

***The prescription of physical
activity and exercise: principles
and practice***

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Why Exercise prescription?

- **Individual adaptation process**
- **Personal life expectations**

The optimal prescription for any individual is determined on an appropriate evaluation of:

- **GOAL (S) - (Final target to reach)**
- **Physical Capacity - (Physiological Test Performance Task, Clinical risk,**
- **Psychological profile - (attitude to exercise)**
- **Social aspects (Environment and Barriers)**

Managing Exercise Prescription or Counseling?

Exercise is a matter of **health** not simply recreation
(according to OMS)

In the past exercise for individuals (not athletes)
was generally proposed on the basis of
...**reduced intensity** in order to **increased safety**
without any check on the effects

Counseling is a good method, basically aimed at
creating behavioural changes, however we need
to link appropriate prescription to it

The art of exercise prescription is the successful integration of exercise science with behavioral techniques that resulting long-term program compliance and attainment of individual's goal.

***ACSM Guidelines for exercise testing
and prescription. 6th edition***

Milestones of Exercise Prescription

Appropriate mode(s) of exercise

Intensity

Duration

Frequency

Progression

Aerobic training (Cardiovascular endurance)

- 1. Improve the ability of the body to utilise oxygen**
- 2. Basis for physical fitness**
- 3. Measured by VO₂ max or ... other indexes**
- 4. Expected changes in elderly from 5 to 40%**
- 5. Improvement is inversely related to initial level**

Aerobic training

Mode of exercise

Use of large muscle for prolonged (several minutes) periods and rhythmic movements.....wide numbers of activities.....

**Group 1 Activities easily maintained at constant intensity
Low inter- individual diff. In EnExp or EnCost
Precise control, rehabilitation, oldest old**

**Group 2 Activities where the rate of EE is related to skill
EE is relatively constant for a given person
Early stage of conditioning for skilled people**

**Group 3 Activities where skill and intensity are variable
Provide group interaction and variety of ex
Caution for high risk and low fit (not diseased
/disabled/ elderly ?)**

Other considerations: risk of injuries,orthopedic stress, muscle strength requirement,travel cost, partner involvement

Aerobic training Intensity & Duration

**Intensity and duration are interrelated
determining overall EE of exercise activities**

**The same results (in terms of cardiovascular
endurance) can be reached with prolonged exercise
and low to moderate intensity (not too low!!!!)**

**Desirable intensity is from 50 to 80% of VO₂ max but
you can(have to) reached for short periods 90-100%
VO₂ max**

**Individual with very low fitness (< 25ml/Kg/min) can
start from 40-50% of VO₂ max**

Aerobic training Intensity

How to establish intensity:

- evaluation (you have to become very expert on it!)

Set the parameter to follow:

HR (% of maximum or HR reserve)

RPE (rate of perceived exertion) i.e. Borg Scale

VO₂/METs

Thresholds

or others as

ventilatory requirements

lactate

pain limitation

Classification of intensity 30-60 min of exercise

% HR max	% VO2 max	RPE	Classification of intensity	
< 35	< 30	<10	Very light	
35-59	30-49	10-11	Light	
60-79	50-74	12-13	Moderate	
80-89	75-84	14-16	Haevy	
>90	>85	>16	Very Heavy	

Aerobic training Duration

- 1. Time constrains of the individual leads the choice!!!**
- 2. From 5-10 min to 30-40 min inversely related to intensity**
- 3. Gold standard 20-60 min at 55-75% VO₂ max**
- 4. Frail or low fit elderly could benefit also from repeated session of 5-10 min**
- 5. Set the initial goal reasonably for the individual (auto regulation is the tomb of prescription!!!!)**
- 6. Increase as a function of success and absence of fatigue**

Aerobic training Frequency

- 1. Inter-related to Intensity and duration**
- 2. Set on functional capacity:**
 - very low fit subj. (<3 MET/h) require multiple daily sessions**
 - low fit (3-5 MET/h) 2 or 3 sessions per day**
 - normal (> 5 MET/h) 3-5 sessions/week**

Number of exercise sessions per week also depends on caloric goals, subjects preference and limitations lifestyle,.....

Aerobic training

Rate of progression

1. It is determined by:

Functional capacity

Medical and health status

Age

Individual preference/goal

2. Three main stages

INITIAL CONDITIONING STAGE (4-6 wks)

....avoid risk and fatigue...

IMPROVEMENT STAGE (4-5 mo)

.....feel the increasing power...

MAINTENANCE STAGE (> 6 mo)

.....enjoy your exercise as part of your life...

Musculoskeletal flexibility

Mode of exercise: Any that maintain an adequate range of motion (generally called stretching ex.)

Static exercises are to be preferred in elderly with emphasis to low back and thigh area

Intensity: to position at middle discomfort

Duration: 10 to 30 sec for each stretch 3 –5 reps

Frequency: at least 3 days per week

Muscular fitness – Resistance training ***(it should be a part of each protocol)***

Mode of exercise: resistance training, strength training, daily activities requiring muscle power)

Intensity: from 40% to 80% of 1 RM or Max isom

Duration: at least 1 exercise for any major muscle groups (avg 8-10 ex) 8-12 reps for each

Frequency: at least 2 days per week

- 1. Adherence to technique of exercise**
- 2. Perform exercise in the correct range of motion**
- 3. Avoid or reduce eccentric exercise or exercise with high level isometric component**

STRENGTH ASSESSMENT

Dynamometry (static force)

- ✓ One-repetition maximum or 1-RM (dynamic force)
- ✓ Computer-assisted force and power output determination

STRENGTH ASSESSMENT

**MAXIMAL
TEST**

DIRECT TEST



**1MR -
isometric**

**SUBMAXIMAL
TEST**

**INDIRECT
TEST**



MR

ESTIMATE THE 1-RM

Untrained

$$1\text{-RM(kg)} = 1.554 (7\text{-}10\text{-RM weight(kg)}) - 5.181$$

Trained

$$1\text{-RM(kg)} = 1.172 (7\text{-}10\text{-RM weight(kg)}) + 7.704$$

BRZYCKI FORMULA

$$\underline{1MR} = \frac{\text{LIFTED WEIGHT}}{1.0278 - (0.0278 \times \text{reps})}$$




Effect of two training modalities on exercise tolerance in the elderly

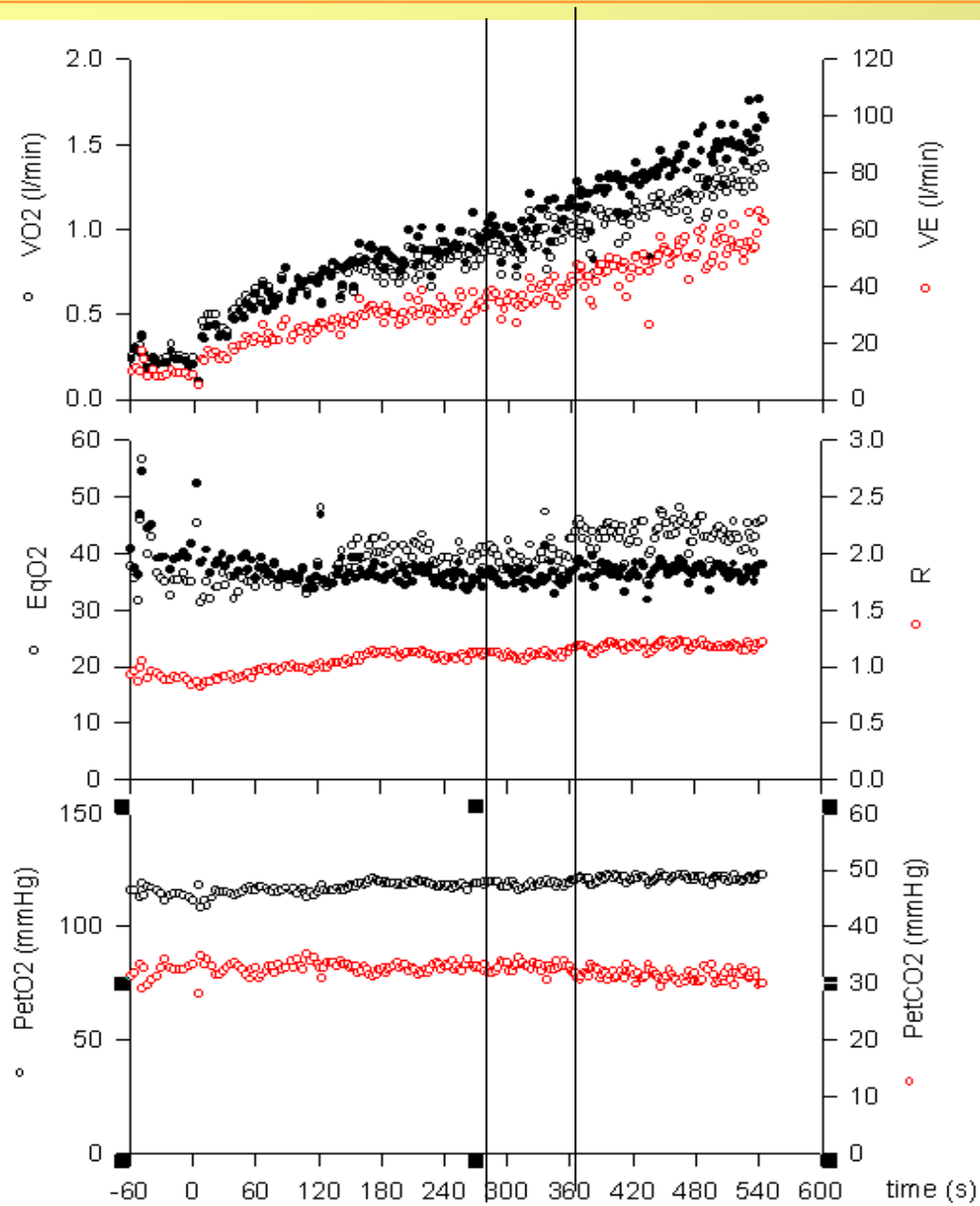
Balestrieri F., Pogliaghi S., Cevese A., Schena F.1

1 CeBiSM, Università degli Studi di Trento, Italy

2 Facoltà di Scienze Motorie, Università degli Studi di
Verona, Italy

Experimental procedures

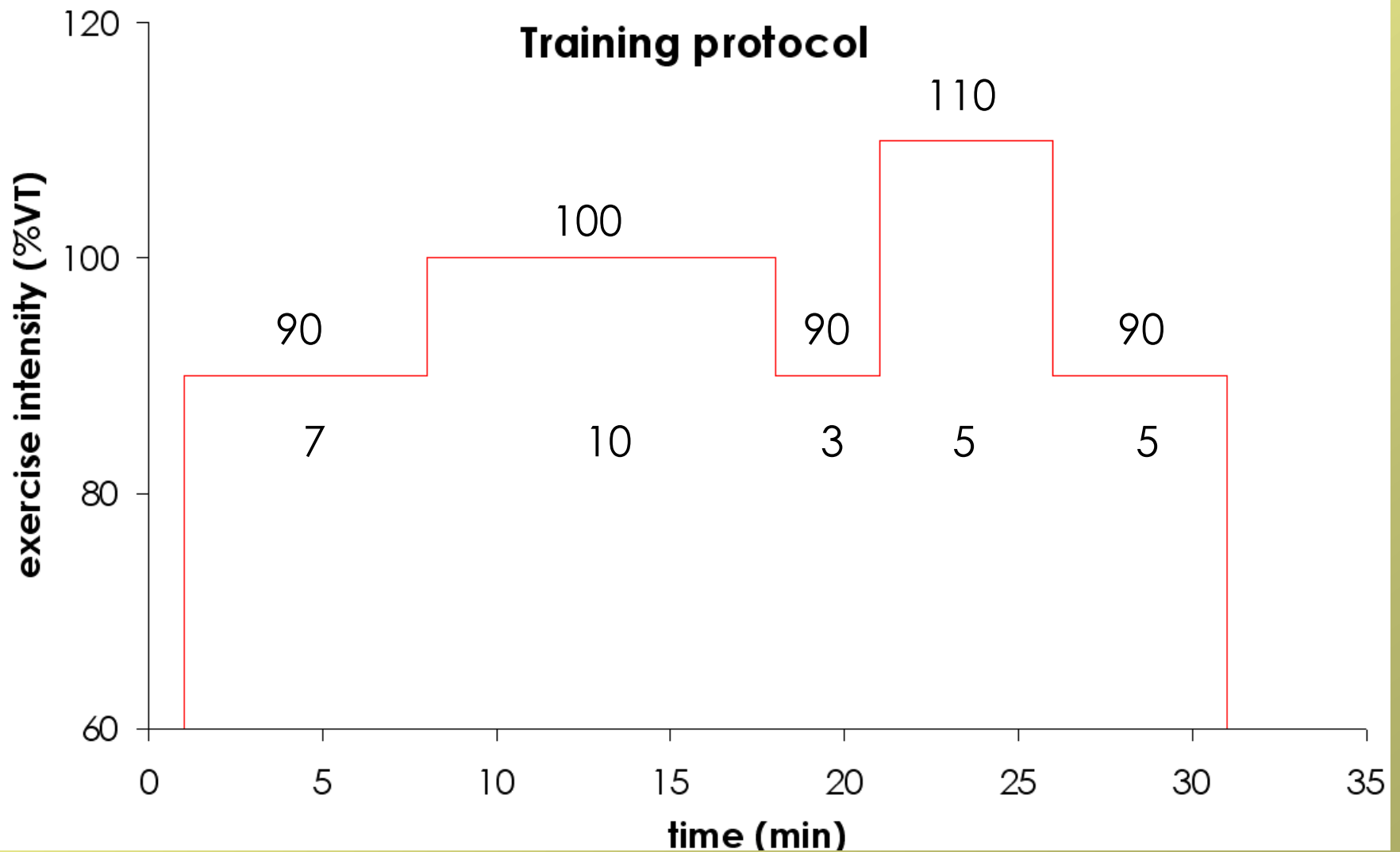
- 
- *Medical check:* all subjects were free of cardiac, pulmonary, metabolic disease or exercise-limiting orthopaedic impairment.
 - *preliminary session:* familiarization with the laboratory setting, the study procedure and the working position.
 - *exercise tests:* performed in a random order on two ergometer (Technogym, Italy) with a minimal recovery of 2 hours
 - maximal test on arm cranking (ARM):* start from 45 watts with increases of 5 watts every 1 min until exhaustion; 60 rpm
 - maximal test on leg cycling (CYC):* start from 50 watts with increases of 10 watts every 1 min, until exhaustion; 60 rpm



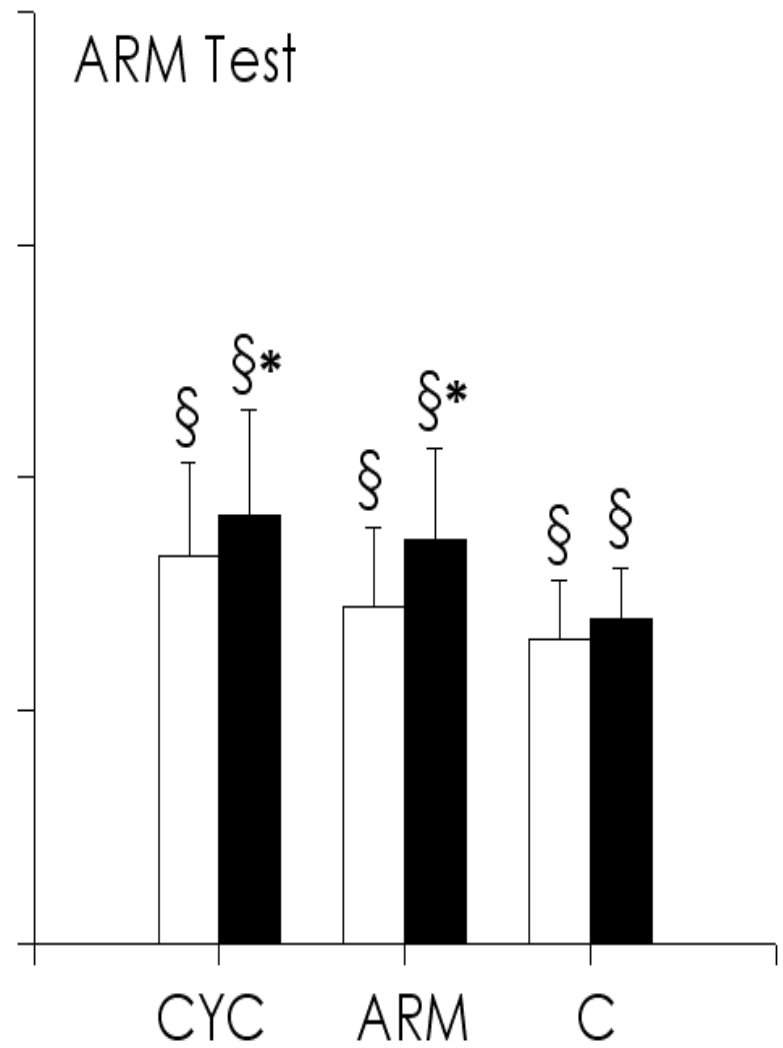
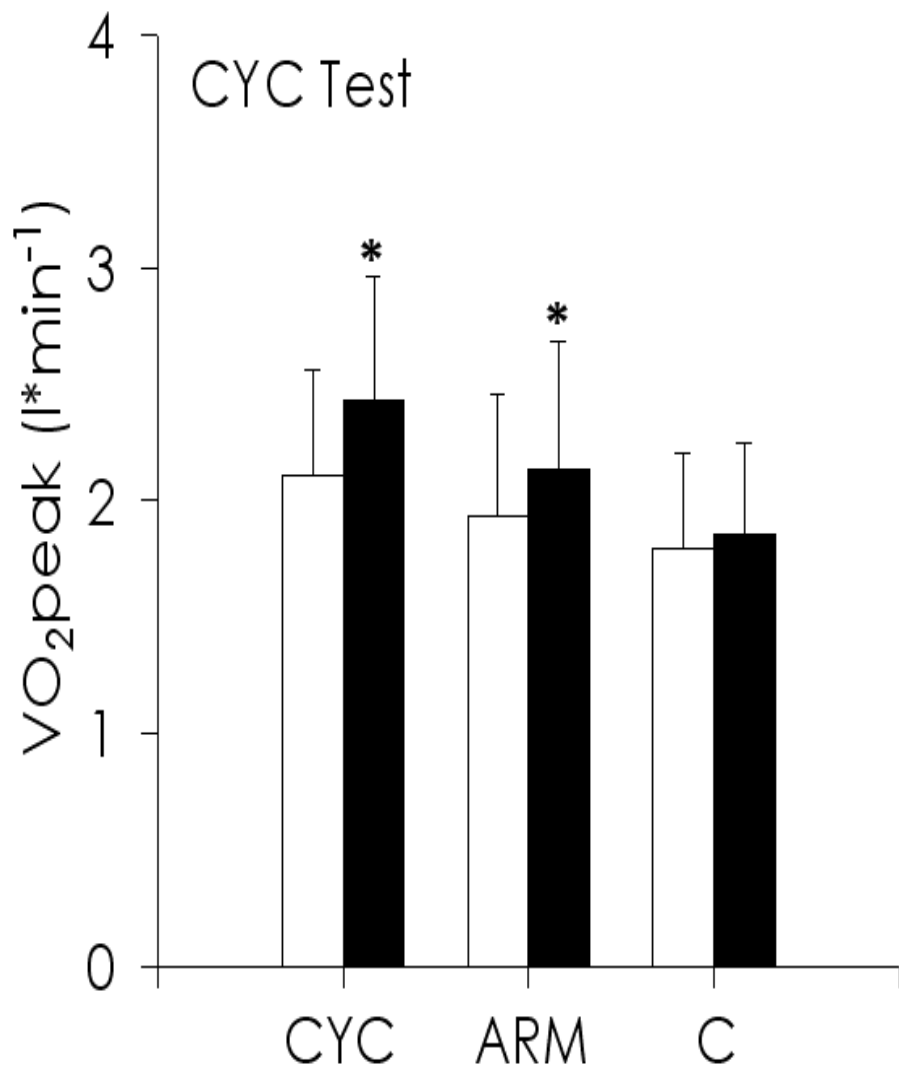
Training design (intensity, rate of progression):

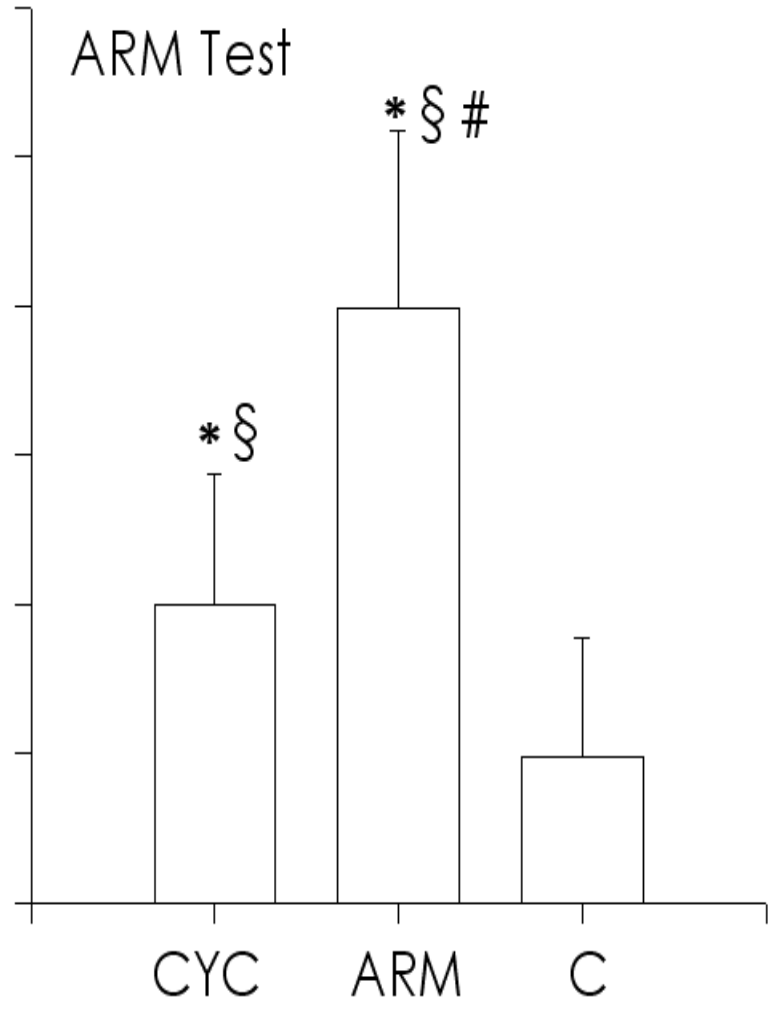
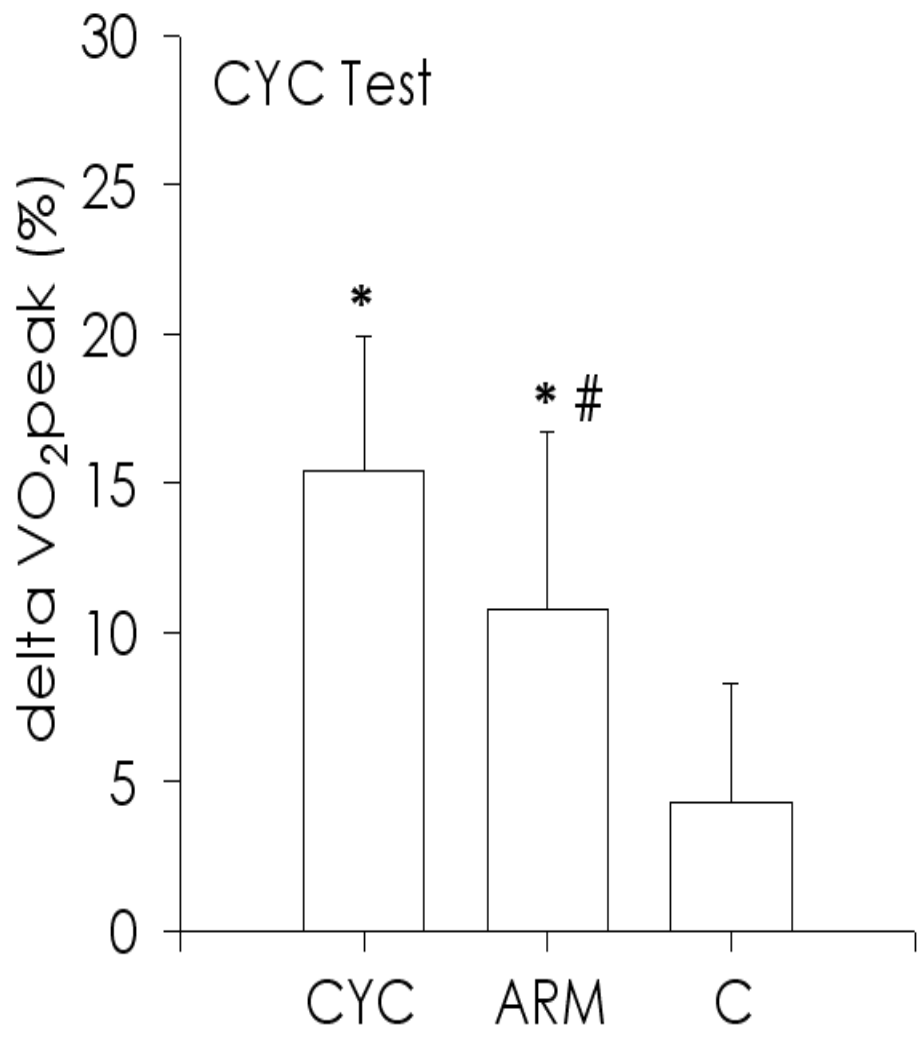
- ✓ **VT identification during incremental test**
 - ✓ **HR corresponding to VT**
 - ✓ **using steady-state tests, translate HR_{VT} in W_{VT}**
 - ✓ **calculate $W_{90\%VT}$ and $W_{110\%VT}$**
-
- ✓ **every 2 weeks check the HR/W relationship**

Training protocol



12-week training, 3 times /week





Congresso Firenze SIGG 2000

IL SIGNIFICATO DELL'ATTIVITÀ FISICA
NELL'ANZIANO ISTITUZIONALIZZATO:
UNA ESPERIENZA ITALIANA

F. Schena, C. Martinelli, G. Noro.
Giornale di Gerontologia, 9:597 - 607, 2000

Protocollo

RSA - (case di riposo)

1° TRAINING GROUP

**Casa di Riposo di
GARDOLO**

GrWM (Weight machines)

n = 7

(6F, 1M - **83,43 ± 8 anni**)

2° TRAINING GROUP

**Casa di Riposo di
TRENTO**

GrEB (Elastic Band)

n = 8

(6F, 2M - **79,25 ± 8,78 anni**)

**CONTROL
GROUP**

**Case di Riposo
di Povo, Gardolo
e Trento**

n = 10

(8F,2M - **81,5±6 anni**)

TRAINING

12 SETTIMANE 3 giorni a settimana per 50 min.

Allenamento alla forza per arti superiori ed inferiori

Macchine isotoniche

(Leg and Chest press,
Vertical row, Recline
Technogym)

Bande elastiche +

**Esercizi carico
naturale**

NO TRAINING

Mantenimento
delle normali
attività previste
dalla struttura
residenziale

Arti superiori

CHEST PRESS
VERTICAL ROW

40% della M.V.C.

ogni 2 sett

Incremento del 20%

Apparecchiatura
Isotonica

Arti inferiori

LEG PRESS

50% della M.V.C

ogni 2 sett

incremento del 20%

SET

3
4

dalla 1° alla 6° settimana
dalla 7° alla 12° settimana

3
5



RIPETIZIONI

6 (1° settimana) 8 (2° settimana)

10-12 (da 3° a 12° sett.)







GrEB Programma di allenamento

15 min

Carico

naturale
ARTI INFERIORI

FLESSIONI, PIEGAMENTI, SEMIPIEGAMENTI e AFFONDI

2 - 3 SETS di 8 - 10 - 12 RIPETIZIONI

5 min

ESERCIZI DI MOBILITÀ PER GLI ARTI SUPERIORI

20
min

Bande

elastiche
ARTI SUPERIORI ARTI INFERIORI



FLESSIONE, ESTENSIONE ED ABDUZIONE

2 - 3 SET di 8 - 10 - 12 RIPETIZIONI

10
min

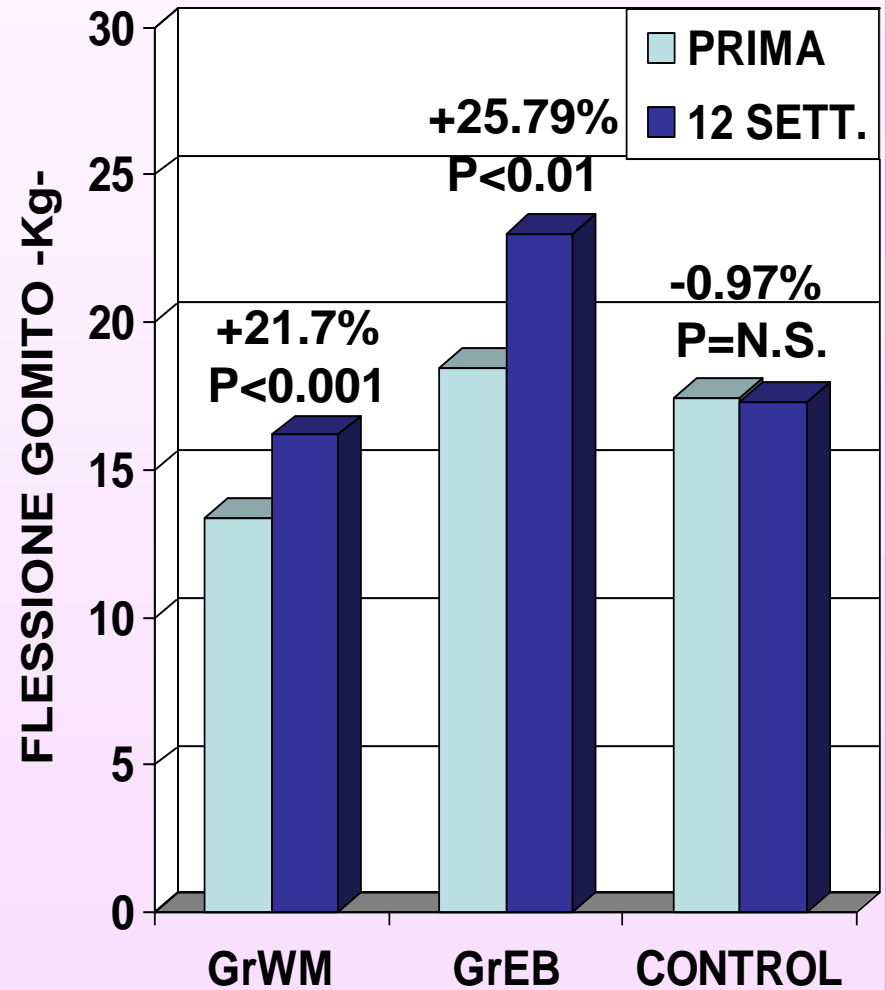
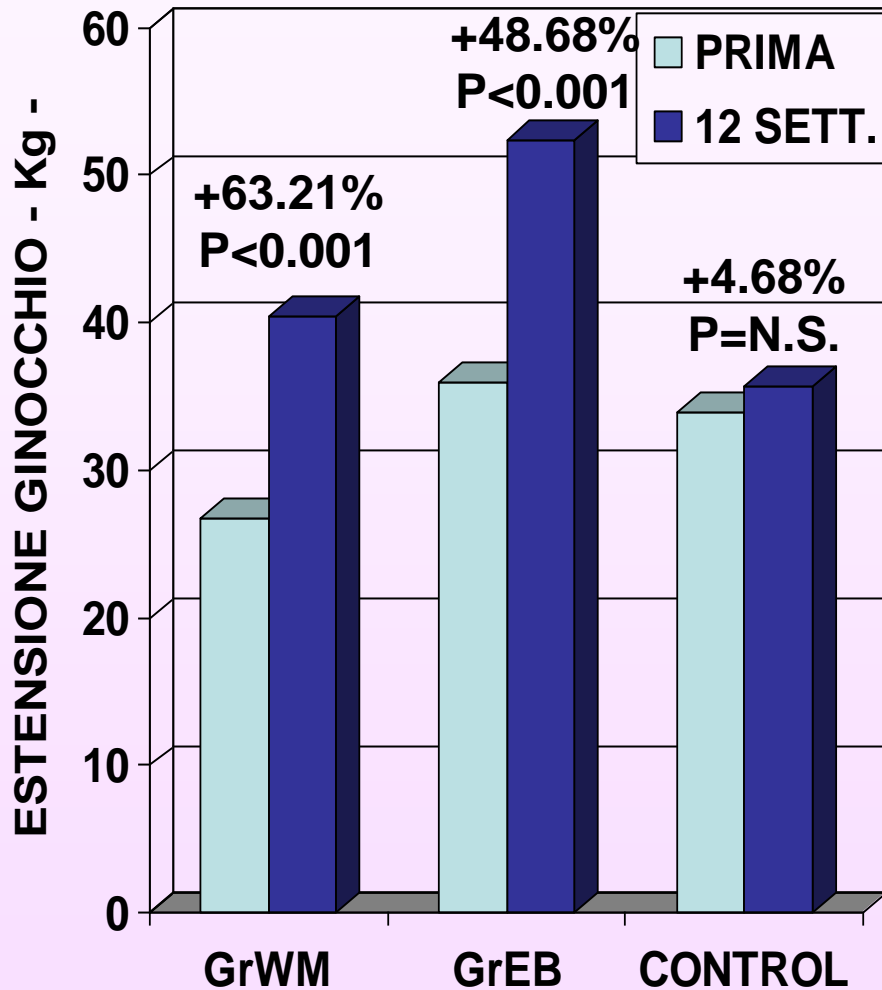
ESERCIZI DI DEAMBULAZIONE E COORDINAZIONE
LANCI DI PALLINE .





VIETATO FUMARE

Massima forza isometrica delle gambe e delle braccia



15 metri di cammino: tempo e lunghezza media del passo

