Nutrizione e attività motoria nel bambino per la prevenzione dell'ipertensione arteriosa

Simonetta Genovesi
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- **Prevenzione primordiale: adottare stili di vita che rallentino l'insorgenza di fattori di rischio.**

- **Prevenzione primaria: individuare e trattare i fattori di rischio prima che si manifesti una patologia.**

- **Prevenzione secondaria: trattare aggressivamente i fattori di rischio di chi è già andato incontro a una patologia.**

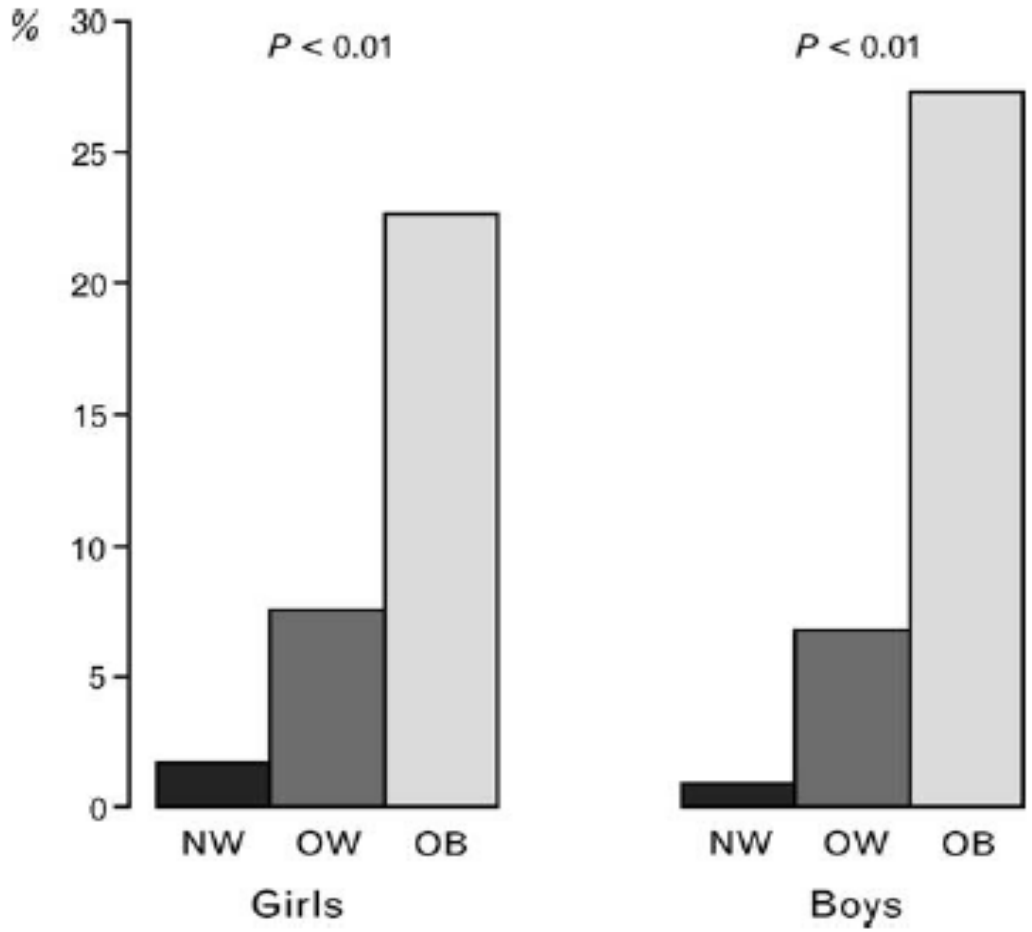
- **Prevenzione terziaria: coincide con il trattamento della malattia.**

Ipertensione arteriosa

A.Chiolero, P.Bovet, G.Paradis and F.Paccaud Has Blood Pressure Increased in Children in Response to the Obesity Epidemic ? Pediatrics 2007;119;544-553

studio	Età	Anno	N	PAS	PAD	PAS e/o PAD
Adrouguè et al. (Minneapolis)	10-15	1986-87	19.542	1° set 2.7% 2° set 0.8%	1° set 2.0% 2° set 0.4%	NA NA
Jafar et al. (Pakistan)	5-14	1990-94	5.641	M 8.7% F 6.2%	M 9.6% F 3.2%	M 13.8% F 8.7%
Paradis et al. (Canada)	9 13 16	1999	3.589	7% 13% 17%	0% 0% 0%	7% 13% 17%
Sorof et al. (Houston)	12-16	2000-01	2.460	1° set 16% 2° set 11%	1° set 2% 2° set 1%	1° set 16.8% 2° set 11.5%
Sorof et al. (Houston)	13±1.7	2002	5.102	NA	NA	1° set 19.4% 2° set 9.5% 3° set 4.5%
Genovesi et al. (Milano)	6-11	2003-04	2.416	NA	NA	1° set 8.8% 2° set 4.2%
Falkner et al. (Delaware)	2-19	2002	18.618	6%	2%	7.2%
Chiolero et al. (Seychelles)	5-16	2002-04	15.612	M 6.1% F 6.0%	M 5.1% F 6.9%	M 9.1% F 10.1%

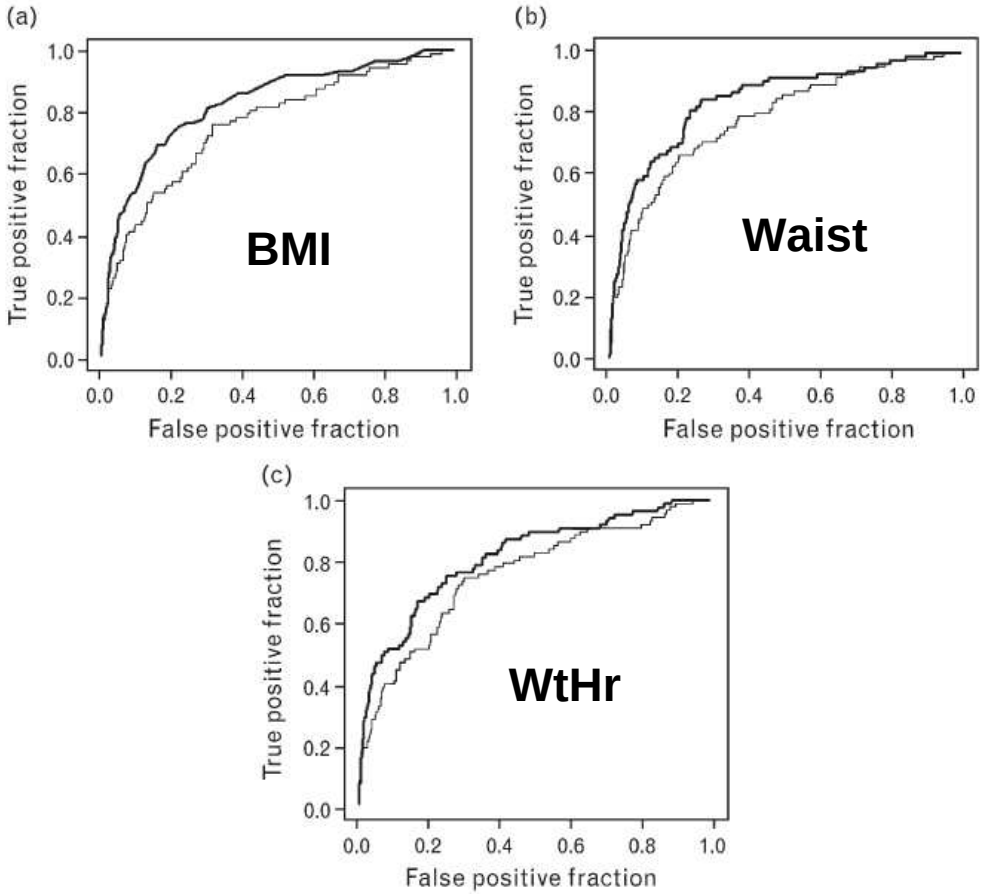
Blood pressure and weight class



N 4177
5-11 aa.
F 48% M 52%

Genovesi, J Hypertension 2008

BMI, Waist and Waist to Height ratio and hypertension



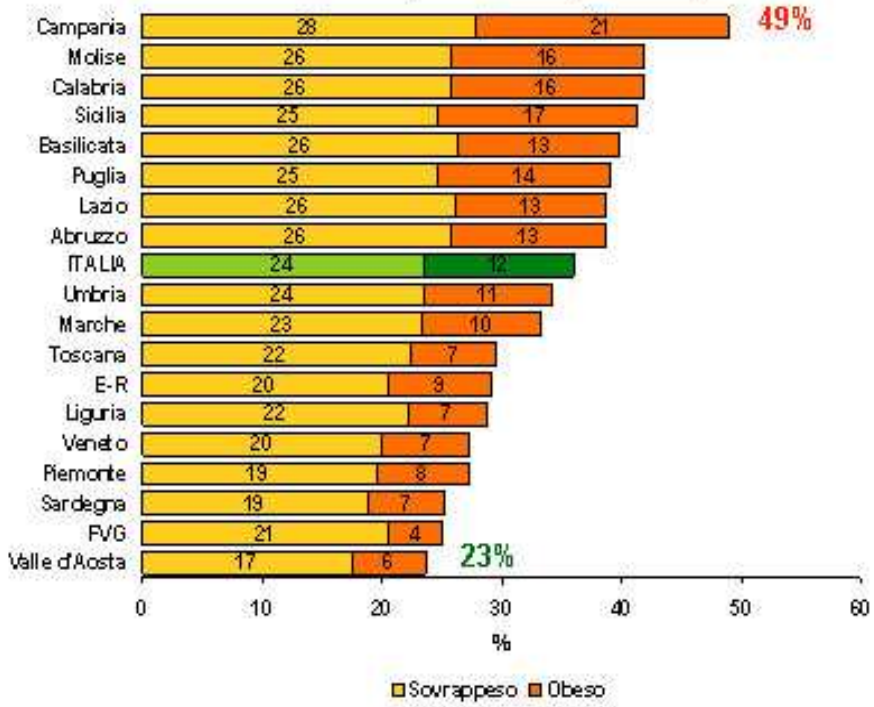
Receiver operating characteristic curve of BMI *z*-score (panel a), waist circumference *z*-score (panel b) and waist-to-height ratio *z*-score (panel c) as single markers in the identification of hypertension in girls (thin line) and boys (thick line).

Genovesi, J of Hypertension 2008

Sovrappeso e obesità per regione, bambini di 8-9 anni della 3ª primaria. Italia, 2008

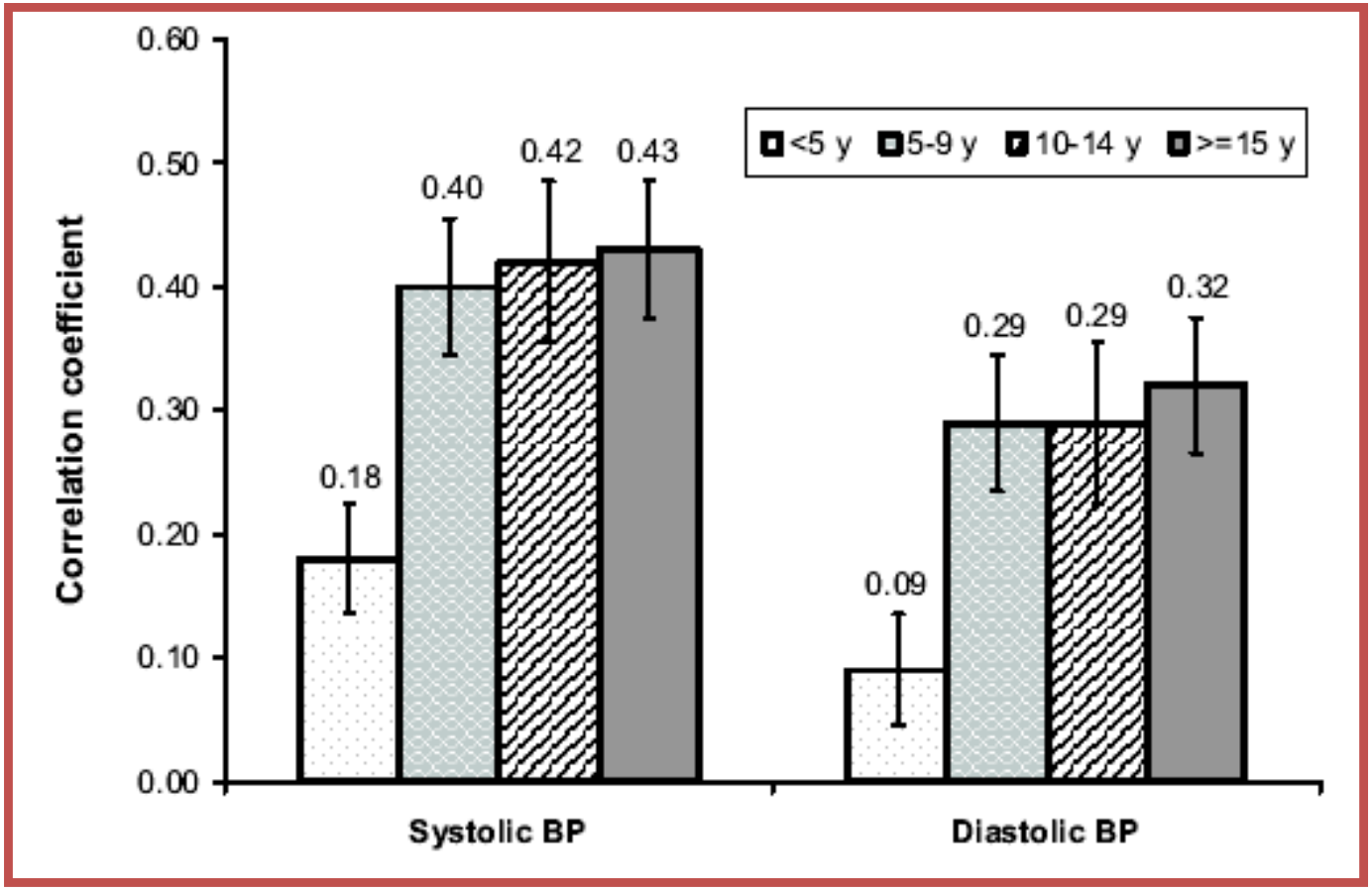
* Dati stimati

Sovrappeso e obesità per regione, bambini di 8-9 anni della 3ª primaria, Italia, 2008



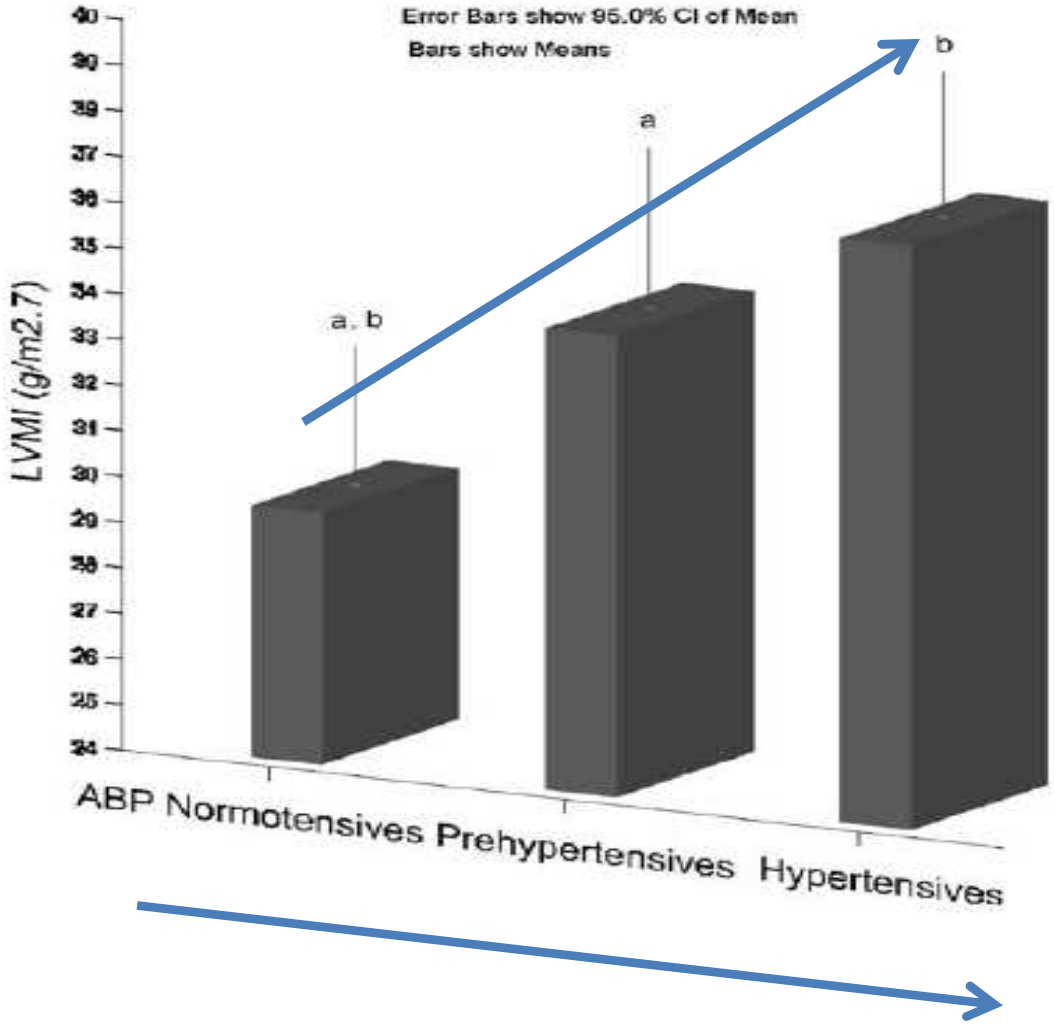
Indagine Okkio alla salute 2008

Tracking of BP from childood to adulthood : base-line age



Chen, Circulation,2008

Left ventricular mass index and blood pressure

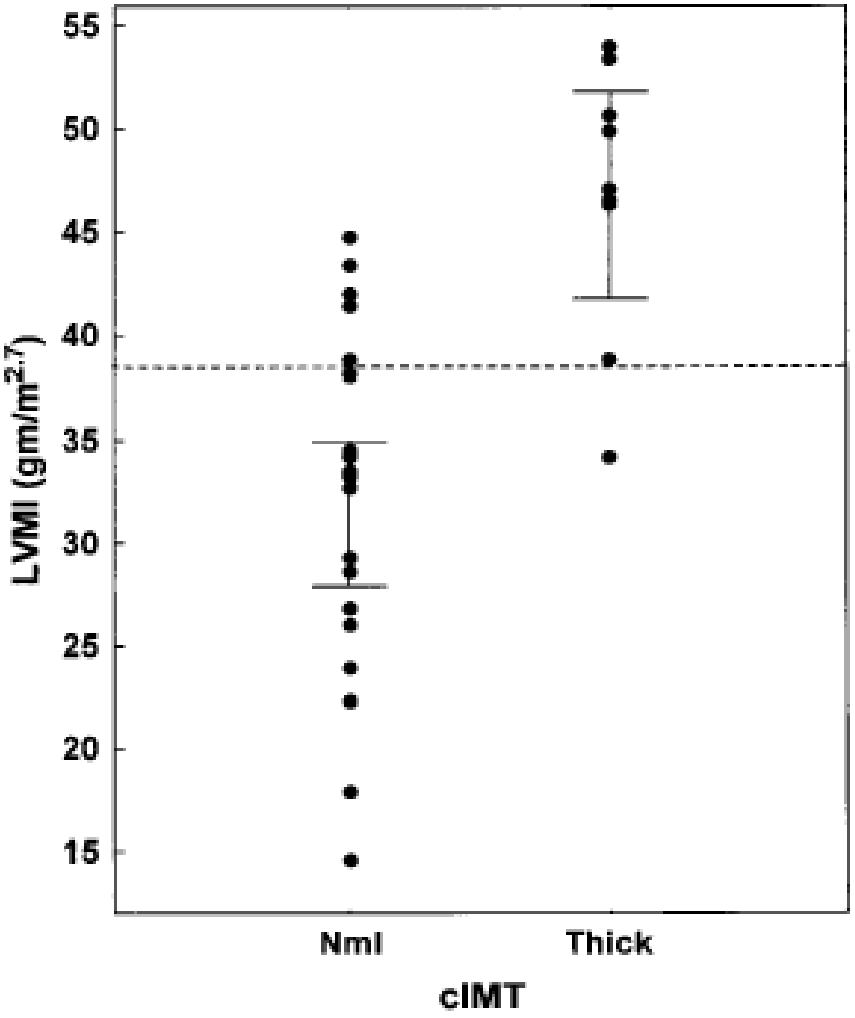


Stabouli, Pediatr Nephrol 2009

Left ventricular mass index, intima-media thickness and blood pressure

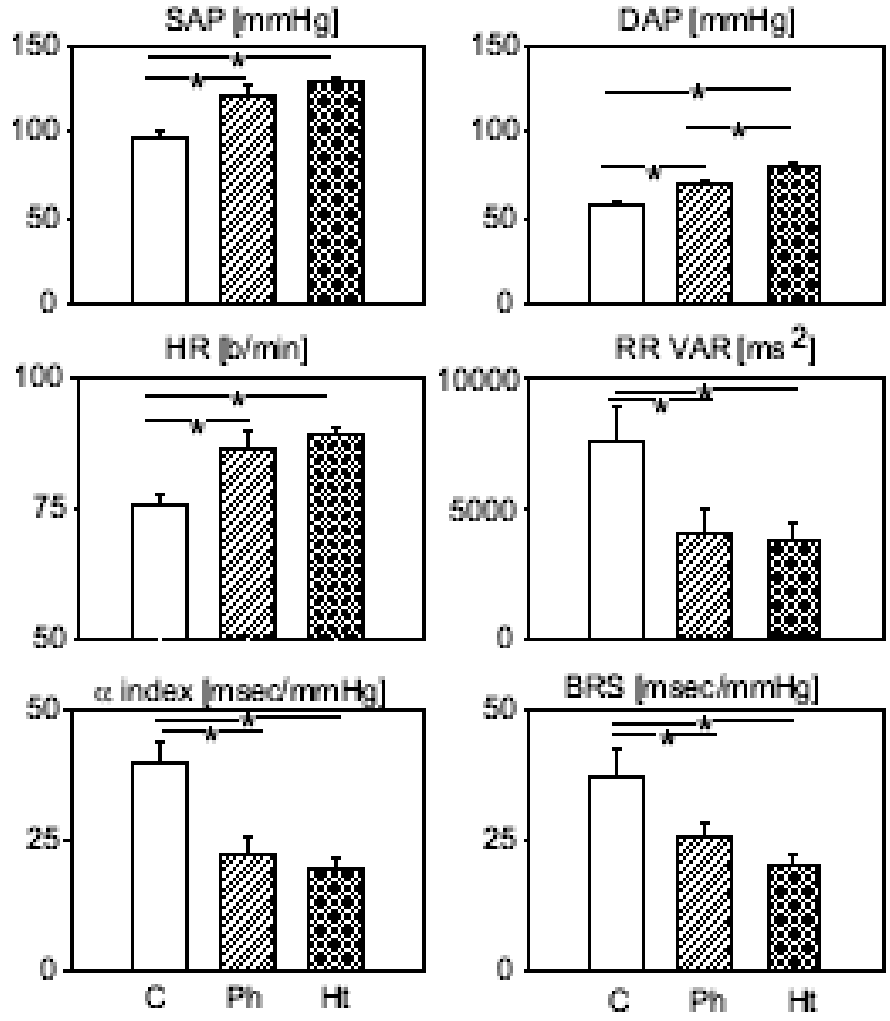
LVH : 41%

cIMT : 28%



Sorof, Pediatrics 2003

Blood pressure and autonomic nervous system



Genovesi, Hypertension, 2008

Modificazioni degli stili di vita

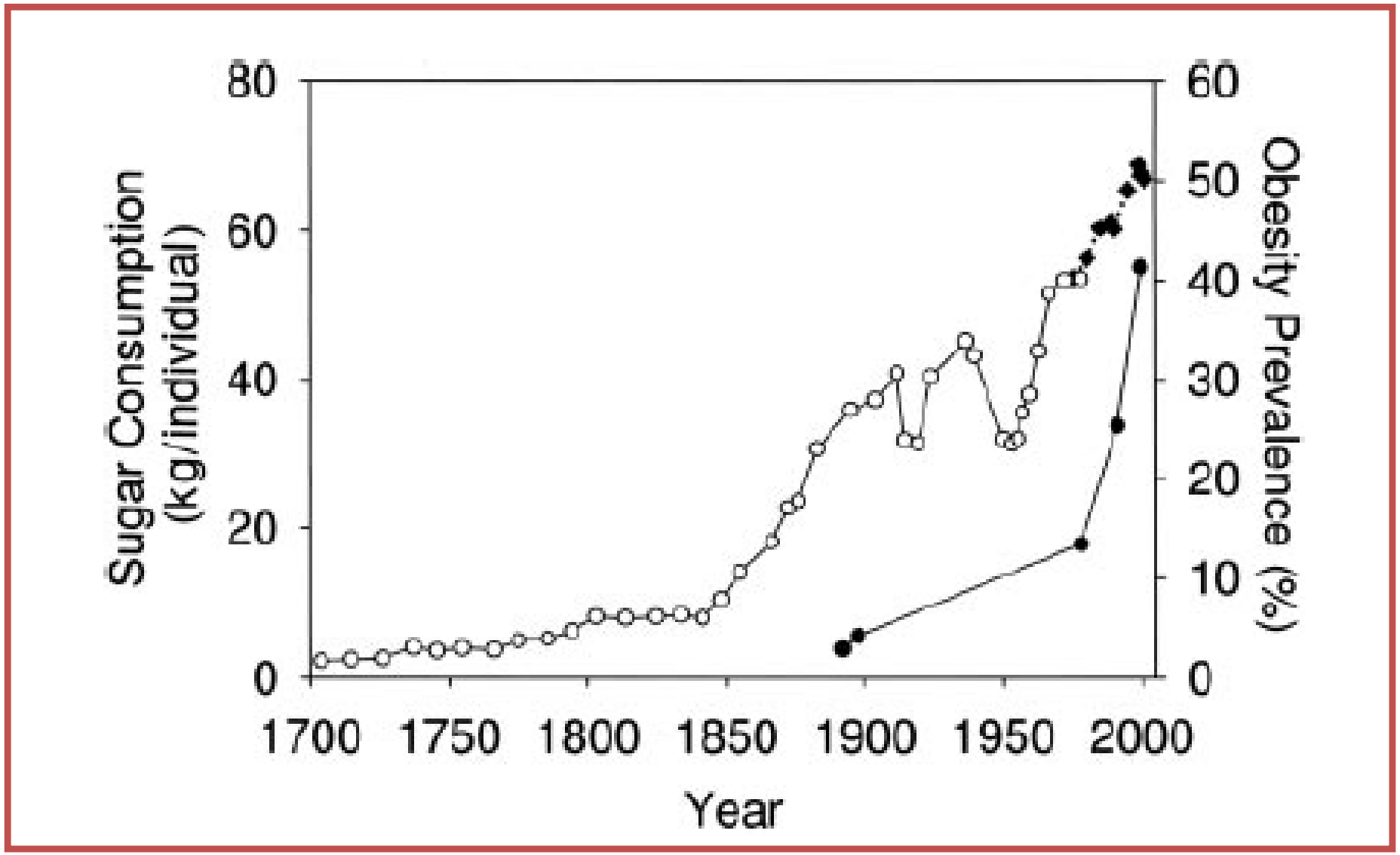
- **Diminuzione dell'eccesso ponderale se presente**
- **Diminuzione dell'apporto di sodio con la dieta**
- **Aumento dell'attività fisica**

Diminuzione della quantità di zuccheri e di sale che i nostri bambini assumono con la dieta

Zucchero e Sale

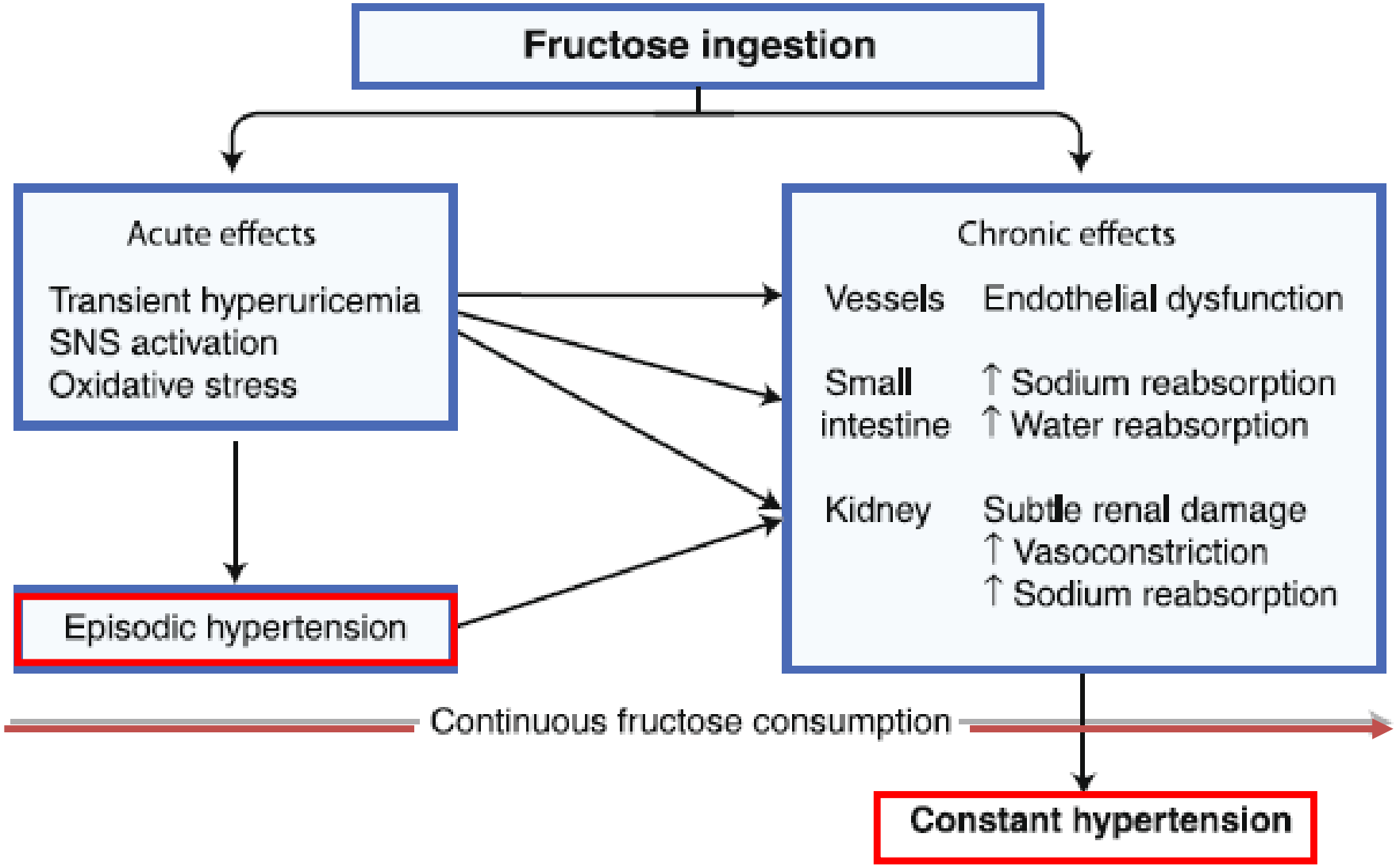
Recettore	Stimolo	Gradimento	Funzione finalistica
Dolce (più recettori ?)	Zuccheri semplici, carboidrati, dolcificanti	Innato	Ricerca sostanze energetiche
Amaro (più recettori ?)	Sostanze differenti	Non innato	Evitamento sostanze tossiche
Salato	NaCl	Innato	Ricerca sale
Acido	H^+	Non innato	Evitamento sostanze in decomposizione
Umami (più recettori ?)	Glutammato GMP, IMP	Innato	Ricerca sostanze proteiche
?	Lipidi	Innato	

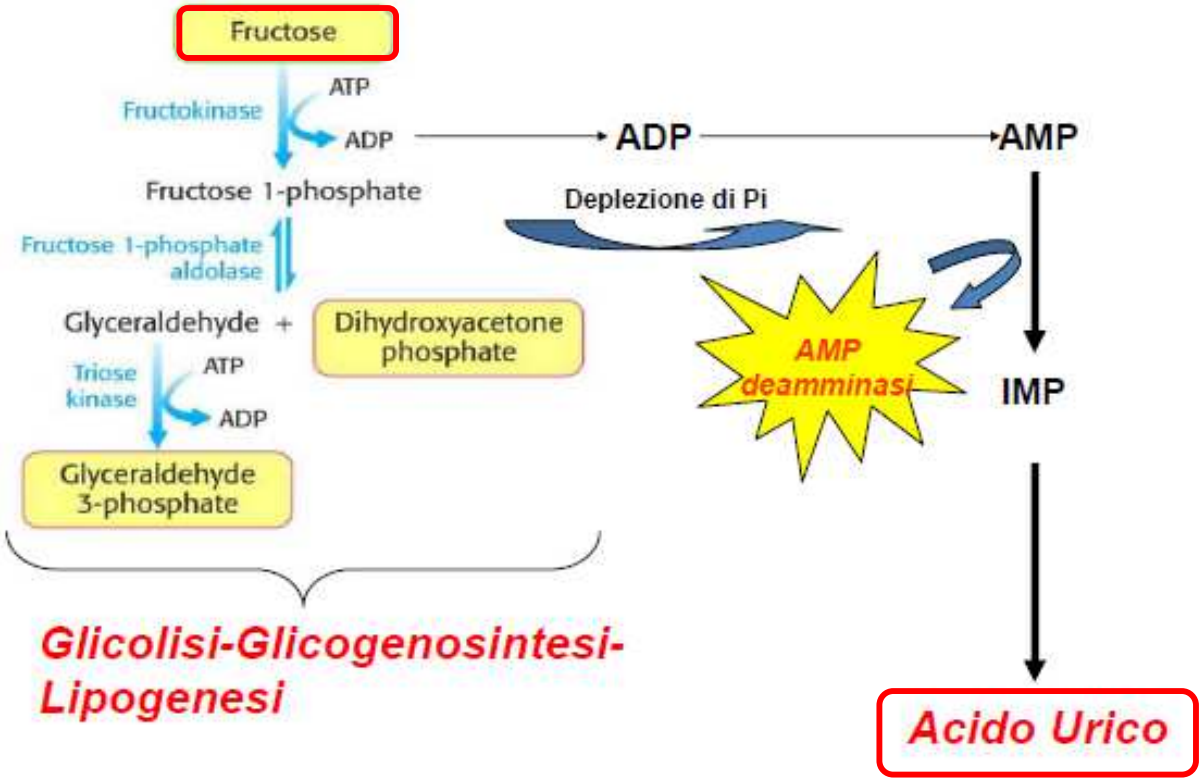
Zucchero


Sugar Consumption (kg/individual)
Obesity Prevalence (%)
Year
0
20
40
60
80
0
10
20
30
40
50
60
1700
1750
1800
1850
1900
1950
2000

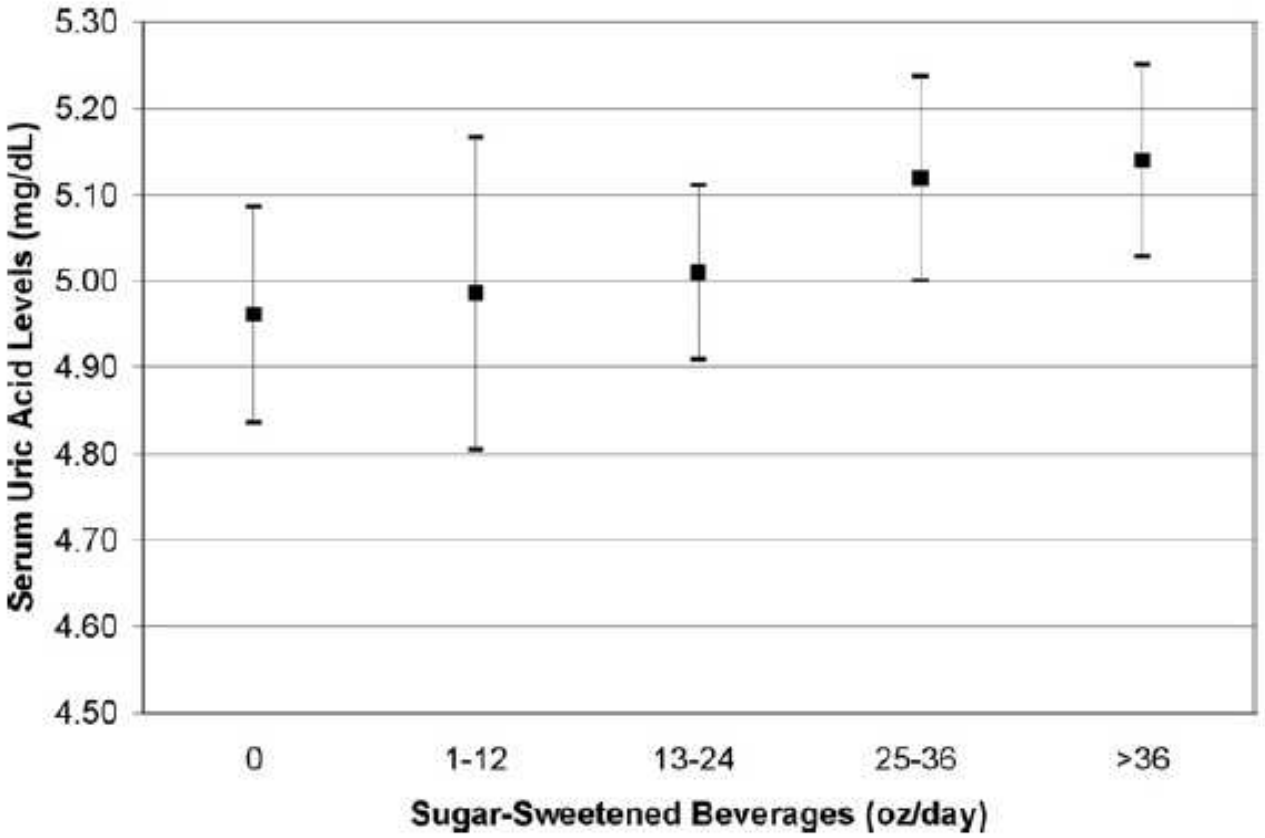
Glucosio : necessita dell’insulina per entrare nelle cellule

Fruttosio : entra liberamente nelle cellule quando presente nel sangue


Fructose ingestion
Acute effects
Transient hyperuricemia
SNS activation
Oxidative stress
Episodic hypertension
Chronic effects
Vessels
Endothelial dysfunction
Small intestine
↑ Sodium reabsorption
↑ Water reabsorption
Kidney
Subtle renal damage
↑ Vasoconstriction
↑ Sodium reabsorption
Continuous fructose consumption
Constant hypertension

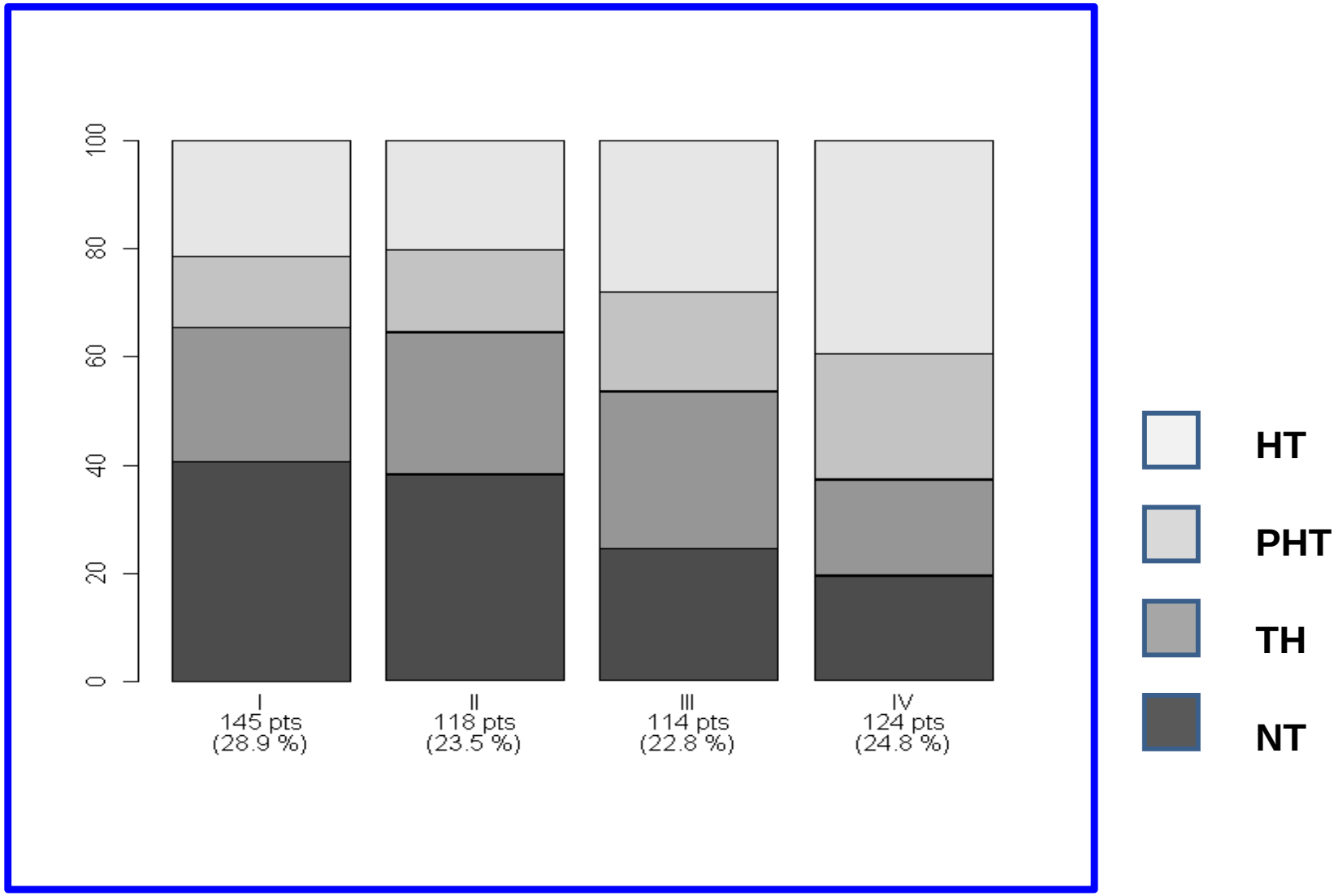

Fructose
ATP
Fructokinase
ADP
ADP
AMP
Fructose 1-phosphate
Deplezione di Pi
Fructose 1-phosphate aldolase
Glyceraldehyde +
Dihydroxyacetone phosphate
AMP deamminasi
IMP
Triose kinase
ATP
ADP
Glyceraldehyde 3-phosphate
Glicolisi-Glicogenosintesi-Lipogenesi
Acido Urico

Uric acid and sugar–sweetend beverages



n=4867, age 12-18 yr

Nguyen, J Pediatr 2009



Genovesi Pediatrics 2013

Sale

Sodio nella dieta

- **Non discrezionale**

  10% presente naturalmente negli alimenti

- **Discrezionale**

  54% aggiunto nella produzione degli alimenti

  36% aggiunto durante o dopo la preparazione casalinga

Consumo sale/procapite/giorno in Italia

10-12 g

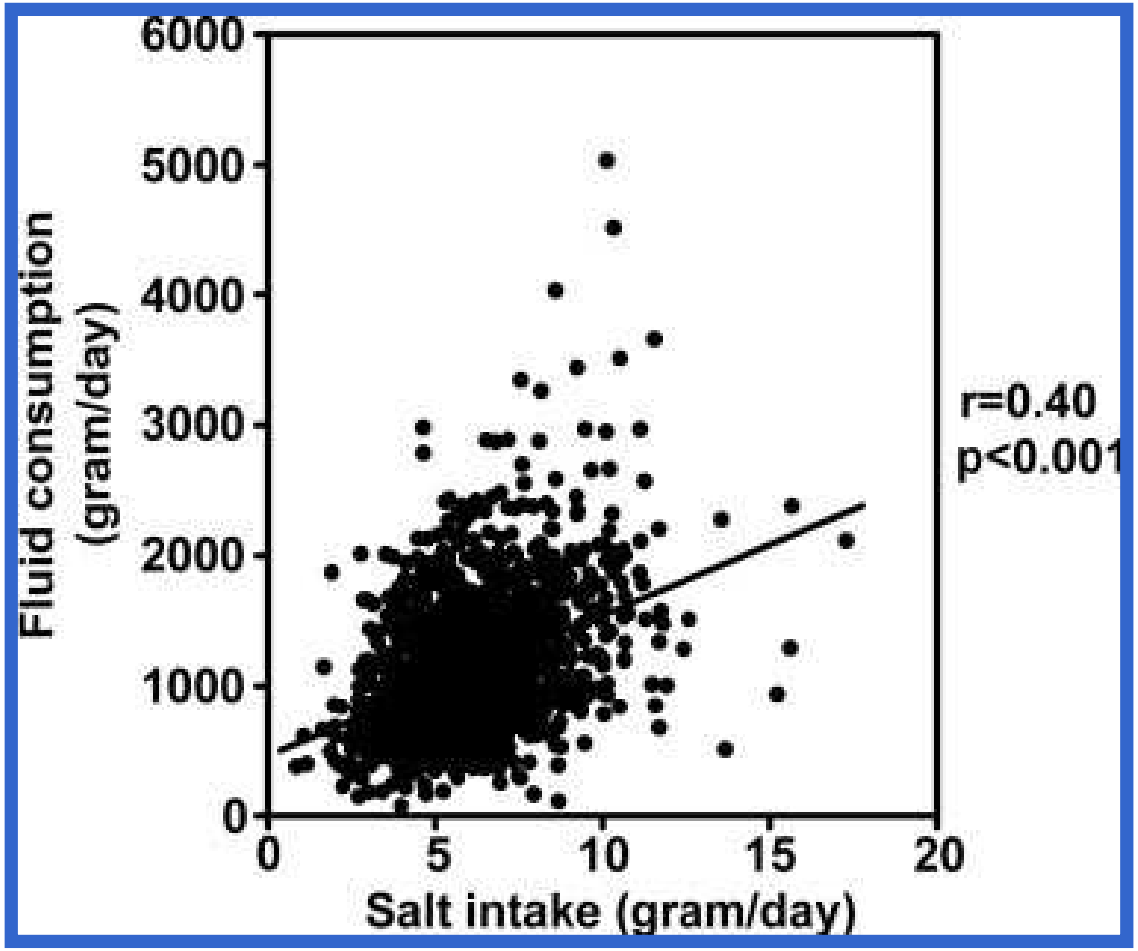
Fonte: Ministero della Salute

Quantità consigliata OMS

5 g

Table 2: Reference nutrient intakes (RNI) for sodium & target average salt intakes for infants & children

Age	RNI		Target average salt intake (g/d)
	sodium mmol/d (mg/d)	salt (g/d)	
0-6 months*	10.5 (242)	0.60	< 1
7-12 months*	14.5 (334)	0.84	1
1-3 years	22 (500)	1.28	2
4-6 years	30 (700)	1.80	3
7-10 years	50 (1200)	3.06	5
11-14 years	70 (1600)	4.08	6

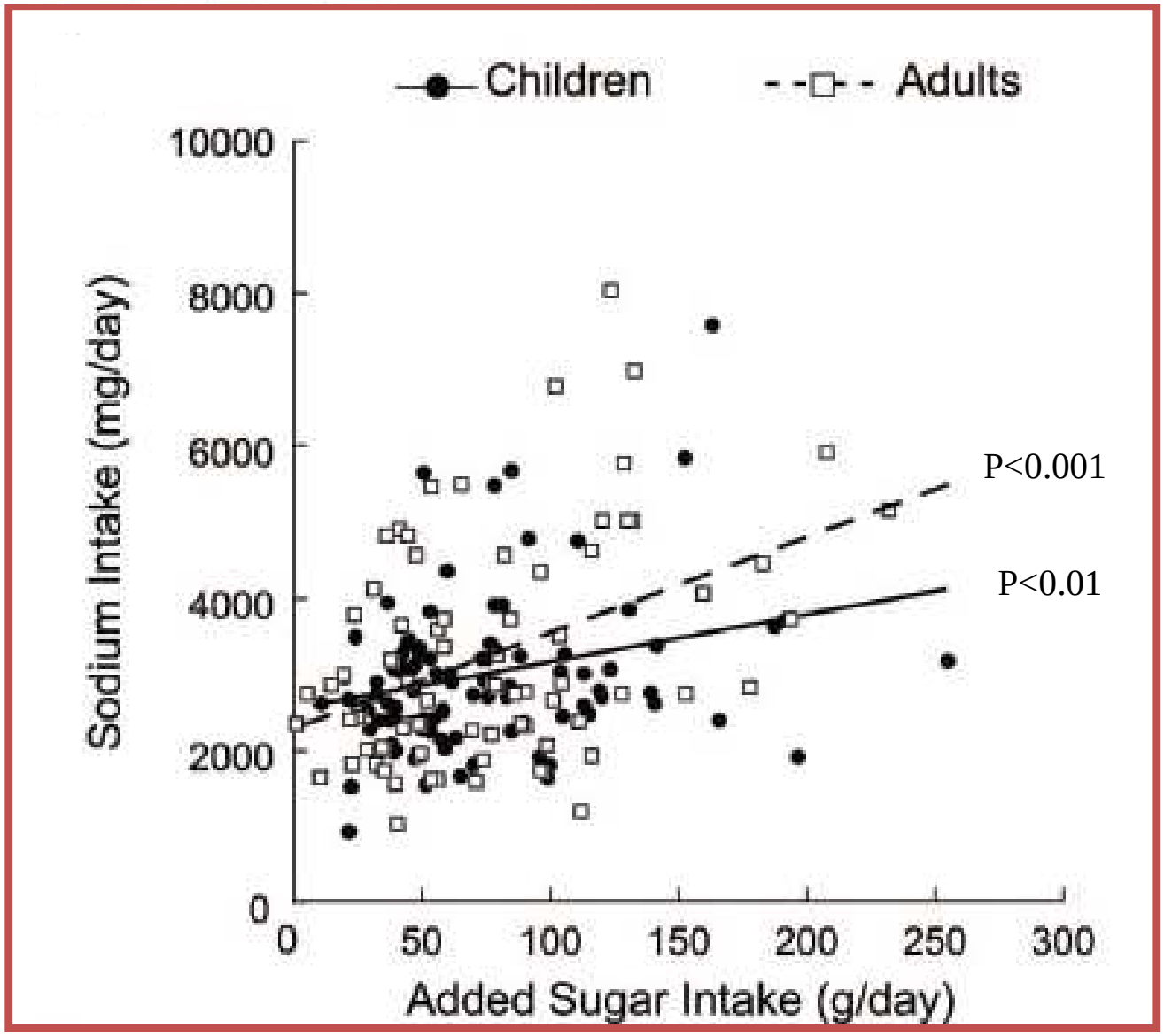


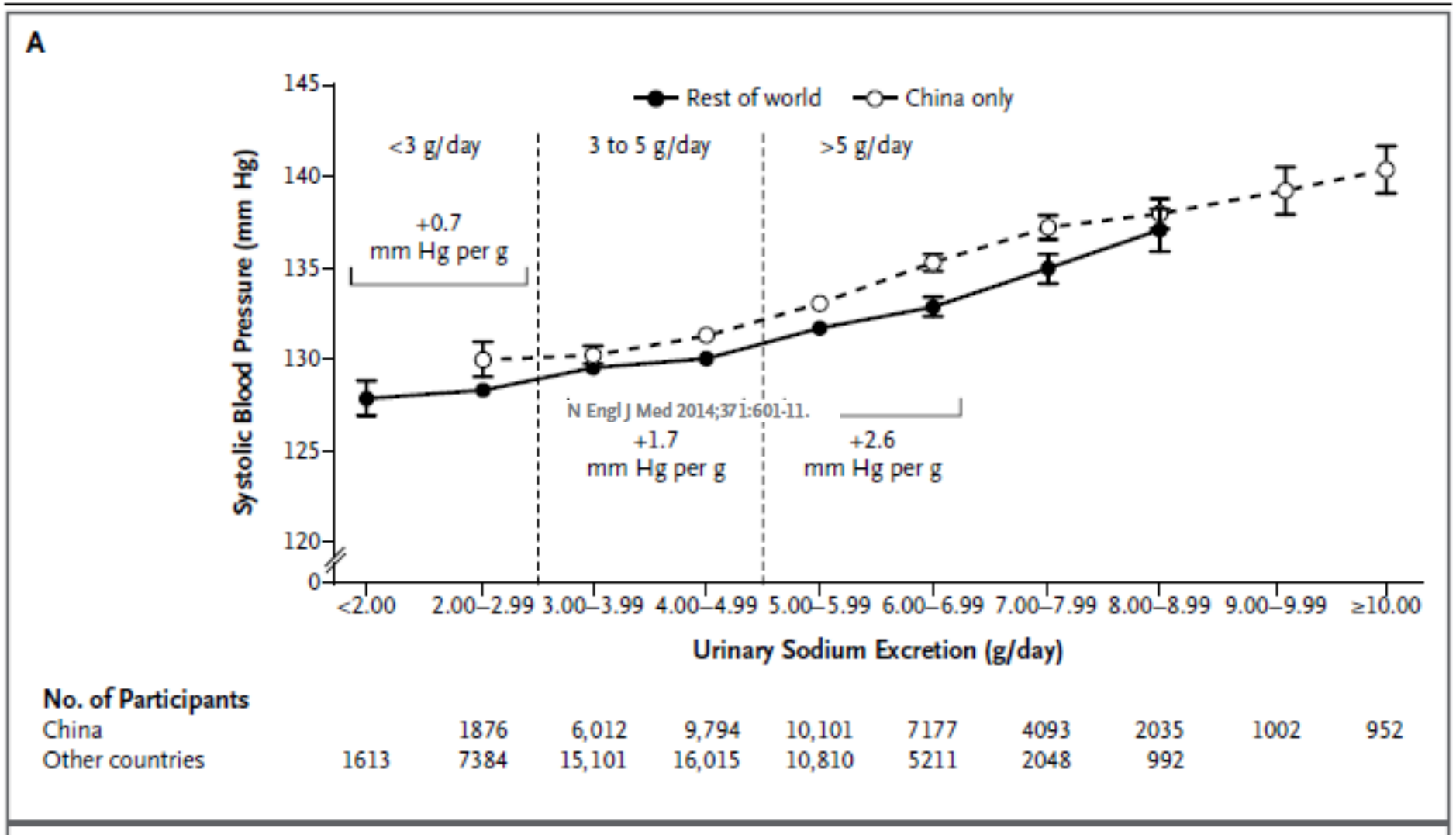
He et al. Hypertension 2008

Preferences for Salty and Sweet Tastes Are Elevated and Related to Each Other during Childhood

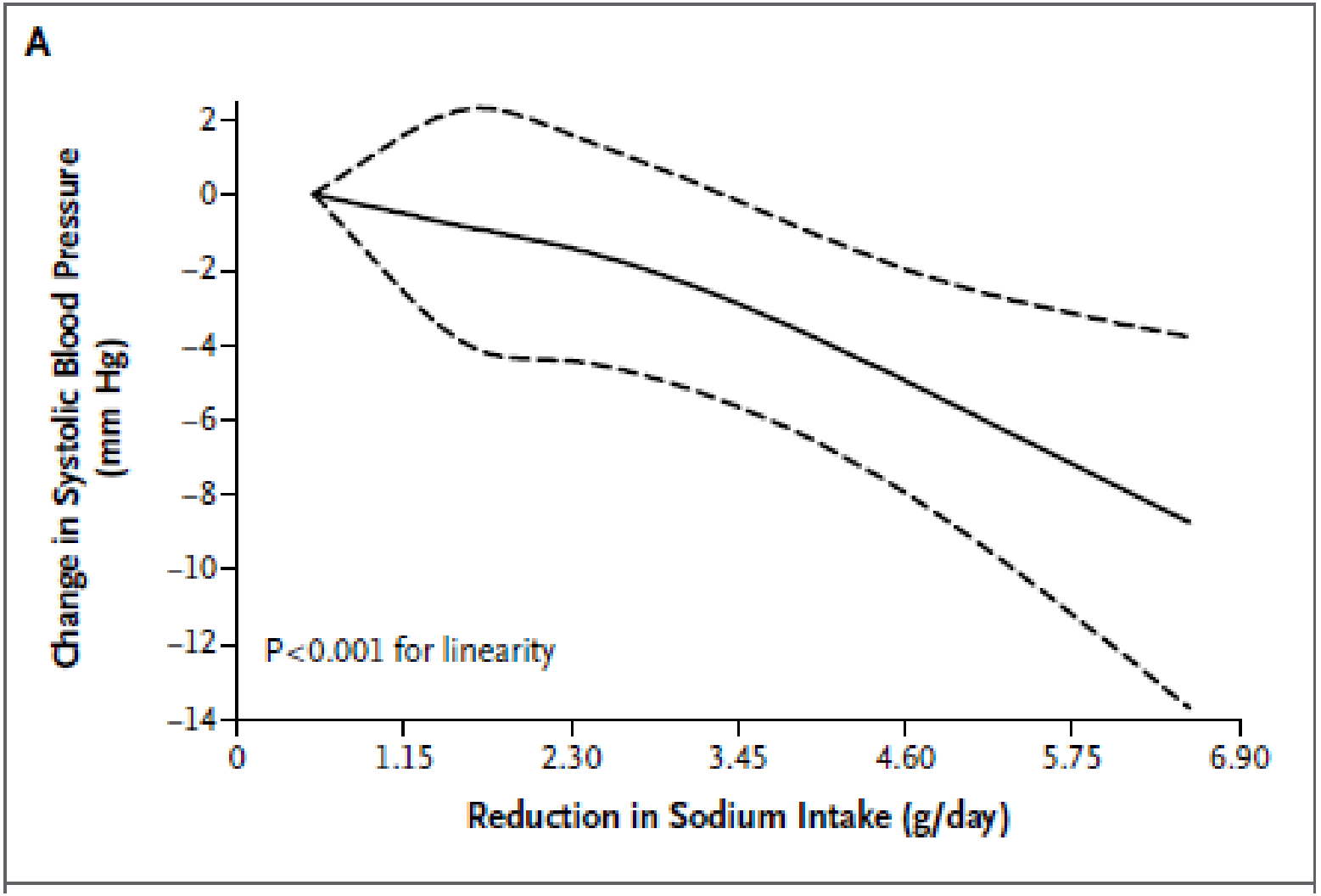
Julie A. Mennella*, Susana Finkbeiner, Sarah V. Lipchock, Liang-Dar Hwang, Danielle R. Reed

Monell Chemical Senses Center, Philadelphia, Pennsylvania, United States of America





N Engl J Med 2014;371:601-11.



N Engl J Med 2014;371:624-34.

Am J Clin Nutr. 2014; 99(suppl):704s-11s

Ontogeny of taste preference: basic biology and implications for health

Julie A Mennella

… children naturally prefer higher levels of sweet and salty taste and reject lower level of bitter taste …

…their basic biology does not predispose them to favor the recommended low-sugar, low-sodium, vegetable-rich diets…

The good news is that sensory experiences beginnins early in life can chape preferences

Am J Clin Nutr. 2012 Jan;95(1):123-9

The development of salty taste acceptance is related to dietary experience in human infants: a prospective study.

Stein LJ, Cowart BJ, Beauchamp GK.

The findings suggest an influential role of early dietary experience in shaping salty taste responses of infants and young children.

Attività fisica

Giussani *et al.*

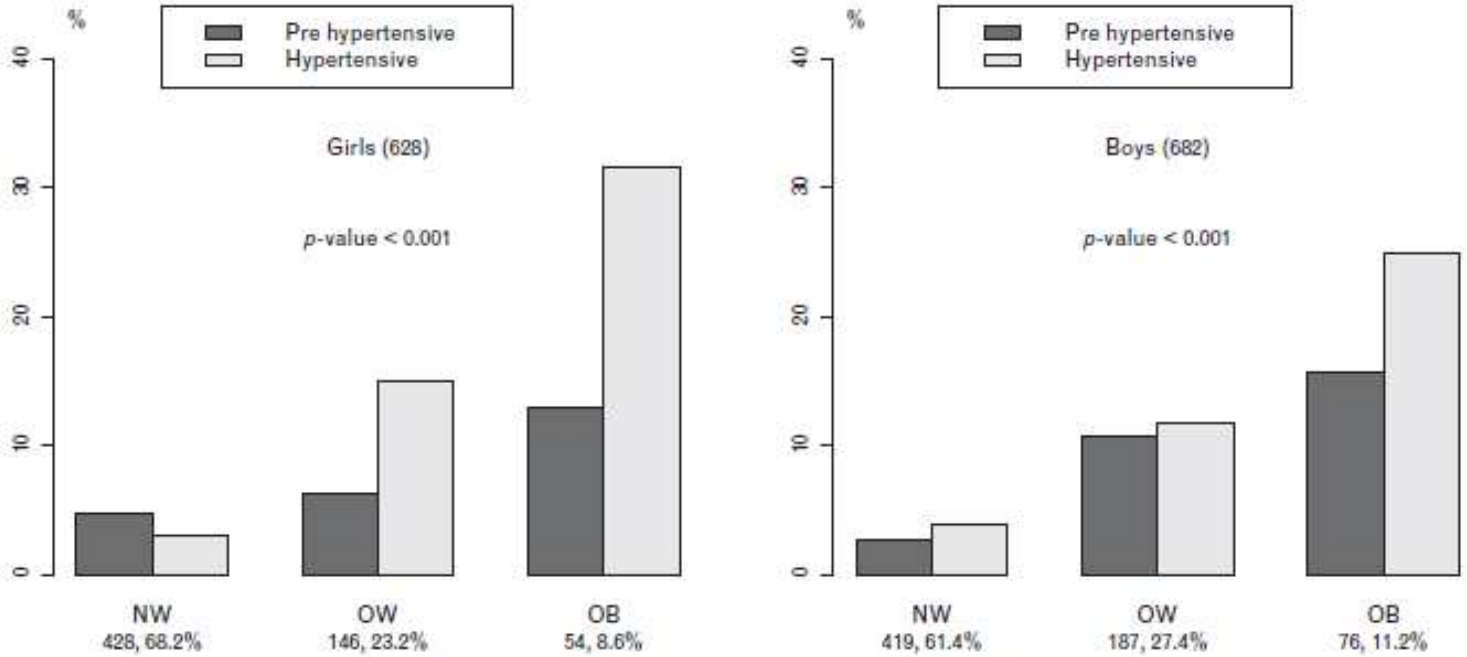
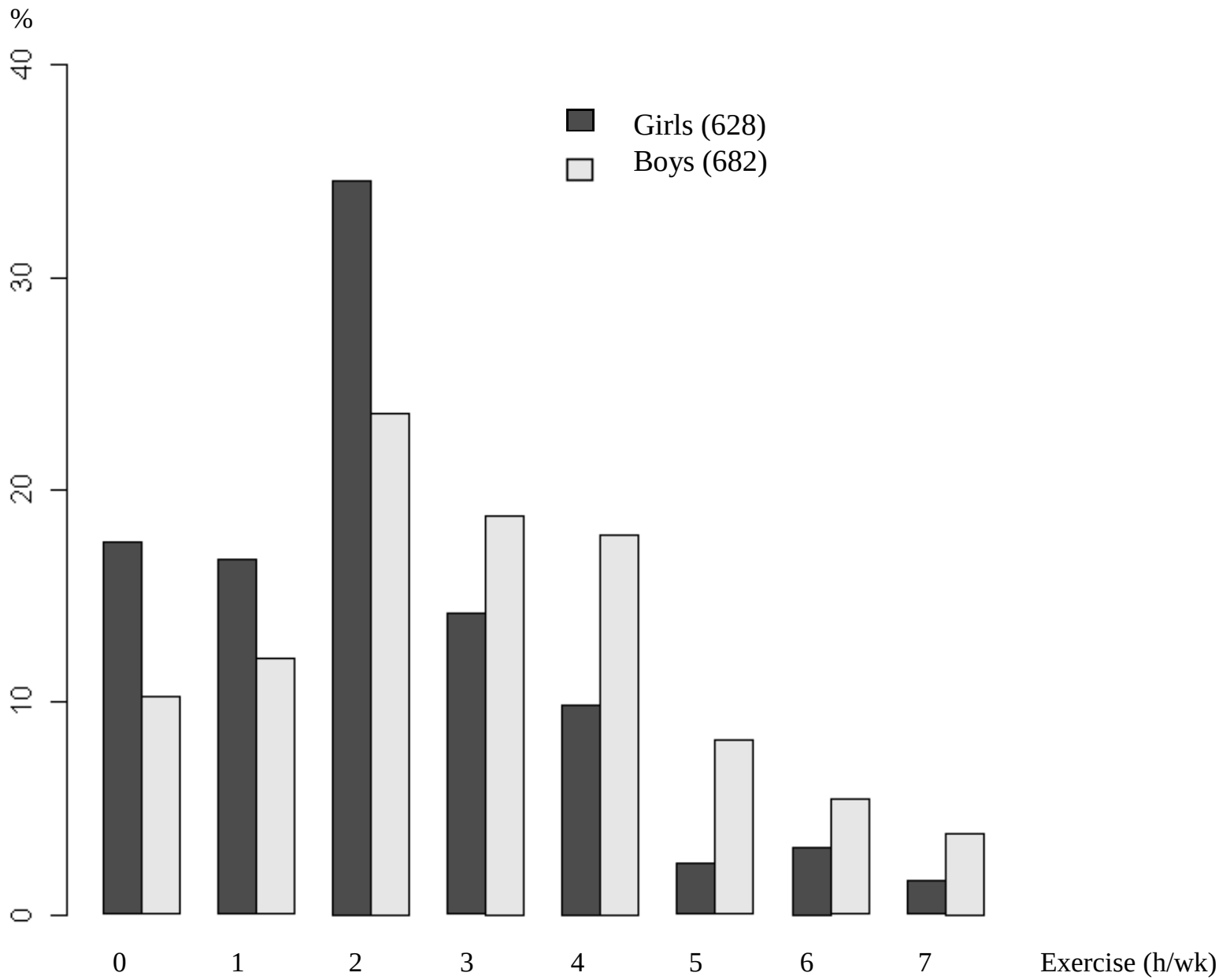


FIGURE 2 Distribution of hypertension category by weight class (NW = normal weight; OB = obese; OW = overweight).

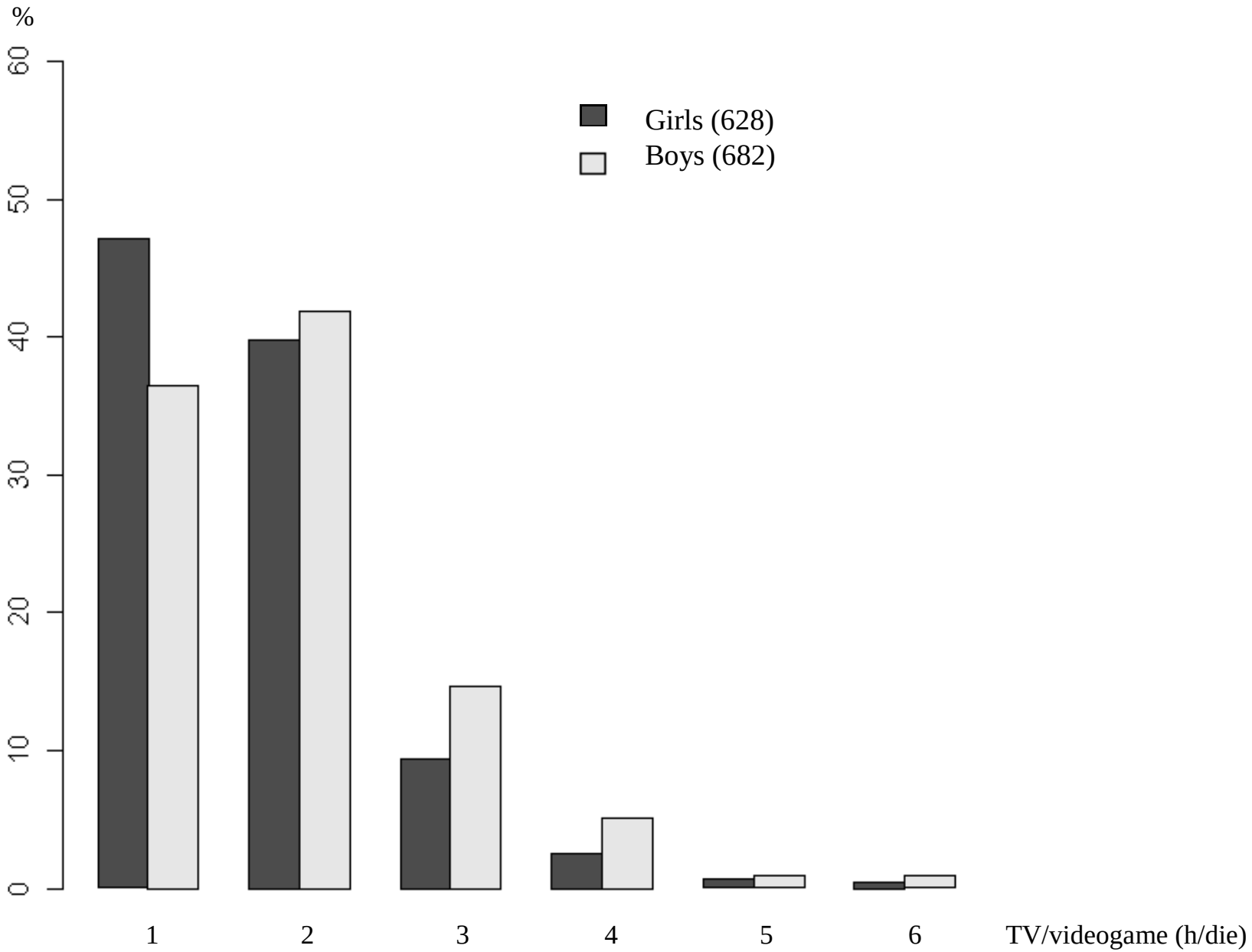
Giussani J of Hypertension 2013

Figure 1 b



Giussani J of Hypertension 2013

Figure 1 c



Giussani J of Hypertension 2013

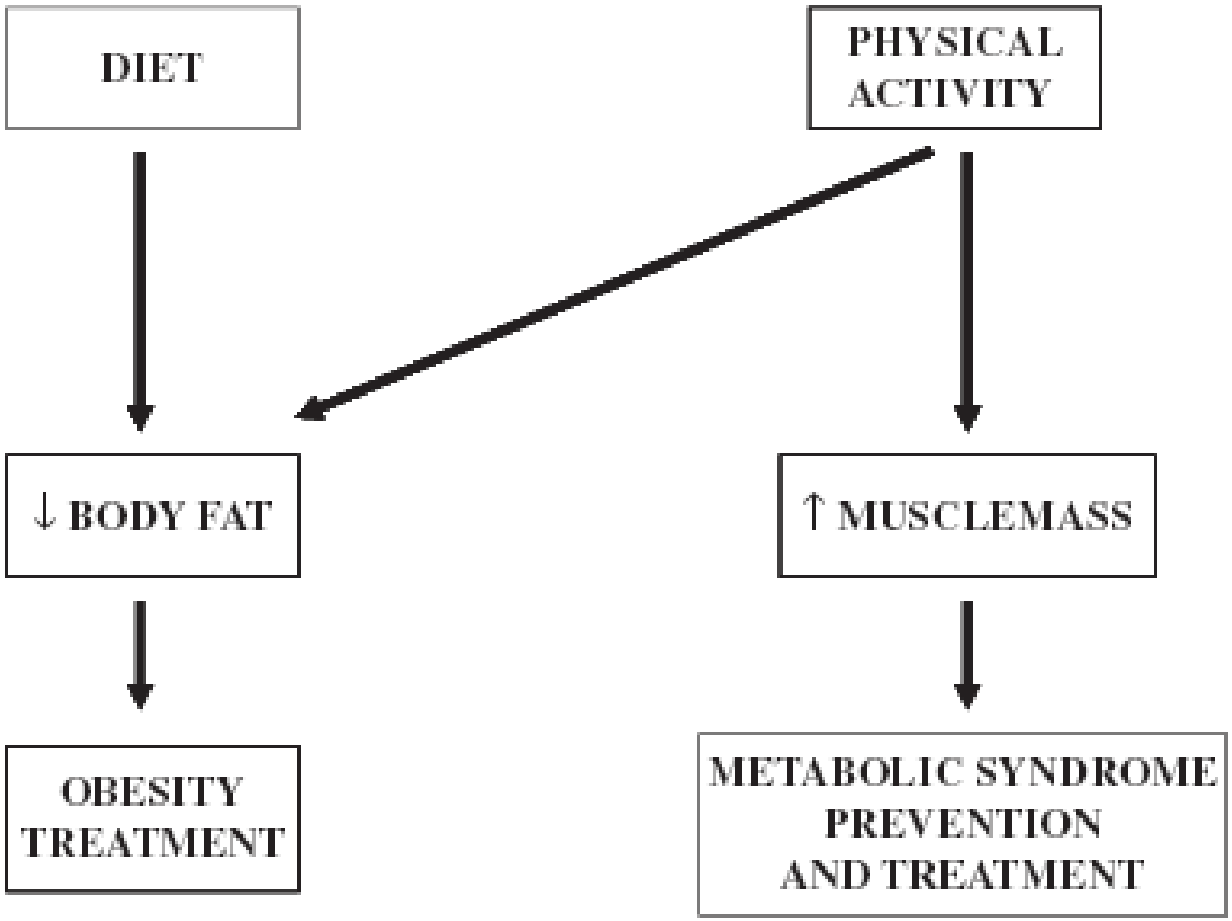
	Variable	*b*	(95% CI)	*P* value	OR	(95% CI)	*P* value
Model 1	Age, years	0.048	(0.015–0.081)	0.0043	1.172	(1.062–1.293)	0.0016
	BMI, z-score	0.310	(0.253–0.368)	<0.0001	2.633	(2.116–3.276)	<0.0001
	SGA	0.245	(0.068–0.422)	0.0067	1.443	(0.877–2.374)	0.1489
	EAR	0.034	(−0.133–0.201)	0.6874	1.073	(0.706–1.631)	0.7418
	Exercise <2 h/week	0.140	(0.014–0.265)	0.0298	1.580	(1.117–2.236)	0.0097
	TV/videogame >2 h/day	0.193	(0.042–0.344)	0.0125	1.046	(0.698–1.566)	0.8290
	Family score	0.063	(0.018–0.107)	0.0061	1.064	(0.937–1.208)	0.3391
	Parental smoking	−0.043	(−0.164–0.079)	0.4908	1.025	(0.726–1.447)	0.8879

Giussani J of Hypertension 2013

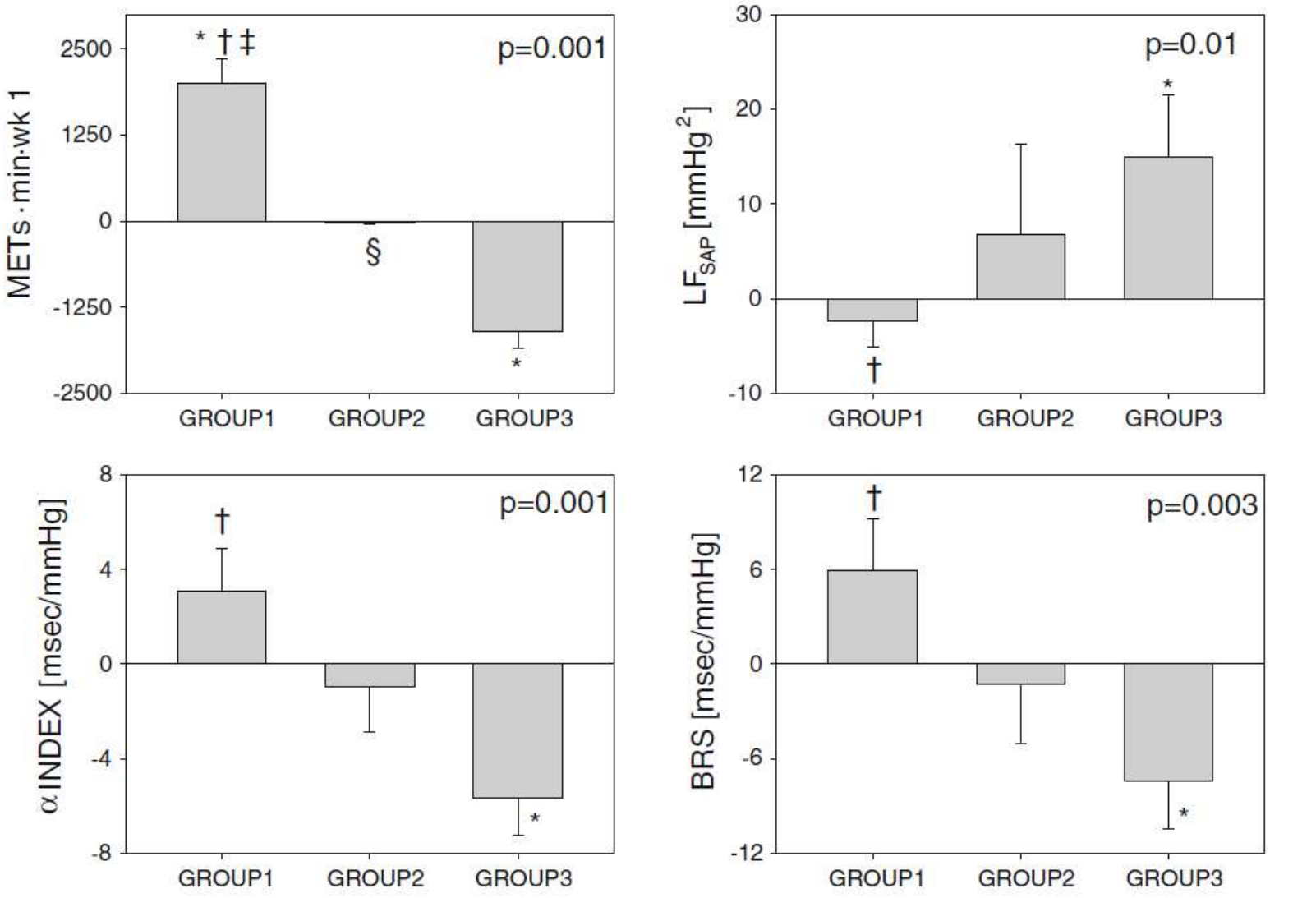
Parameters	Obese Exercise (n = 22)	Obese Control (n = 22)	Treatment Effect*	p Value
Body weight, kg	1.0 (2.4)†	1.6 (1.5)‡	−0.9	0.3
BMI, kg × m^{-2}	−0.1 (1.0)	0.3 (0.7)†	−0.4	0.06
BMI z-score	−0.1 (0.1)‡	0.0 (0.1)	−0.1	0.04
Whole body fat, %	−1.5 (1.7)‡	0.8 (1.6)†	−2.4	<0.0001
Abdominal fat, %	−2.1 (2.5)‡	0.7 (2.4)‡	−2.9	0.0007
Fat-free mass, kg	1.2 (1.3)‡	−0.1 (2.8)	1.4	0.03
Physical activity, cpm	1.1 (86.3)	−41.1 (71.2)†	48.1	0.05§
Total energy intake, kcal	−347.8 (224.6)‡	−4.0 (551.9)	−343.8	0.1
Total cholesterol, mmol × l^{-1}	−0.22 (0.53)†	−0.14 (0.46)	−0.08	0.6
LDL-cholesterol, mmol × l^{-1}	−0.18 (0.44)†	−0.17 (0.55)	0.01	0.9
HDL-cholesterol, mmol × l^{-1}	−0.06 (0.11)‡	−0.03 (0.13)	−0.05	0.3
Triglycerides, mmol × l^{-1}	0.04 (0.31)	0.12 (0.43)	−0.04	0.6
Glucose, mmol × l^{-1}	0.15 (0.33)†	−0.01 (0.26)	0.15	0.09
Insulin, mU × l^{-1}	3.81 (4.28)‡	3.0 (5.1)‡	0.85	0.6
HOMA-IR	0.99 (1.04)‡	0.62 (1.20)†	0.37	0.3
hsCRP, mmol × l^{-1}	−0.13 (4.53)	−0.17 (3.76)	0.04	0.9

Results are shown as mean (SD). *Treatment effect defined as the change in obese exercise group compared with control group. †Significant within-group change between baseline and 3 months ($p < 0.05$). ‡Significant within-group change between baseline and 3 months ($p < 0.01$). §Adjusted for age and sex.

Abbreviations as in Table 1.



Brambilla Int J Obes 2010



* p<0.05 T0vsT1 † p<0.01 GROUP1 vs GROUP3 ‡ p=0.009 GROUP1 vs GROUP2 § p=0.04 GROUP 2 vs GROUP 3

Non capisco: viviamo in un mondo senza inquinamento, mangiamo solo biologico, facciamo un sacco di attività fisica, eppure la nostra vita media non supera i 30 anni...