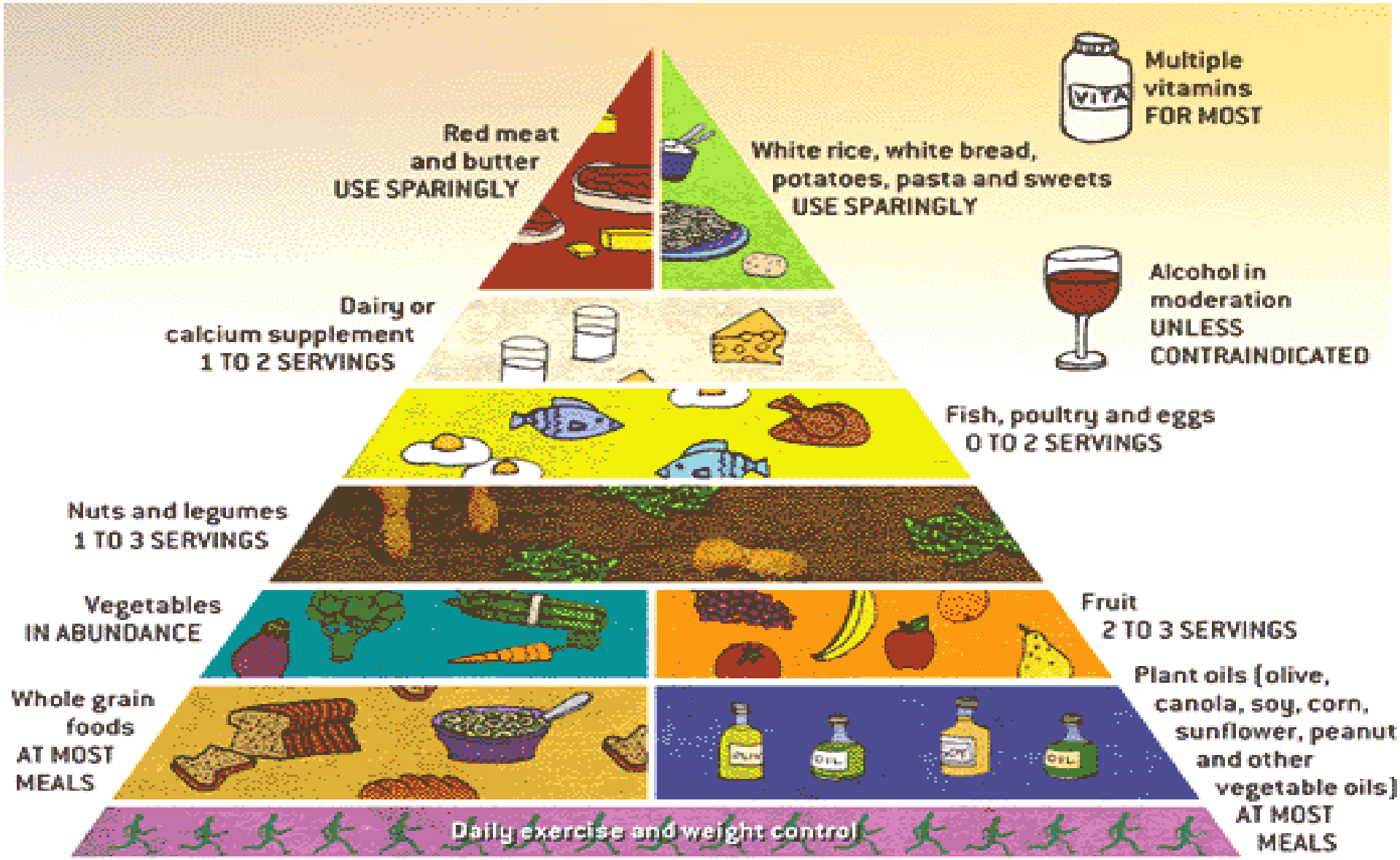
- More research is needed to specify the most beneficial types of physical activity and the amount and intensity of physical activity needed to prevent the development of impaired glucose tolerance and type 2 diabetes. Studies are also needed to investigate the independent and combined effects of physical inactivity and obesity on impaired glucose tolerance and type 2 diabetes.
- Higher levels of physical activity and fitness were associated with lower levels of CRP. Randomized controlled trials are needed to study the magnitude of the effect of physical activity on systemic low-grade inflammation, the dose of physical activity needed for the anti-inflammatory effect and the causal pathways underlying the effect.

Health related physical fitness components



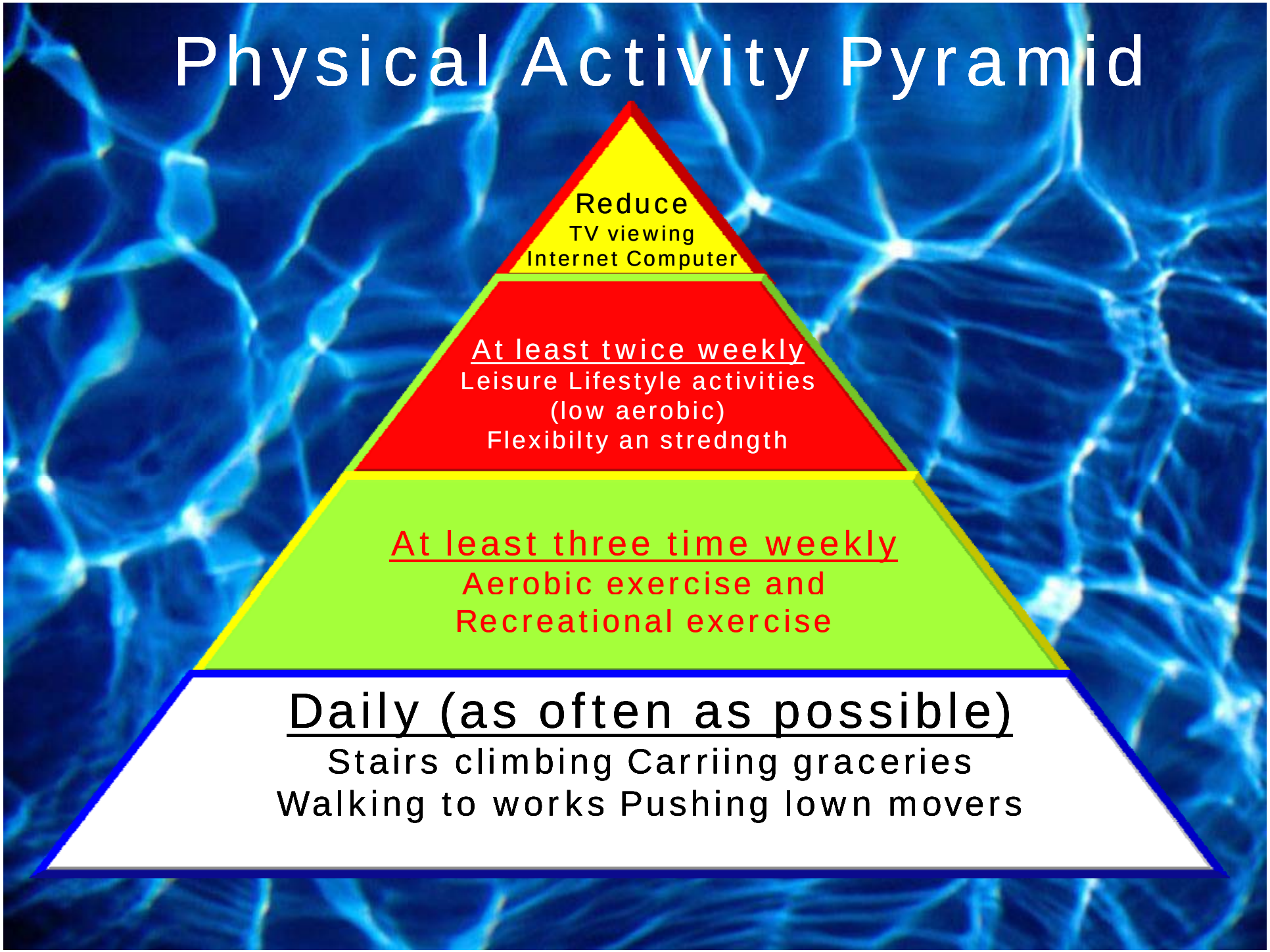
AMS

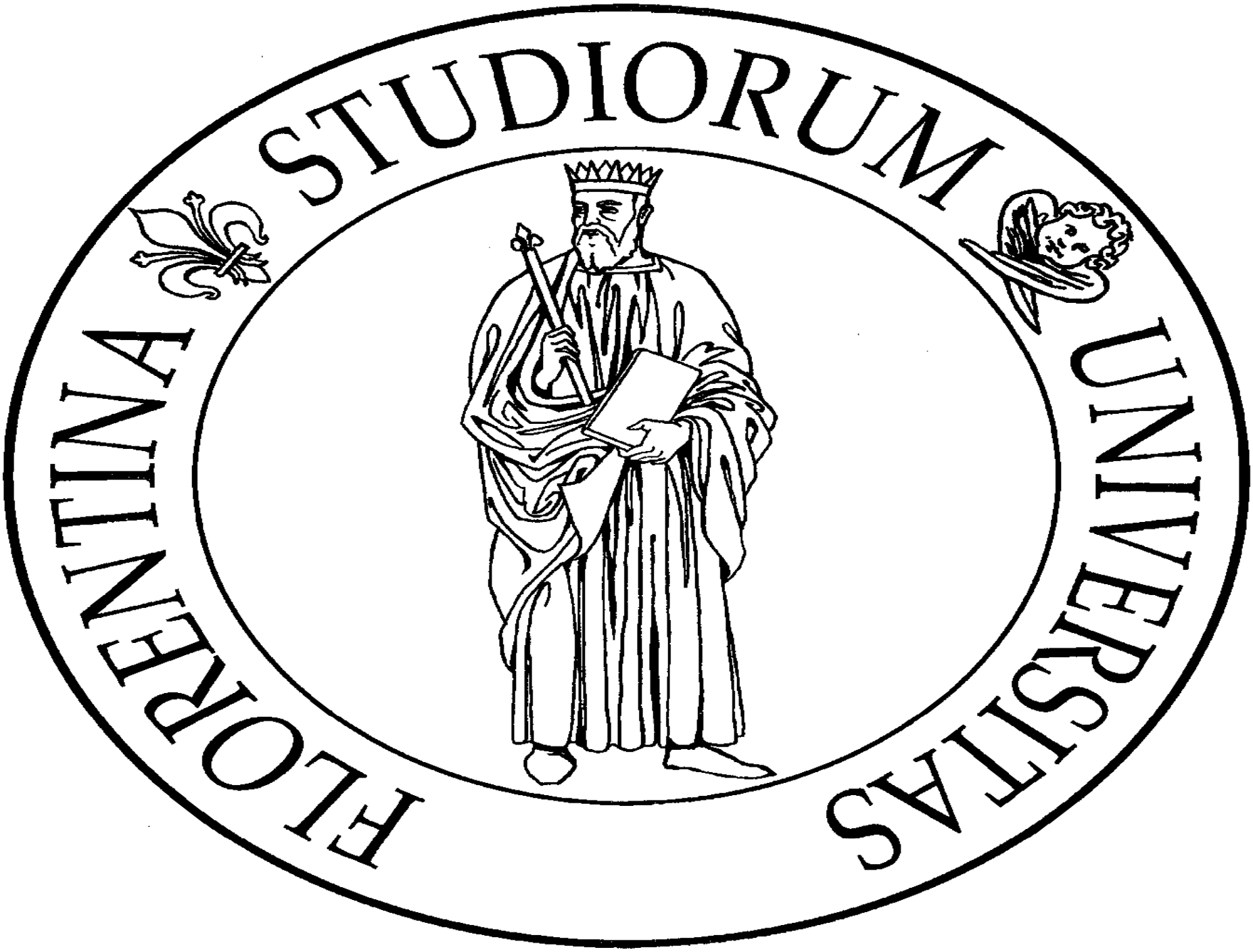

TheFeltSource.com
Have Fun
Eat Right
Exercise
OATMEAL
whole grain cereal
RICE
RAISINS
YOGURT
PEANUT BUTTER
TUNA
Grains
Make half your grains whole
Vegetables
Vary your veggies
Fruits
Focus on fruits
Milk
Get your calcium-rich foods
Meat & Beans
Go lean with protein
For an 1,800-calorie diet, you need the amounts below from each food group. To find the amounts that are right for you, go to MyPyramid.gov
Eat 6 oz. every day: at least half should be whole grain
Eat 2 1/2 cups every day
Eat 1 1/2 cups every day
Get 3 cups every day: for kids ages 2 to 8, it's 2 cups
Eat 5 oz. every day
Oil
Oils are not a food group, but you need some for good health. Get your oils from fish, nuts and liquid oils such as corn oil, soybean oil and canola oil.
Find your balance between food and play
Fats and sugars – know your limits



NEW FOOD PYRAMID

outlined by the authors distinguishes between healthy and unhealthy types of fat and carbohydrates. Fruits and vegetables are still recommended, but the consumption of dairy products should be limited.


Physical Activity Pyramid
Reduce
TV viewing
Internet Computer
At least twice weekly
Leisure Lifestyle activities
(low aerobic)
Flexibilty an stredngth
At least three time weekly
Aerobic exercise and
Recreational exercise
Daily (as often as possible)
Stairs climbing Carriing graceries
Walking to works Pushing lown movers


STUDIORUM
UNIVERSITAS
FLORENTINA

Moderate-intensity physical activity

Moderate-intensity physical activity refers to a level of effort in which a person should experience:

Some increase in breathing or heart rate a "perceived exertion" of 11 to 14 on the Borg scale

the effort a healthy individual might expend while walking briskly, mowing the lawn, dancing, swimming, or bicycling on level terrain, for example.

3 to 6 metabolic equivalents (METs); or any activity that burns 3.5 to 7 Calories per minute (kcal/min)

Vigorous-intensity physical activity

Vigorous-intensity physical activity may be intense enough to represent a substantial challenge to an individual and refers to a level of effort in which a person should experience:

large increase in breathing or heart rat (conversation is difficult or “broken”) a "perceived exertion" of 15 or greater on the Borg scale;

the effort a healthy individual might expend while jogging, mowing the lawn with a nonmotorized pushmower, participating in high-impact aerobic dancing, swimming continuous laps, or bicycling uphill, carrying more than 25 lbs up a flight of stairs, standing or walking with more than 50 lbs for example.

greater than 6 metabolic equivalents (METs); or

any activity that burns more than 7 kcal/ min

Borg Rating of Perceived Exertion (RPE) Scale

6 No exertion at all
7
Extremely light (7.5)
8
9 Very light
10
11 Light
12
13 Somewhat hard
14
15 Hard (heavy)
16
17 Very hard
18
19 Extremely hard
20 Maximal exertion

9 corresponds to "very light" exercise. For a healthy person, it is like walking slowly at his or her own pace for some minutes

13 on the scale is "somewhat hard" exercise, but it still feels OK to continue.

17 "very hard" is very strenuous. A healthy person can still go on, but he or she really has to push him- or herself. It feels very heavy, and the person is very tired.

19 on the scale is an extremely strenuous exercise level. For most people this is the most strenuous exercise they have ever experienced.