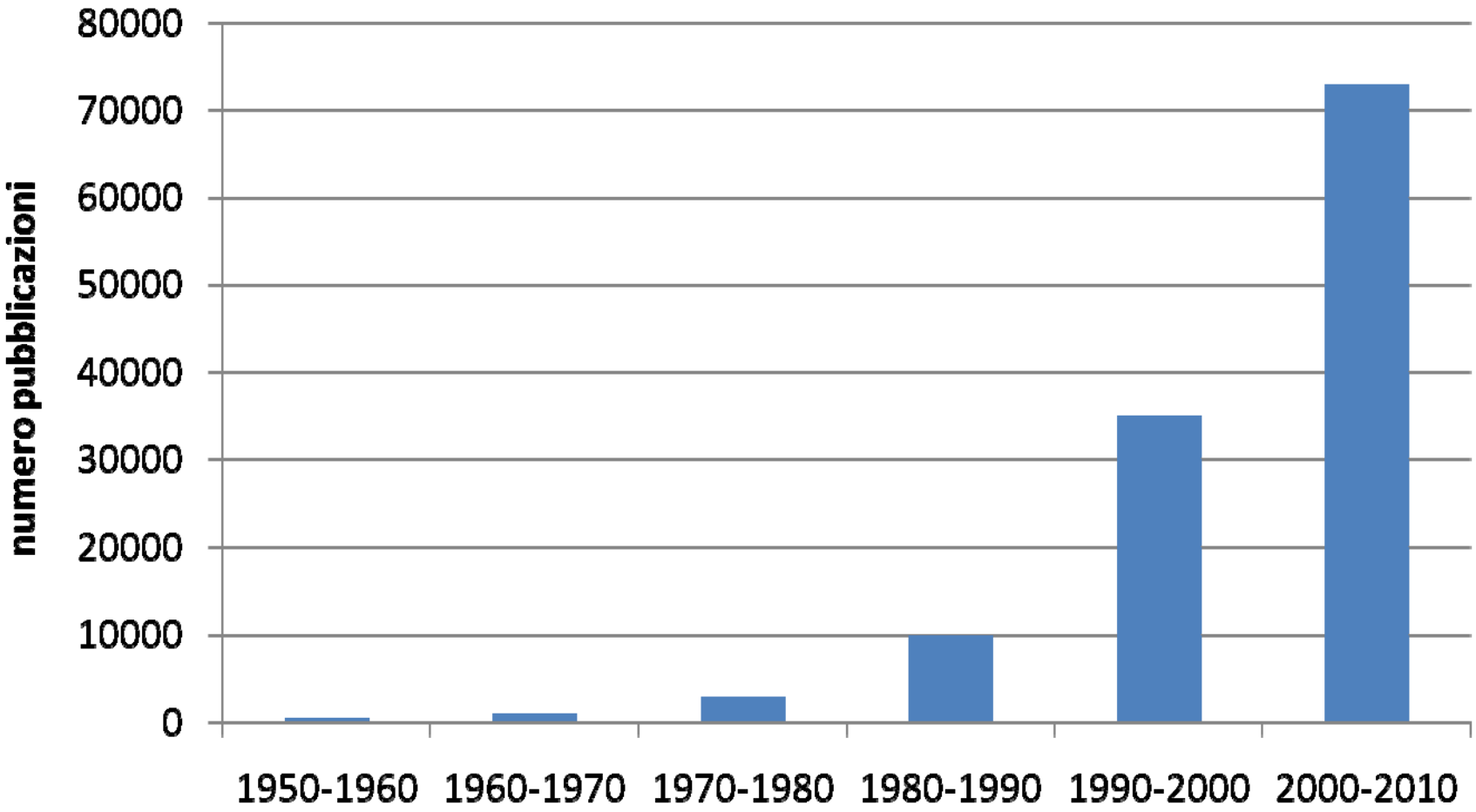
Bologna 22 febbraio 2014

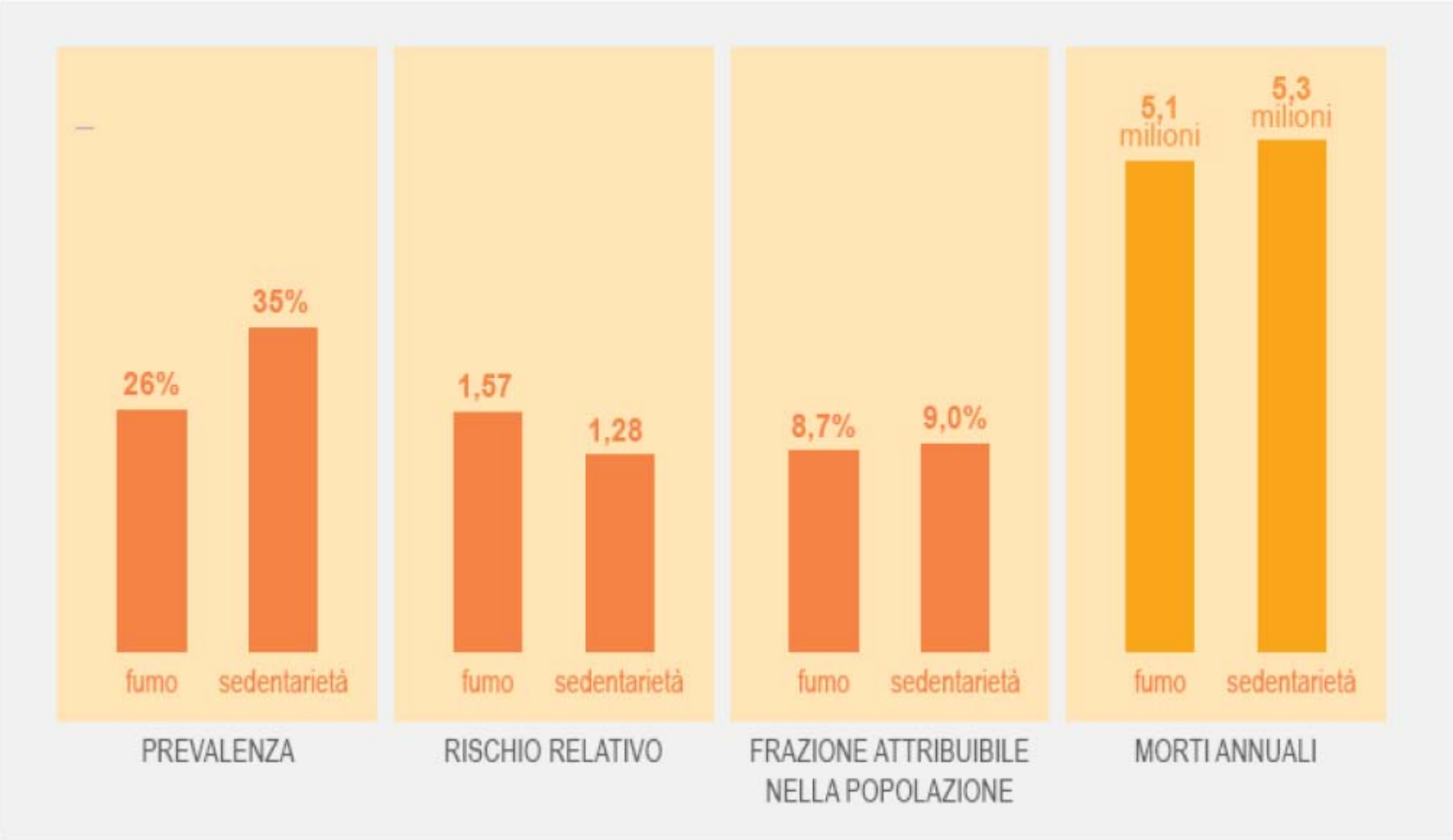
UN NUOVO FARMACO: L'ESERCIZIO FISICO

G. Mazzoni - Università di Ferrara.
Attività fisica in soggetti con malattie dismetaboliche

Attività fisica e malattie cardiovascolari



Courtesy Prof. S. Blair, University of South Carolina



Wen CP et al. Lancet 2012

Physical Activity and Health

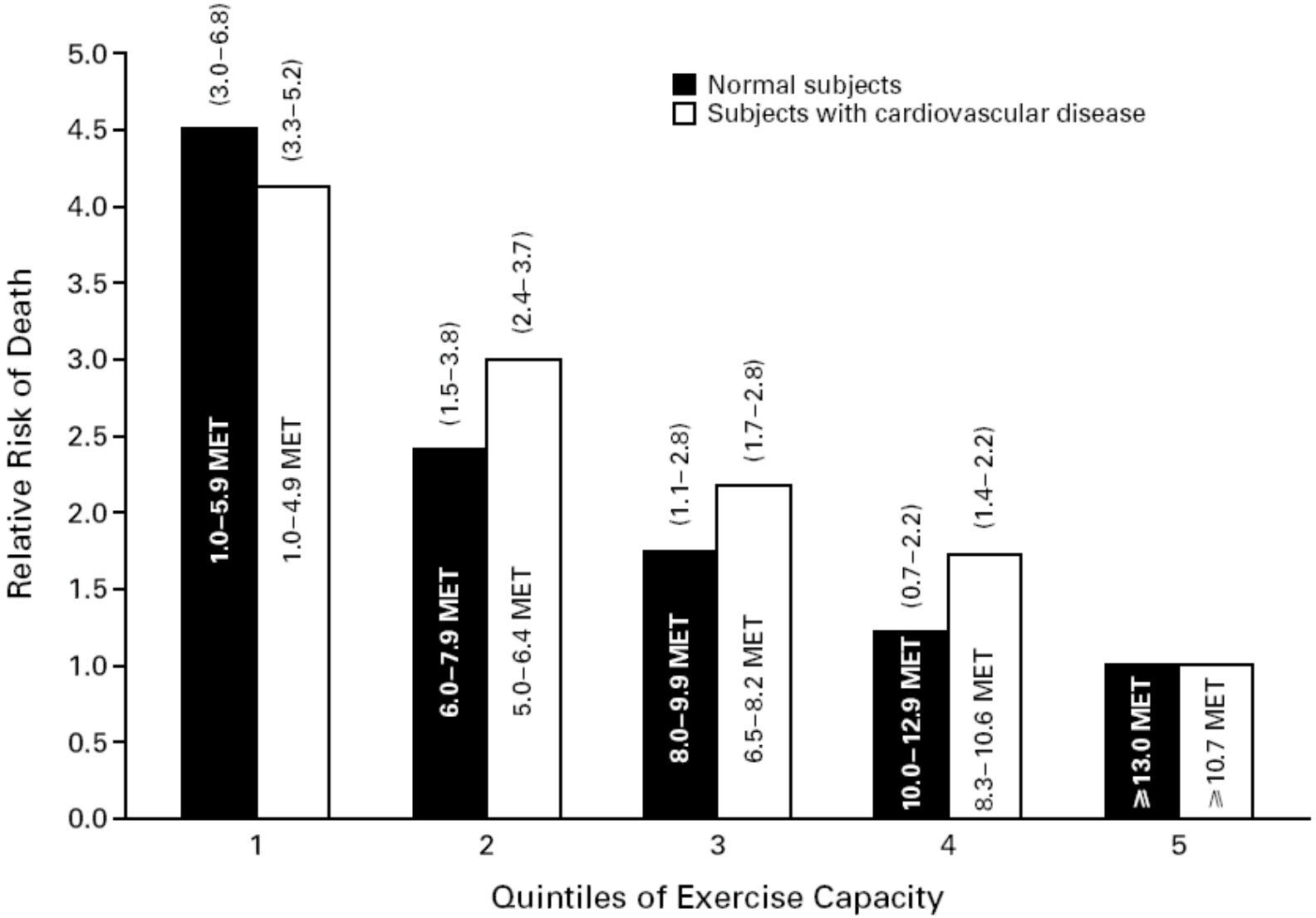
A Report of the Surgeon General
Executive Summary

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion
The President's Council on Physical Fitness and Sports

The Nation's Prevention Agency
CDC 50
Centers for Disease Control and Prevention

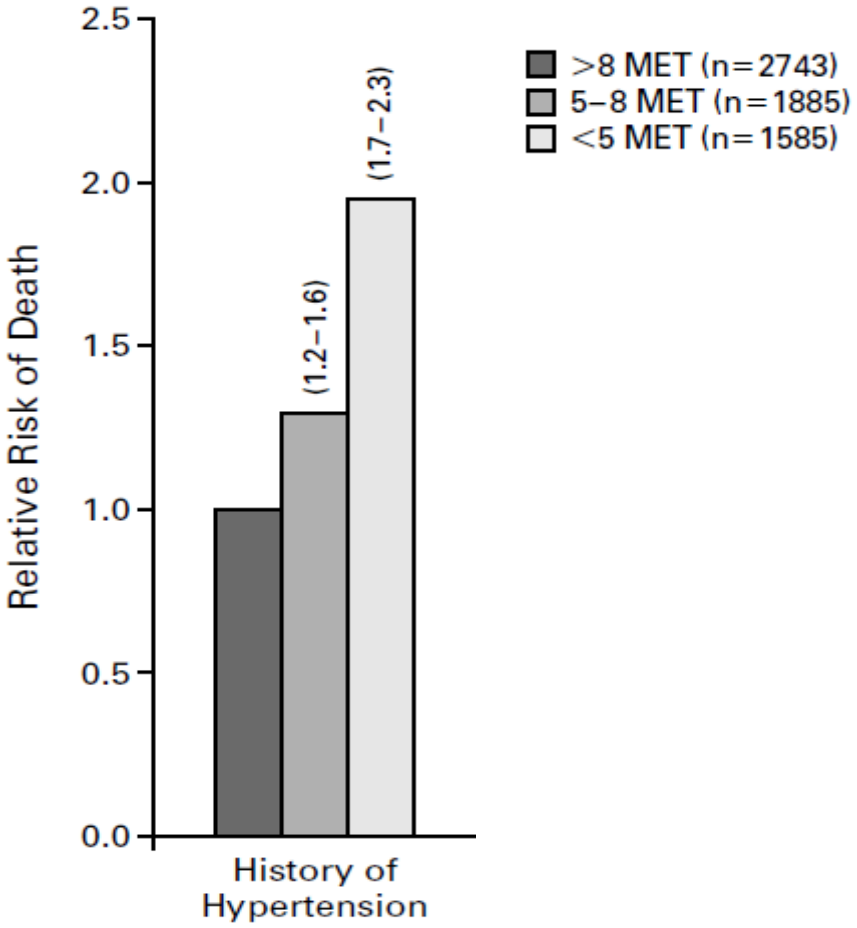
The President's Council on Physical Fitness and Sports

This report is a passport to good health for all Americans. Its key finding is that people of all ages can improve the quality of their lives through a lifelong practice of moderate physical activity. You don't have to be training for the Boston Marathon to derive real health benefits from physical activity. A regular, preferably daily regimen of at least 30–45 minutes of brisk walking, bicycling, or even working around the house or yard will reduce your risks of developing coronary heart disease, hypertension, colon cancer, and diabetes. And if you're already doing that, you should consider picking up the pace: this report says that people who are already physically active will benefit even more by increasing the intensity or duration of their activity.

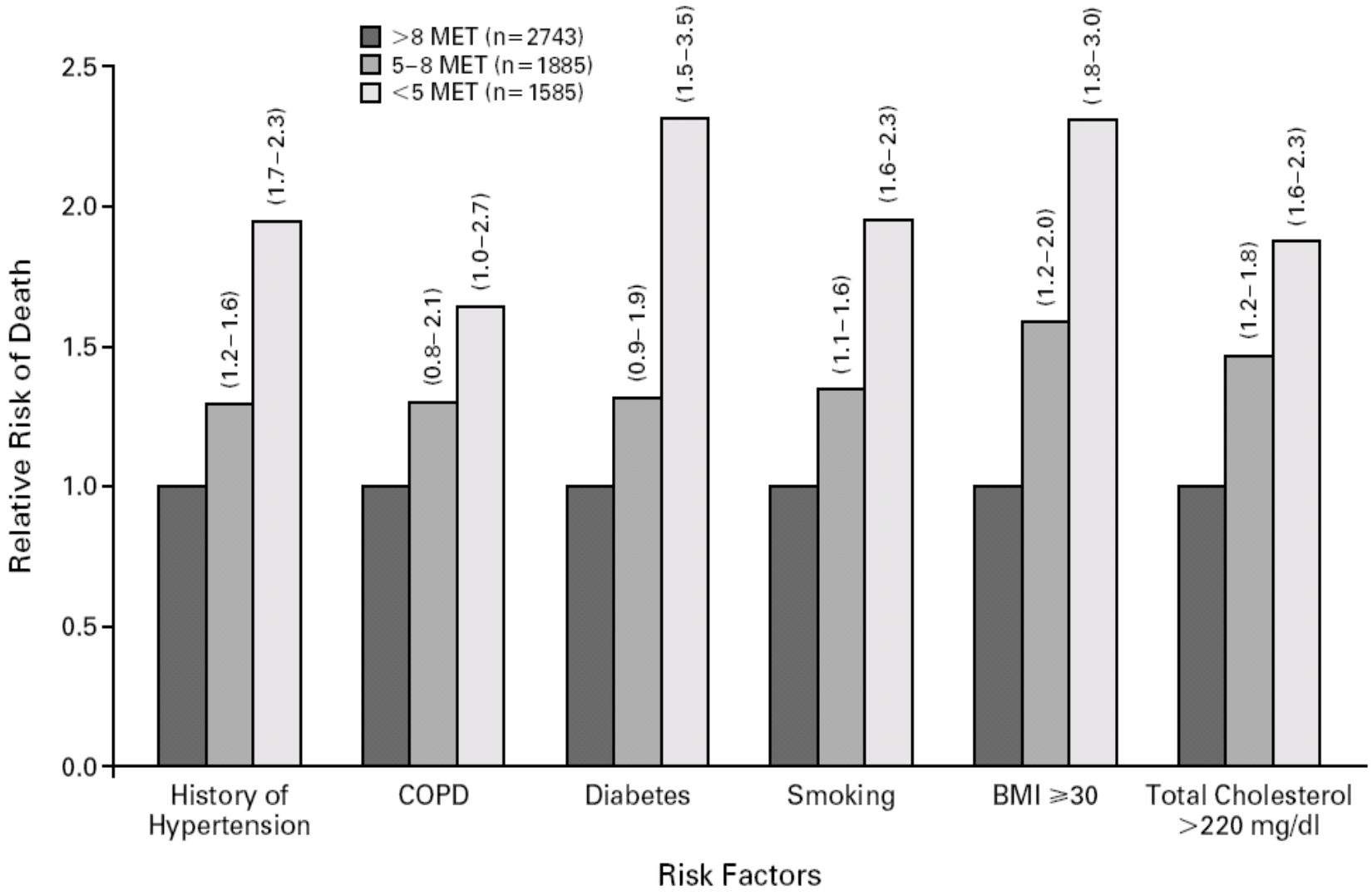


Myers J. et al, *New Engl J Med*, 2002

Indipendenza del fattore *Fitness*



Myers J et al, *New Engl J Med*, 2002



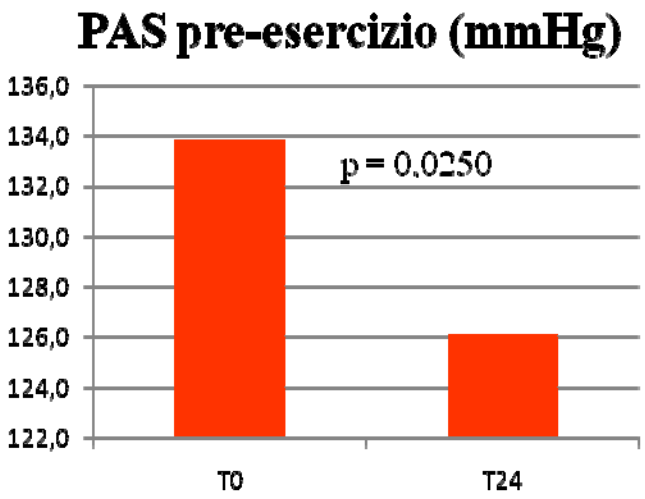
Myers J et al, *New Engl J Med*, 2002

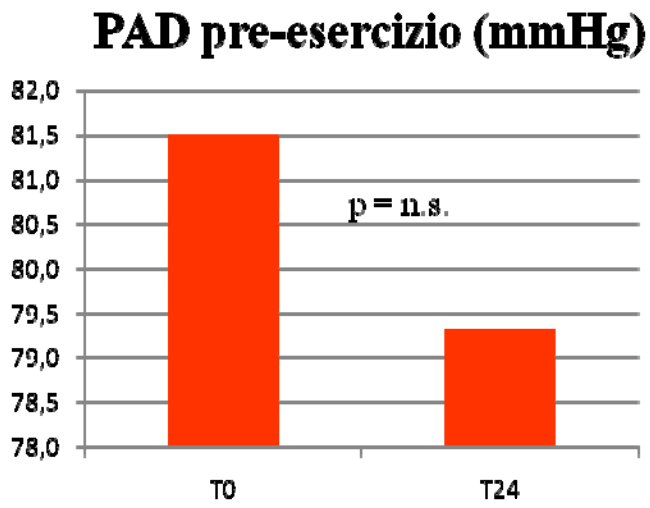
RISULTATI

PARAMETRI ANTROPOMETRICI

	T0			T24					
	Media	Dev. St.	Range	Media	Dev. St.	Range	Δ	Δ %	
PESO (kg)	**90,8**	±16,5	[68-120]	**89,0**	±15,5	[68-116]	**1,8**	2%	p = 0,0035
CV (cm)	**107,8**	±10,9	[89-124]	**105,5**	±10,1	[88-124]	**2,3**	2,2%	p = 0,0002
BMI (kg/m^2)	**31,5**	±5,1	[23-42]	**30,9**	±4,9	[23-42]	**0,6**	1,8%	p = 0,0378

VALORI PRESSORI PRE-ESERCIZIO



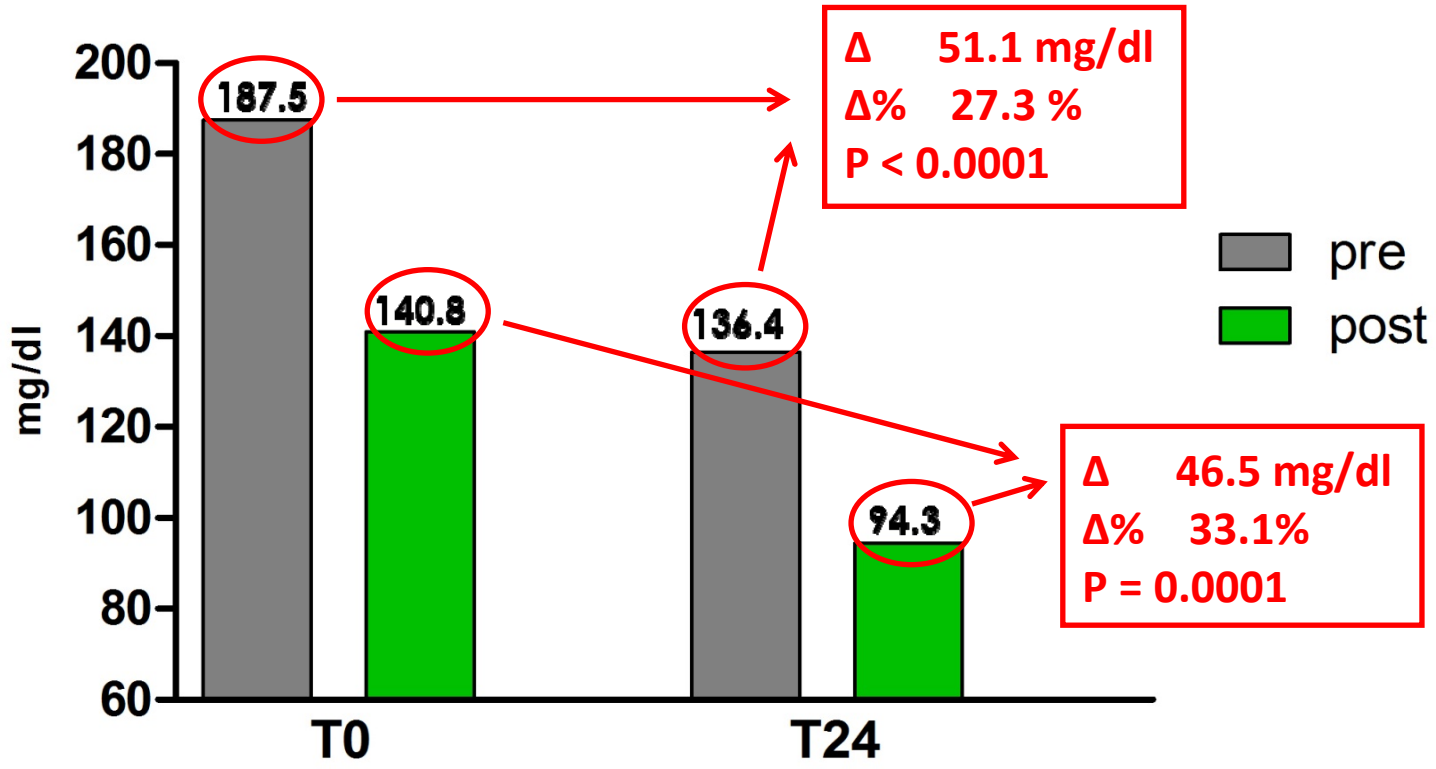


	T0		T24			
	Media	Dev. St.	Media	Dev. St.	Δ	Δ %
PAS pre-esercizio (mmHg)	**133,9**	± 14,6	**126,1**	± 15,9	**7,8**	5,8%
PAD pre-esercizio (mmHg)	**81,5**	± 10,1	**79,3**	± 12,9	**2,2**	2,7%

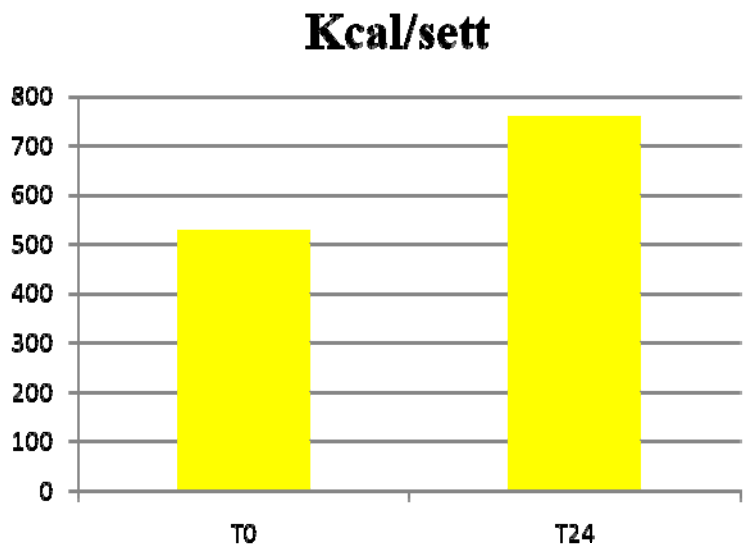
→ p = 0,0250

→ p = n.s.

Valori medi glicemici pre e post esercizio, a T0 e T24



DISPENDIO ENERGETICO DELL'ATTIVITÀ MOTORIA



528 Kcal nella prima settimana

759 Kcal nell'ultima settimana

Δ = **231 Kcal**

ORIGINAL CONTRIBUTION

Gait Speed and Survival

… Gait speed, also often termed *walking speed*, has been shown to be **associated with survival**… and has been shown to **reflect health and functional status**. Gait speed has been **recommended as a potentially useful clinical indicator** of well-being…

Studenski S. et al. 2011, *JAMA*. 305(1):50-58

BMJ

BMJ 2011;343:d7679 doi: 10.1136/bmj.d7679 (Published 15 December 2011)

RESEARCH

How fast does the Grim Reaper walk? Receiver operating characteristics curve analysis in healthy men aged 70 and over

Stanaway FF et al. *BMJ* 2011.

Un nuovo test di cammino per la valutazione funzionale di soggetti cardiopatici in prevenzione secondaria

- Development
- Validation
- Practical application
  - Prognostic value
    - Mortality
    - Hospitalization
    - Costs
  - Exercise Prescription

A new walking test: why?

- VO_2max is a widely considered excellent indicator of cardiorespiratory fitness
  - Diagnostic, prognostic and therapeutic purposes
  - Espeecially in regard to exercise prescription either in healthy people (including athletes) and subjects with reduced exercise capacity (including patients).

A new walking test: why?

- Drawbacks of direct assessment that limit its practical application

  - Relatively expensive
  - Time consuming
  - Not well suited for large population
  - Needs maximal or near-maximal effort
  - “Invasive” (mask or mouthpieces)
  - Needs direct medical supervision

A new walking test: why?

- … because of these limitations…
  - Less strenous
  - Less time consuming
  - More cost effective
- …submaximal VO_2peak prediction tests have been developed.

A new walking test: why?

- … the test mode should be consistent with the primary activity used by the participant to address specificity of training issues … (ACSM Guidelines 2005).

- … an endurance constant work rate protocol … lasting more than 6min … was more sensitive to detect the effects of therapeutic interventions … including cardiopulmonary rehabilitation … (ATS Guidelines 2003).

- … in order to obtain a certain learning trial effect (i.e. to make experience of moderate intensity and to favor transition from supervised to self-guided exercise program (Wegner et al *Int J Sports Med* 2007).

Peak Oxygen Uptake Prediction from a moderate, perceptually-regulated, 1-km treadmill walk in male cardiac patients.

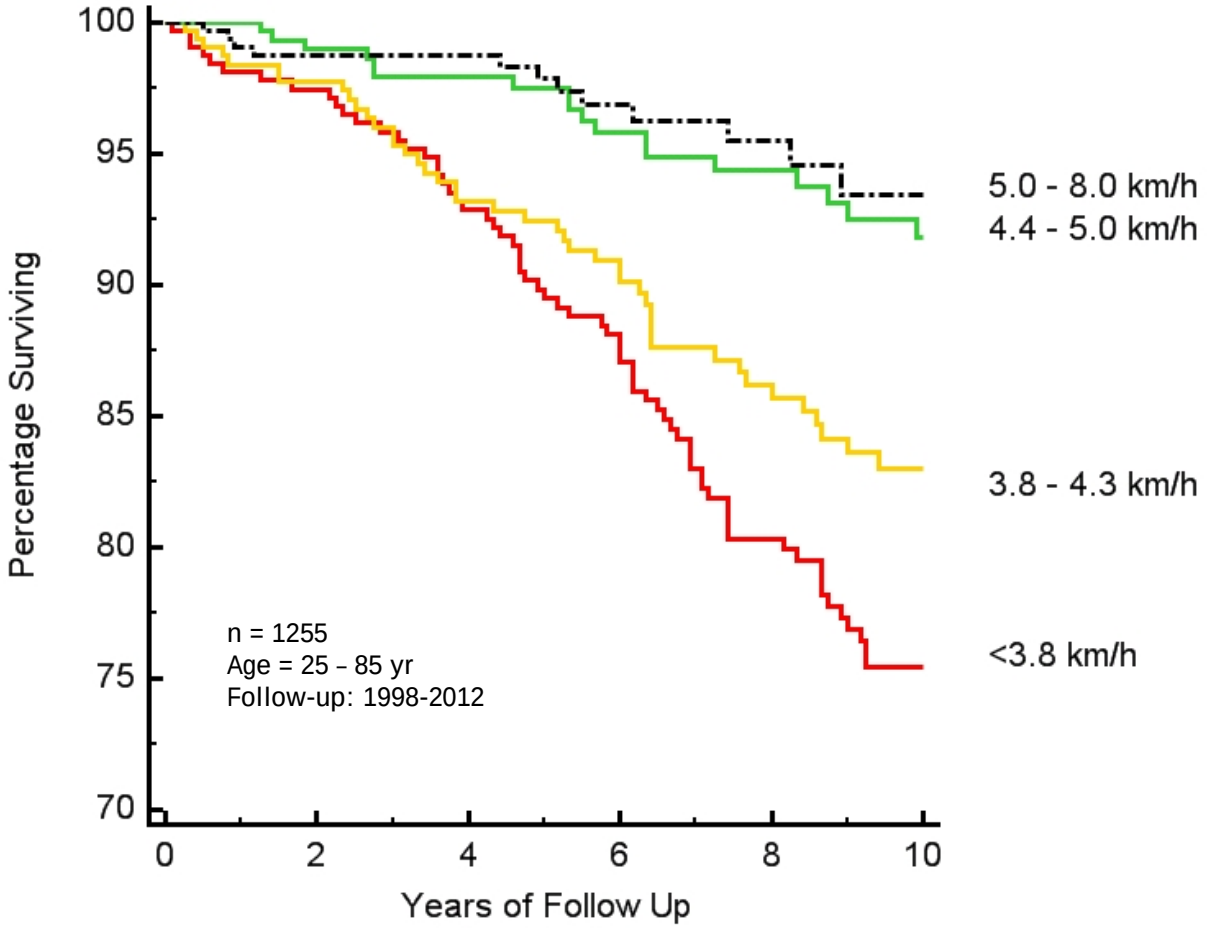
1K-TWT (*1-Km Treadmill Walking Test*)

Key words:

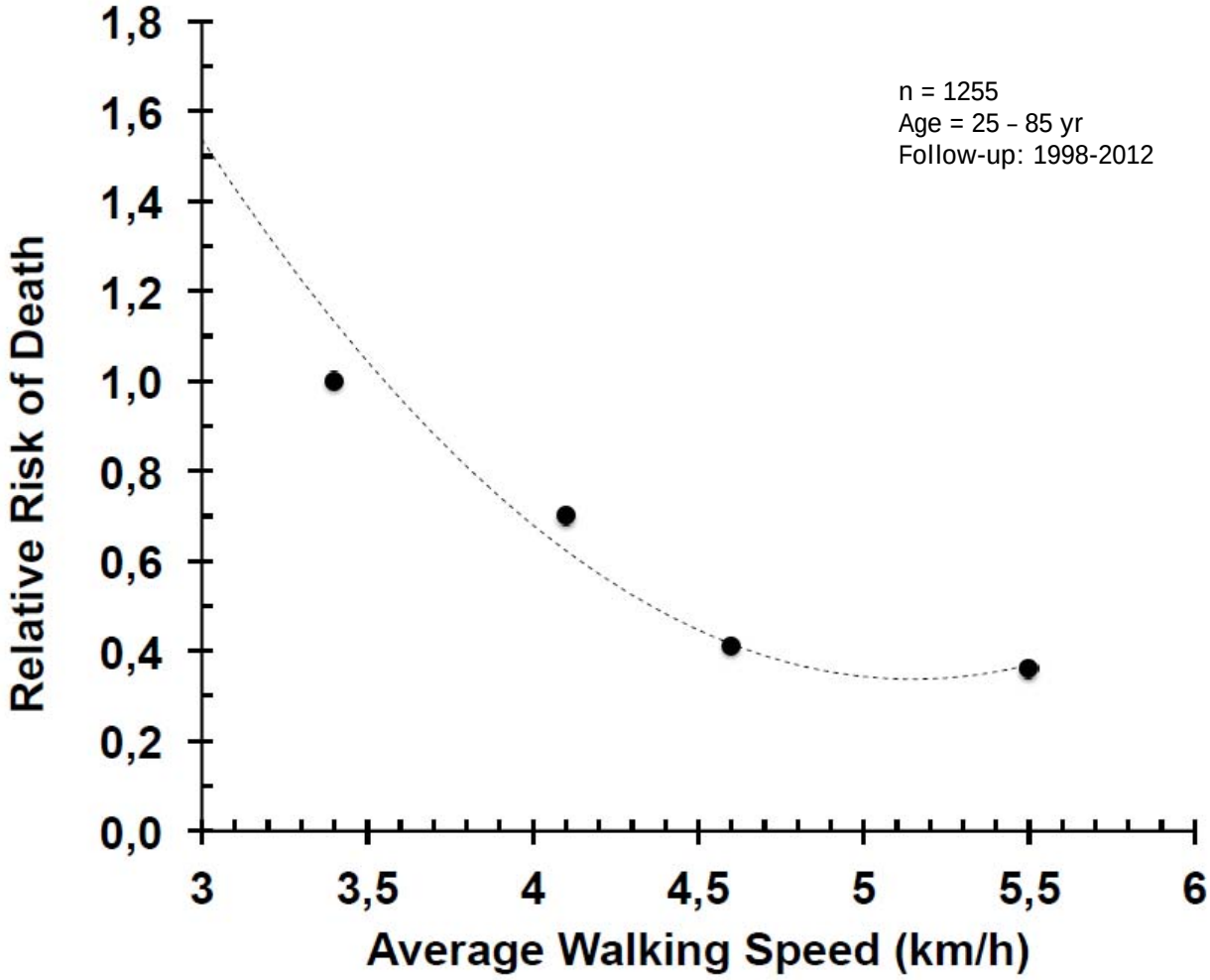
- VO_{2peak}
- Treadmill walk
- Moderate intensity
- Perceptually regulated
- 1-km
- Cardiac patients

Chiaranda G et al, *JCRP*, 2012

Moderate walking and 10-yr overall mortality

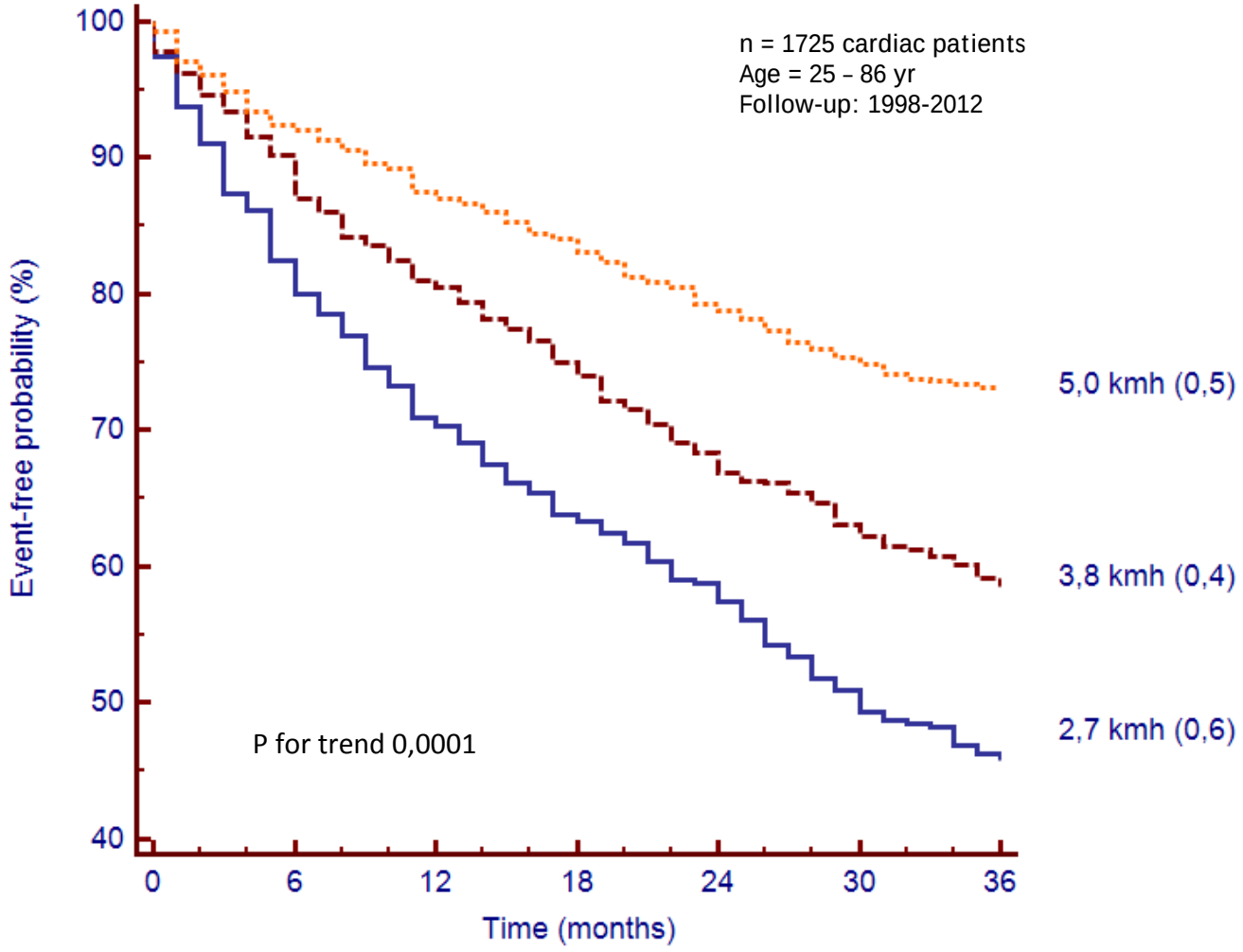


Chiaranda G. et al, *BMJ* 2013



Chiaranda G. et al, *BMJ* 2013

Moderate walking and 3-yr all-cause rehospitalization



Grazzi G, Mazzoni G, 2014, ahead of pub

Moderate walking and costs for overall 3-yr readmission

	Low Fit	Moderate Fit	High Fit	*P*
Walking speed (km/h)	2,7 (0,6)	3,8 (0,4)	5,0 (0,5)	<0,0001
Readmission (%)	58%	41%	26%	<0,0001
Costs (€)	5100 (10231)	3341 (9314)	1794 (5599)	<0,0001

Data are presented as mean ± SD

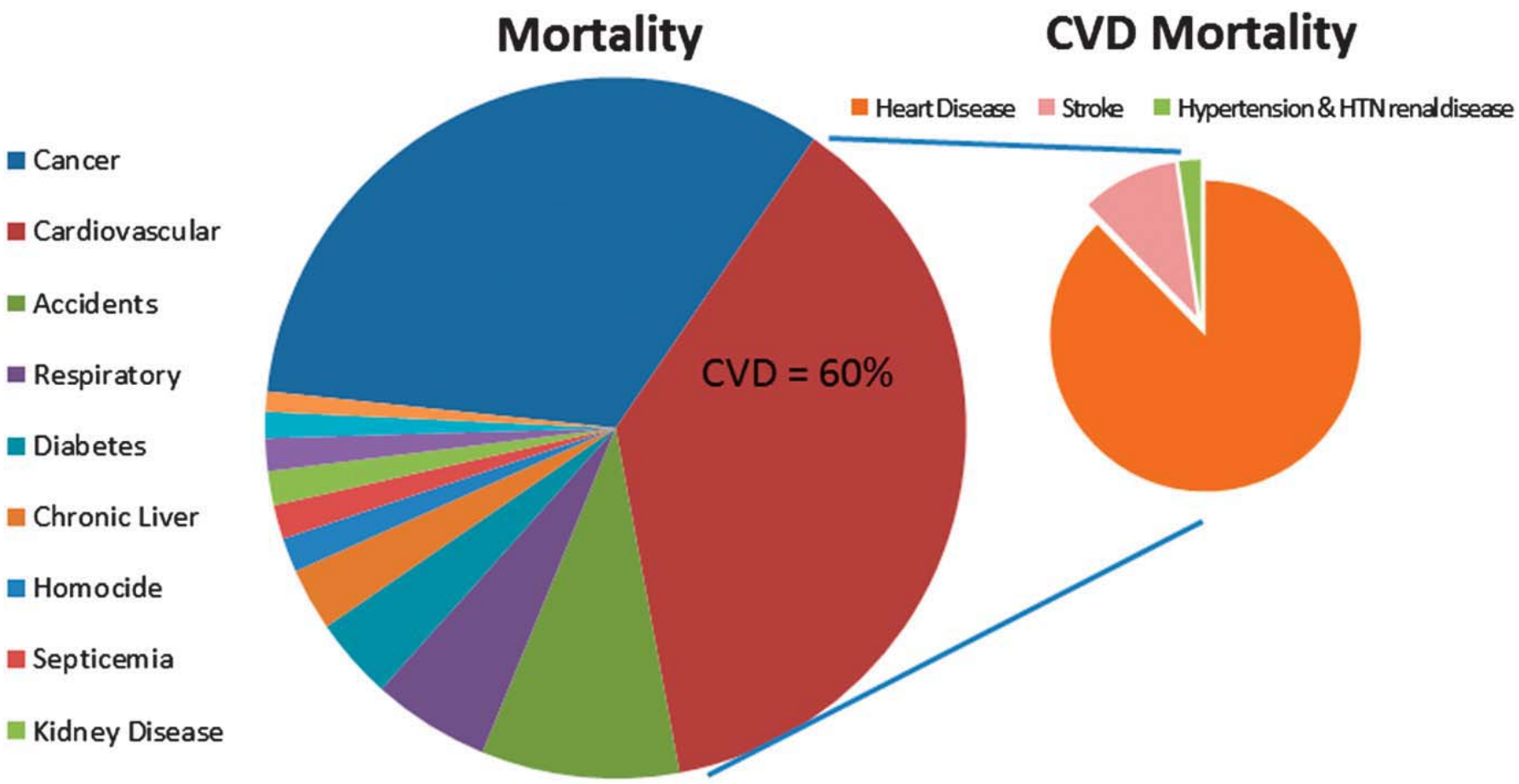
Grazzi G, Mazzoni G, 2014, ahead of pub

Role of exercise in treating CVDs

Improved autonomic function	Headley, 2012; Malfatto, 2005; European Association of Cardiovascular Prevention Rehabilitation Committee for Science, 2010
Increased peak $\dot{V}O_2$	Belardinelli, 1999; Garber, 2011; European Association of Cardiovascular Prevention Rehabilitation Committee for Science, 2010; Headley, 2012; Kobashigawa, 1999
Favorable clotting factors (increased fibrinolysis and decreased coagulability)	El-Sayed, 2004; Kokkinos, 2010
Decreased inflammation	Balducci, 2012; Kokkinos, 2010; Milani, 2004
Improved vasodilation/constriction	Gielen, 2001; Hambrecht, 2003
Improved myocardial perfusion	Gielen, 2001
Slowing or regression of CAD	Gielen, 2001; Ornish, 1990; Ornish, 1998
Blood lipid profile	Balducci, 2012; Kokkinos, 2010
Additional benefits of exercise training for health-related fitness	
Increased muscle mass—decreased muscle wasting	Balducci, 2012; Garber, 2011; Peterson, 2011; Peterson, 2010; Peterson, 2011; Ratamess, 2009
Increased bone mineral density	Gomez-Cabello, 2012; Guadalupe-Grau, 2009
Reduced depression and anxiety	Dunn, 2005; Mota-Pereira, 2011
Increased muscle strength	Ferreira, 2012; Peterson, 2004; Peterson, 2005; Peterson, 2010; Rhea, 2003
Improved glucose metabolism	Black, 2010; Hansen, 2012; Miller, 1994; Miller, 1984
Improved insulin sensitivity	Black, 2010; Hansen, 2012; Miller, 1994; Miller, 1984
HbA1c	Avery, 2012; Balducci, 2012

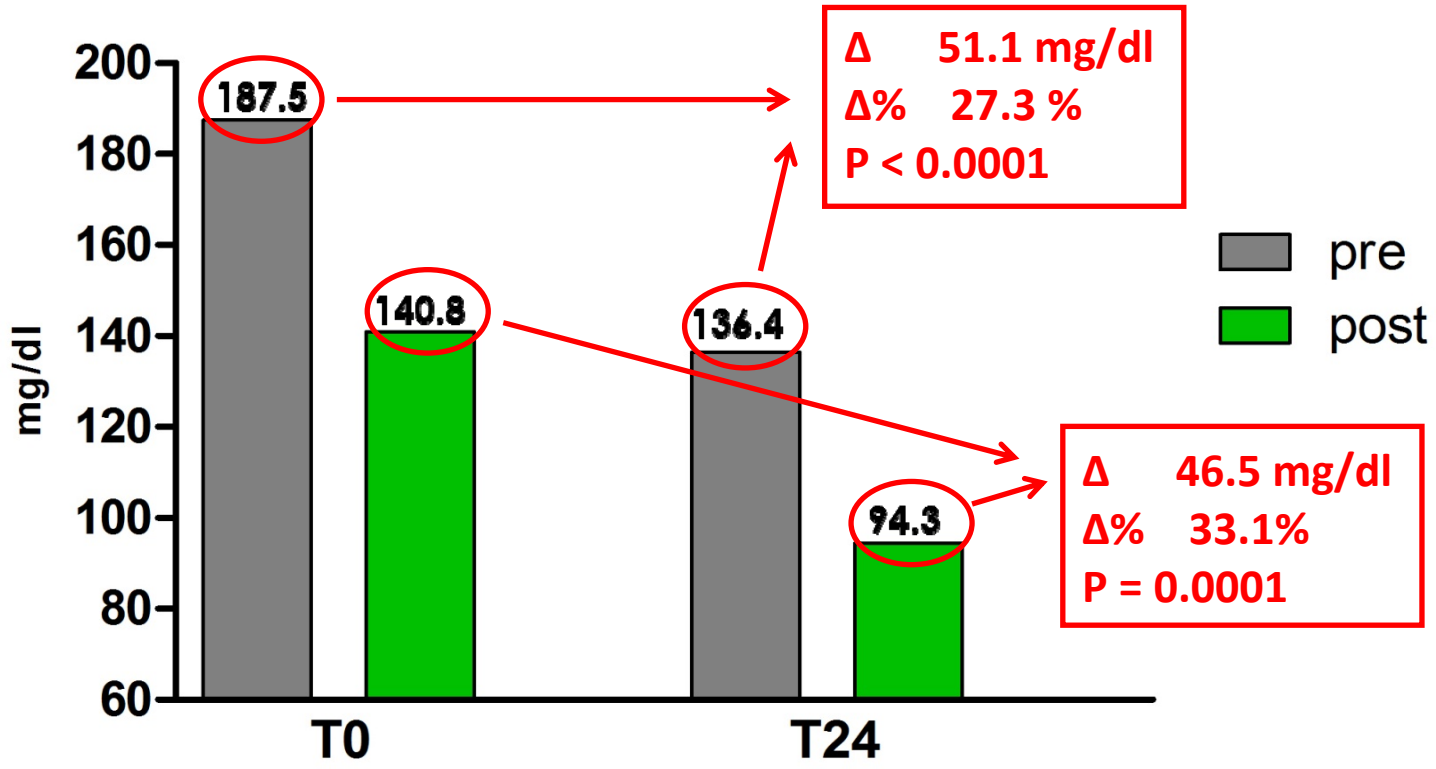
Weiler AA, *Nasca* 2013

Top causes of mortality in 2010.



Weiler AA, *Nasca* 2013

Valori medi glicemici pre e post esercizio, a T0 e T24



Raccomandazione / Evidenza

Stop Fumo	I	B
PA < 140/90	I	B
LDL < 100	I	A
HbA1C < 7%	I	B
Attività fisica	**I**	**B**

AHA/ACC Guidelines for Secondary Prevention
for Patients with Coronary and Other Atherosclerotic Vascular Disease: 2006 Update.
Circulation 2006;113:2363-2372 / *J Am Coll Cardiol* 2006;47:2130-2139

Secondary prevention through cardiac rehabilitation: physical activity counselling and exercise training

Physical Activity Counselling	Recommendation/Evidence Class
Post-SCA/PCI	I/B
Post-Stable IHD/PCI	I/B
Chronic Heart Failure	I/B
...	

European Heart Journal (2010) **31**, 1967–1976
doi:10.1093/eurheartj/ehq236

AHA-ACC recommendations

- **Assess** risk **with** a physical activity history and/or **an exercise test**, **to guide prescription …**

- Recommendation/Evidence: **I/B**

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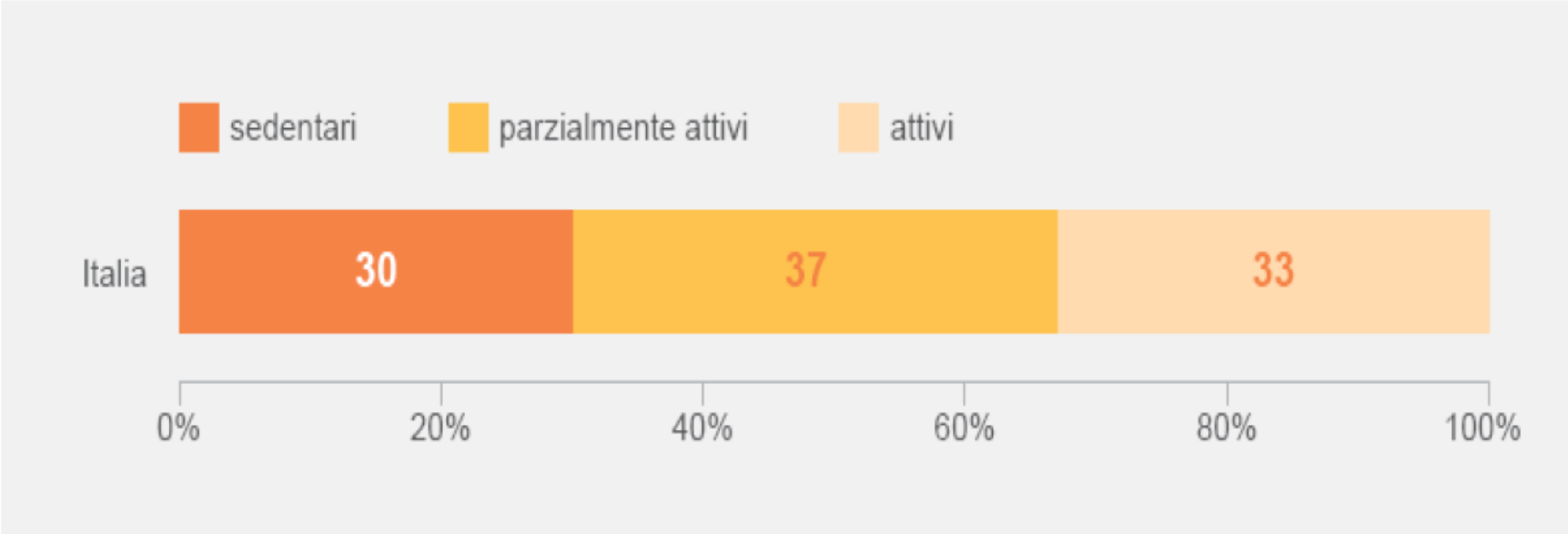
Livello di attività fisica in Italia
PASSI 2008-2011