Programmazione di un allenamento per soggetti sedentari.
Evidenze e metodologia

Introduction

- General introduction relatedto ACSM's / AHA's Guidelines for exercise assessment and prescription;
- Presentation of a case study;
- Team work → designing a program related to case study (Assessment – Prescription of exercise);
- Presentation and discussion of team works.

Introduction

Dose response relationship between exercises and health outcomes

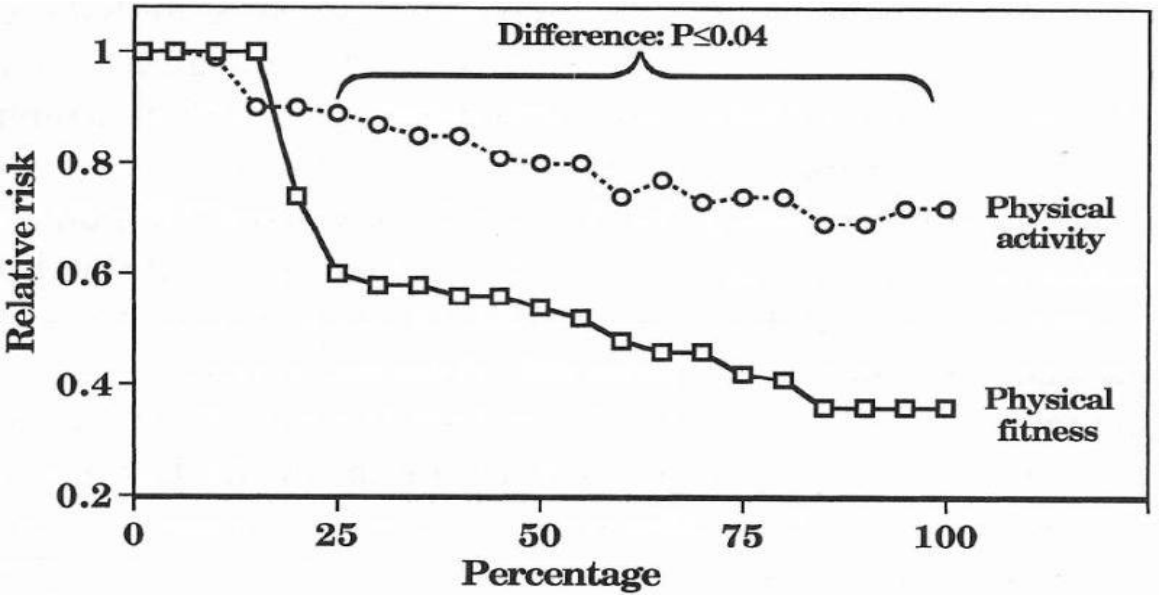

Figure 2.
Estimated dose-response curve for the relative risk of either CHD or CVD by sample percentages of fitness and physical activity. Studies weighted by person-years of experience.

Med Sci Sports Exerc. 2001 May ; 33(5): 754–761.

Physical fitness and activity as separate heart disease risk factors: a meta-analysis

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Introduction

- ACSM – AHA update (2010) (guidelines for exercise testing–www.acsm.org);
- Moderate – intensity training at least 5 times/week;
- High – intensity training 3days/week;
- Muscular strength and endurance at least 2 times/week;

Introduction–benefitsof regular physicalactivity and/or exercise

TABLE 1.3. EVIDENCE FOR DOSE-RESPONSE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND HEALTH OUTCOME

VARIABLE	EVIDENCE FOR INVERSE DOSE-RESPONSE RELATIONSHIP	CATEGORY OF EVIDENCE
All-cause mortality	Yes	C
Cardiovascular and coronary heart disease	Yes	C
Blood pressure and hypertension	No[a]	B
Blood lipids and lipoproteins	Insufficient data	
Coagulation and hemostatic factors	Insufficient data	
Overweight, obesity, and fat distribution	Yes	C
Type 2 diabetes mellitus	Yes[b]	C
Colon cancer	Yes	C
Low back pain, osteoarthritis, and osteoporosis	Insufficient data	
Quality of life and independent living in older persons	Yes	C
Depression and anxiety	No[a]	B

Introduction – Risk Stratifications

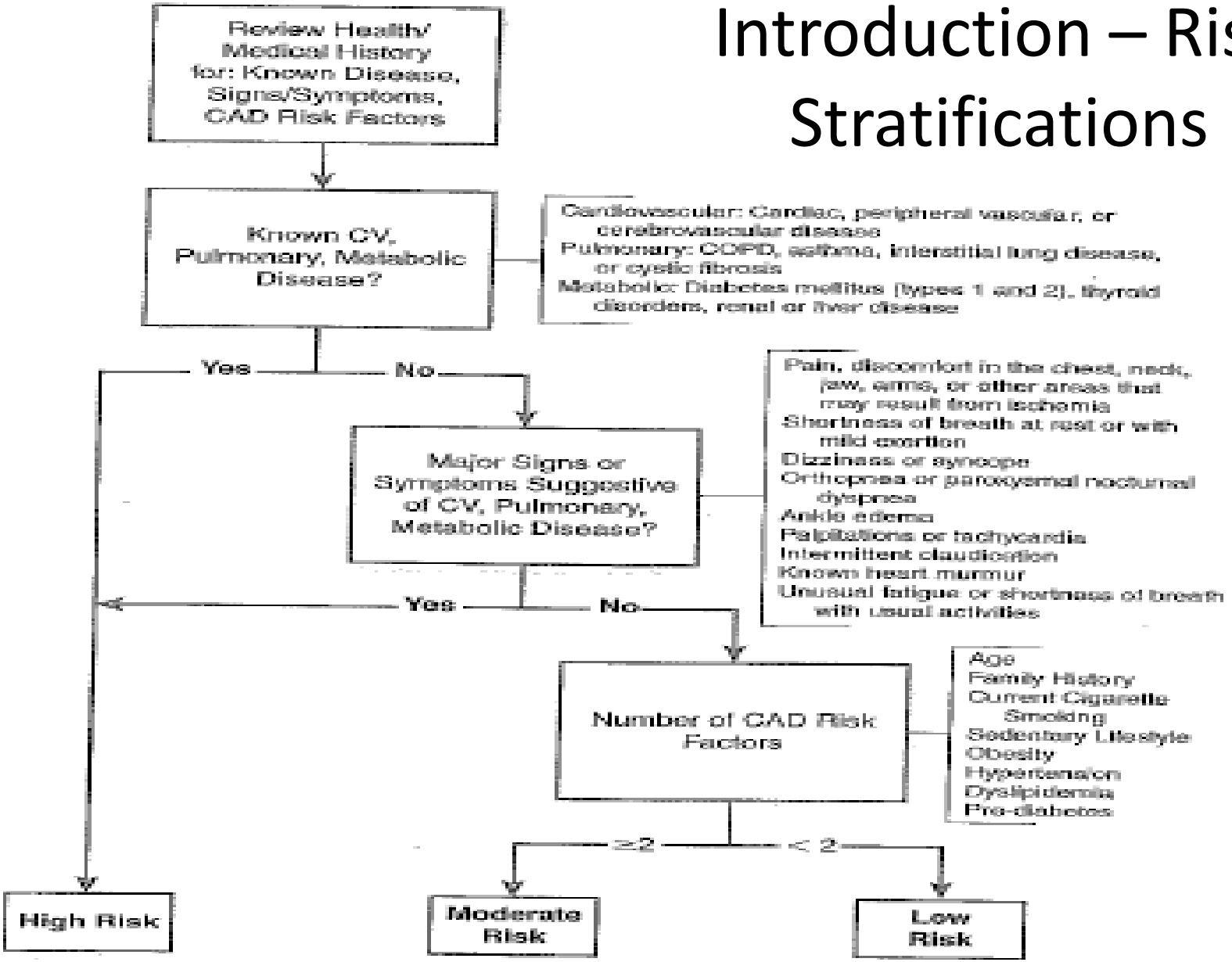

FIGURE 2.3. Logic model for risk stratification.

Introduction – Risk Stratifications

TABLE 2.3. ATHEROSCLEROTIC CARDIOVASCULAR DISEASE (CVD) RISK FACTOR THRESHOLDS FOR USE WITH ACSM RISK STRATIFICATION

POSITIVE RISK FACTORS	DEFINING CRITERIA
Age	Men ≥45 yr; Women ≥55 yr
Family history	Myocardial infarction, coronary revascularization, or sudden death before 55 yr of age in father or other male first-degree relative, or before 65 yr of age in mother or other female first-degree relative
Cigarette smoking	Current cigarette smoker or those who quit within the previous 6 months or exposure to environmental tobacco smoke
Sedentary lifestyle	Not participating in at least 30 min of moderate intensity (40%–60% $\dot{V}O_2R$) physical activity on at least three days of the week for at least three months (20,23)
Obesity[a]	Body mass index ≥30 $kg \cdot m^2$ *or* waist girth >102 cm (40 inches) for men and >88 cm (35 inches) for women (2)
Hypertension	Systolic blood pressure ≥140 mm Hg and/or diastolic ≥90 mm Hg, confirmed by measurements on at least two separate occasions, *or* on antihypertensive medication (10)
Dyslipidemia	Low-density lipoprotein (LDL-C) cholesterol ≥130 $mg \cdot dL^{-1}$ (3.37 $mmol \cdot L^{-1}$) *or* high-density lipoprotein (HDL-C) cholesterol <40 $mg \cdot dL^{-1}$ (1.04 $mmol \cdot L^{-1}$) *or* on lipid-lowering medication. If total serum cholesterol is all that is available use ≥200 $mg \cdot dL^{-1}$ (5.18 $mmol \cdot L^{-1}$) (3)
Prediabetes	Impaired fasting glucose (IFG) = fasting plasma glucose ≥100 $mg \cdot dL^{-1}$ (5.50 $mmol \cdot L^{-1}$) but <126 $mg \cdot dL^{-1}$ (6.93 $mmol \cdot L^{-1}$) *or* impaired glucose tolerance (IGT) = 2-hour values in oral glucose tolerance test (OGTT) ≥140 $mg \cdot dL^{-1}$ (7.70 $mmol \cdot L^{-1}$) but <200 $mg \cdot dL^{-1}$ (11.00 $mmol \cdot L^{-1}$) confirmed by measurements on at least two separate occasions (8)

CASE STUDY

Male, age 54 years, nonsmoker. Height = 72 inches (182.9 cm), weight = 168 pounds (76.4 kg), BMI = 22.8 $kg \cdot m^{-2}$. RHR = 64 bpm, RBP = 124/78 mm Hg. Total cholesterol = 187 $mg \cdot dL^{-1}$ (4.84 $mmol \cdot L^{-1}$), LDL = 103 $mg \cdot dL^{-1}$ (2.67 $mmol \cdot L^{-1}$), HDL = 52 $mg \cdot dL^{-1}$ (1.35 $mmol \cdot L^{-1}$), FBG = 88 $mg \cdot dL^{-1}$ (4.84 $mmol \cdot L^{-1}$). Recreationally com-

- Team work (man – no 54 years, but 35 years)

CASE STUDY

- Subjects Characteristics:
  - VO_2 (ml * Kg $^{-1}$ * min $^{-1}$) : 40 (Heyward, 2010)
  - Lactate threshold : 12 km * h $^{-1}$
  - HR_{max} : 186 bpm
  - Healthy subject (no diseases)
- AIMS:
  - Improvement of fitness status;
  - Improvement of muscular strength

Principles of exercise prescription

Intensity category	Objective measures	Subjective measures	Descriptive measures
SEDENTARY	< 1.6 METs < 40% HR_{max} < 20% HRR < 20% VO_{2max}	RPE (C): < 8 RPE (C-R): < 1	• activities that usually involve sitting or lying and that have little additional movement and a low energy requirement
LIGHT	1.6 < 3 METs 40 < 55% HR_{max} 20 < 40% HRR 20 < 40% VO_{2max}	RPE (C): 8-10 RPE (C-R): 1-2	• an aerobic activity that does not cause a noticeable change in breathing rate • an intensity that can be sustained for at least 60 minutes
MODERATE	3 < 6 METs 55 < 70% HR_{max} 40 < 60% HRR 40 < 60% VO_{2max}	RPE (C): 11-13 RPE (C-R): 3-4	• an aerobic activity that is able to be conducted whilst maintaining a conversation uninterupted • an intensity that may last between 30 and 60 minutes
VIGOROUS	6 < 9 METs 70 < 90% HR_{max} 60 < 85% HRR 60 < 85% VO_{2max}	RPE (C): 14-16 RPE (C-R): 5-6	• an aerobic activity in which a conversation generally cannot be maintained uninterupted • an intensity that may last up to about 30 minutes
HIGH	≥ 9 METs ≥ 90% HR_{max} ≥ 85% HRR ≥ 85% VO_{2max}	RPE (C): ≥ 17 RPE (C-R): ≥ 7	• an intensity that generally cannot be sustained for longer than about 10 minutes

Principles of AEROBIC exercise prescription

- MODE (type of exercise) → LARGE MUSCLES GROUPS – PROLONGED PERIODS – RHYTHMIC AND AEROBIC IN NATURE;
- INTENSITY;
- DURATION → time of exercise;
- PROGRESSION;

Principles of AEROBIC exercise prescription

- INTENSITY → % of VO_2 - % HR – RPE; (There are several methods to determine ex. Int.);

- In this case we decide to compare use of

  1- % HR_{max}

  2- RPE

  3- Ventilatory threshold

Principles of AEROBIC exercise prescription

- DURATION → time of exercise;

- Exercise time from 20 to 60 minutes in the first phases of training;

Principles of AEROBIC exercise prescription

- The interaction between Intensity and Duration determine TOTAL CALORIC EXPENDITURE during the training. Are inversely proportional;
- Importance of High intensitiy training for CDV DISEASE RISK REDUCTION. (ACSM, 2010).

HABITUAL PHYSICAL ACTIVITY/ EXERCISE LEVEL	PHYSICAL FITNESS CLASSIFICATION[c]	FREQUENCY		INTENSITY[b]			TIME		
		kcal · wk^{-1}	d · wk^{-1}	HRR/$\dot{V}O_2R$	% HR_{max}	PERCEPTION OF EFFORT[d]	TOTAL DURATION PER DAY (min)	TOTAL DAILY STEPS DURING EXERCISE[e]	WEEKLY DURATION (min)
Sedentary/no habitual activity/ exercise/extremely deconditioned	Poor	500–1,000	3–5	30%–45%	57%–67%	Light–moderate	20–30	3,000–3,500	60–150
Minimal physical activity/no exercise/ moderately–highly deconditioned	Poor–fair	1,000–1,500	3–5	40%–55%	64%–74%	Light–moderate	30–60	3,000–4,000	150–200
Sporadic physical activity/no or suboptimal exercise/ moderately to mildly deconditioned	Fair–average	1,500–2,000	3–5	55%–70%	74%–84%	Moderate–hard	30–90	≥3,000–4,000	200–300
Habitual physical activity/regular moderate to vigorous intensity exercise	Average–good	>2,000	3–5	65%–80%	80%–91%	Moderate–hard	30–90	≥3,000–4,000	200–300
High amounts of habitual activity/ regular vigorous intensity exercise	>Good–excellent	>2,000	3–5	70%–85%	84%–94%	Somewhat hard–hard	30–90	≥3,000–4,000	200–300

kcal, kilocalories; $\dot{V}O_2R$, oxygen uptake reserve; HRR, heart rate reserve; $\%HR_{max}$, % age-predicted maximal heart rate.

[a]See Table 7.1 for exercise type (T).

[b]The various methods to quantify exercise intensity in this table may not necessarily be equivalent to each other.

[c]Fitness classification based on normative fitness data categorized by $\dot{V}O_{2max}$.

Principles of RESISTANCE exercise prescription (related to case study)

- Mode of exercise → (free weights – bands – machines);
- 8 to 10 exercises that separately train thighs – legs – back – chest – shoulders – arms – abdomen;
- Primary goal → TOTAL BODY strength and endurance;

Principles of RESISTANCE exercise prescription (related to case study)

- Choose a number of repetitions between 3 → 20 (varying raleted to AIMS of training) ;
- Each repetition has to be performed at a moderate duration (3 sec conc – 3 sec ecc) in a controlled manner;
- Control of breathing (to avoid an excessive increases in blood pressure).

Resistance training programs for novice lifters (Ratamess et al., 2009 Med Sci Sports Exerc)

GOAL	INTENSITY	VOLUME	VELOCITY	FREQUENCY	REST INTERVAL
Stength	60 – 70 % 1 RM	1-3 sets 8-12 reps	Slow to moderate	2-3 d/wk	2-3' MJ 1-2' SJ
Hypertrophy	70 – 85 % 1 RM	1-3 sets 8-12 reps	Slow to moderate	2-3 d/wk	1-2' SJ
Endurance	50 – 70 % 1 RM	1-3 sets 10-15 reps	Slow	2-3 d/wk	< 1'
Power	85 – 100 % 1 RM for Force – 30-60% for UP BODY and 0 - 60 % 1 RM LO BODY for VELOCITY	1-3 sets 3-6 reps	Moderate	2-3 d/wk	2-3' MJ 1-2' SJ