

24 Aprile 2016

# Napule è...

PEDIATRIA PREVENTIVA E SOCIALE



LUCI OMBRE ABBAGLI

Prevenzione

Nutrizione

Allergologia

Dermatologia

Gastroenterologia

22 - 25 APRILE 2016  
Hotel Royal Continental, Napoli

CONSENSUS UP TO DATE:  
VITAMINA D

OBESITÀ E METABOLISMO

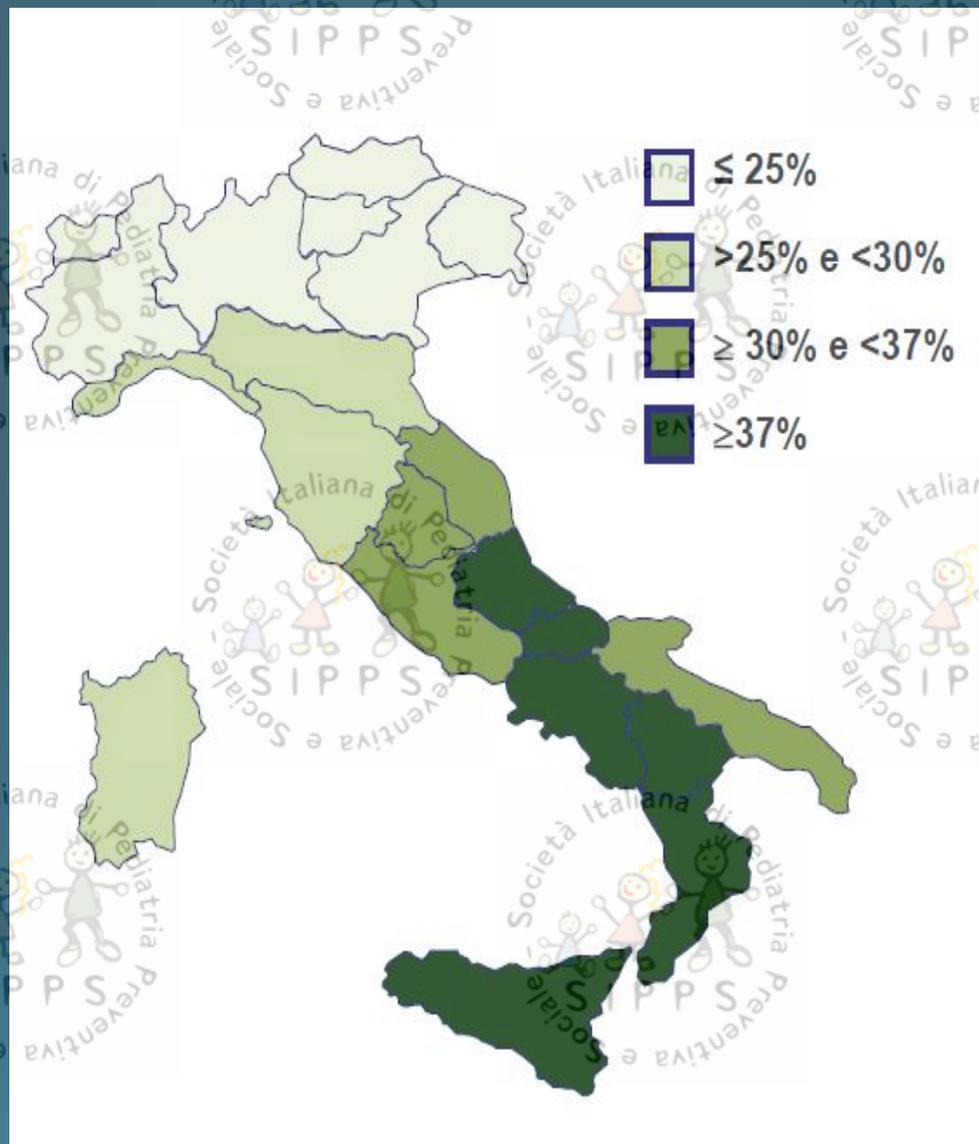


*Emanuele Miraglia del Giudice*

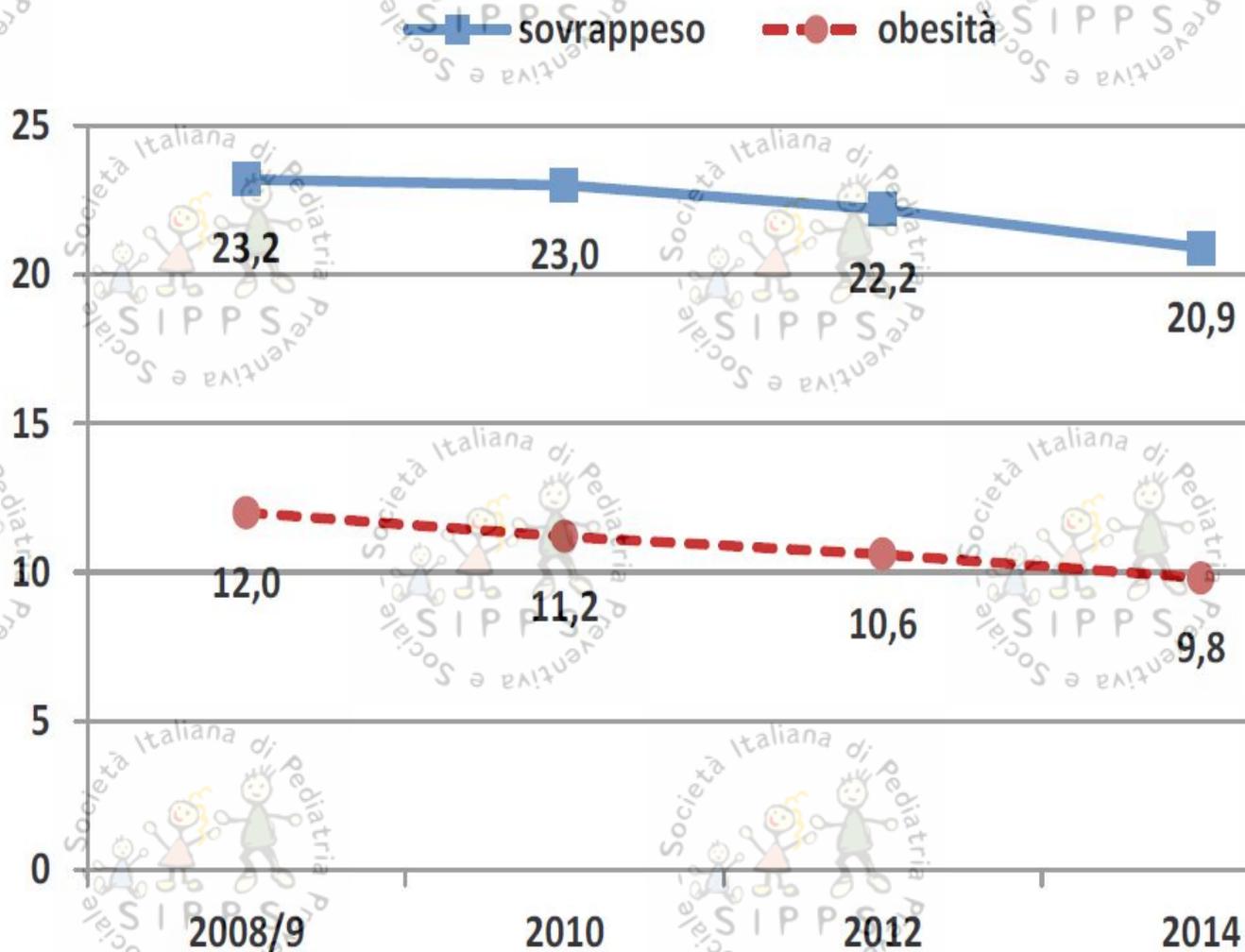
*Seconda Università degli Studi di Napoli*

*Dipartimento della Donna del Bambino e di  
Chirurgia Generale e Specialistica*

# Bambini di 8-9 anni in sovrappeso e obesi per regione, OKkio alla SALUTE 2014



# Trend sovrappeso e obesità, OKkio alla SALUTE 2014



# I bambini obesi sono a rischio di ipovitaminosi D?



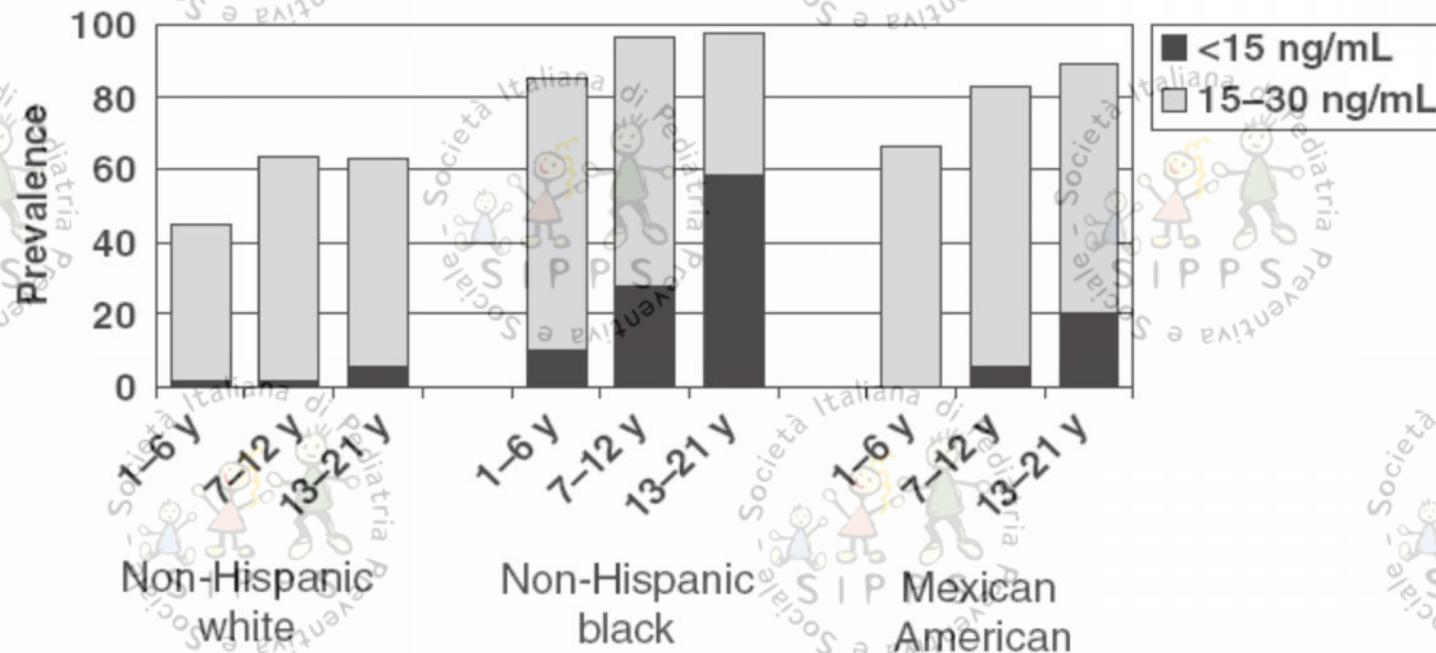
# Prevalence and associations of 25-hydroxyvitamin D deficiency in US children: NHANES 2001-2004

**PEDIATRICS**

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatrics. 2009 Sep;124(3):e362-70

PREVALENZA DI CARENZA E INSUFFICIENZA DI VIT D TRA LE FEMMINE ( 3012 PZ)



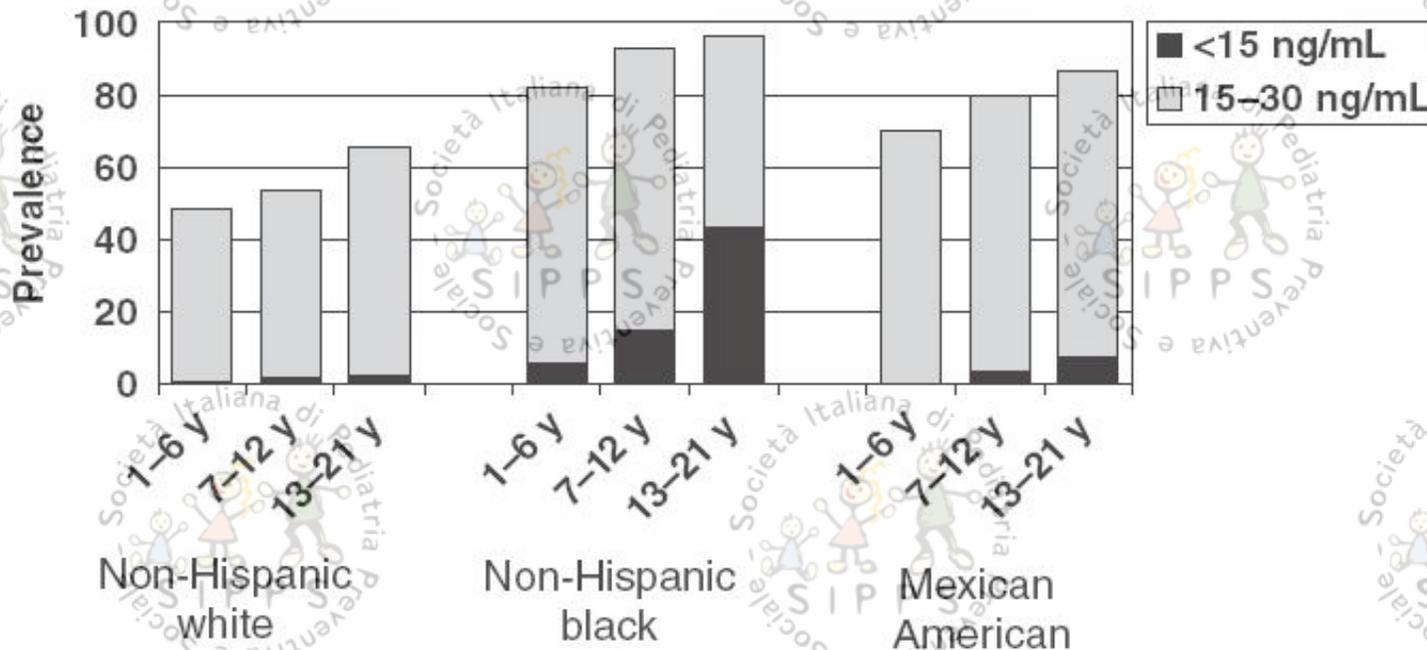
# Prevalence and associations of 25-hydroxyvitamin D deficiency in US children: NHANES 2001-2004

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OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatrics. 2009 Sep;124(3):e362-70

## PREVALENZA DI CARENZA E INSUFFICIENZA DI VIT D TRA I MASCHI ( 3263 PZ)



# Prevalence and associations of 25-hydroxyvitamin D deficiency in US children: NHANES 2001-2004

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OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatrics. 2009 Sep;124(3):e362-70

## CARATTERISTICHE DEI PZ IN FUNZIONE DEI LIVELLI DI VIT D (6275 pz di età da 1 a 21 anni)

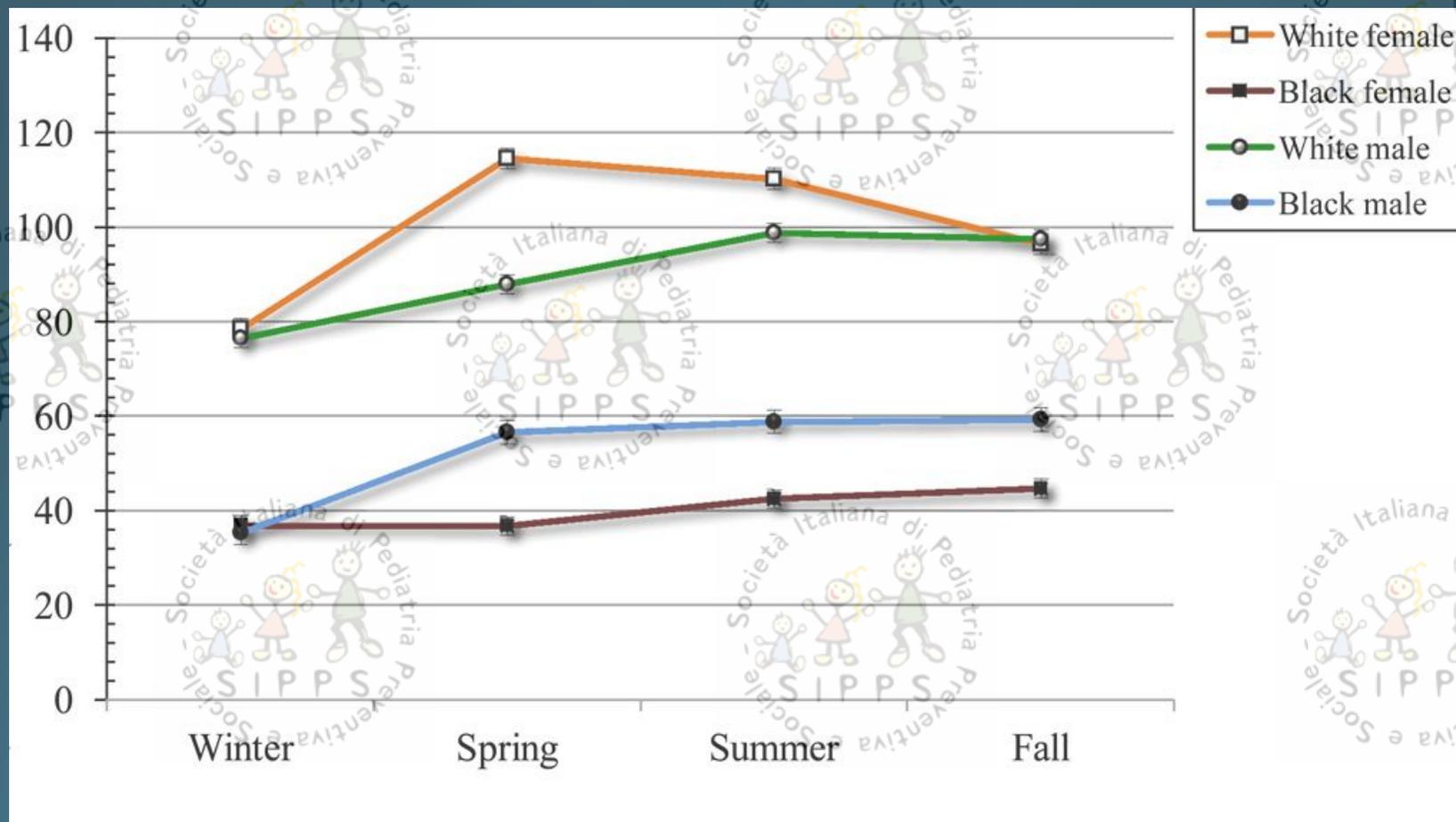
| Characteristic                                     | 25 (OH)D Levels, ng/mL |            |            | P     |
|--|------------------------|------------|------------|-------|
|  | ≥30                    | 15-29      | <15        |       |
| Age, mean ± SE, y                                  | 11.0 ± 0.3             | 13.0 ± 0.2 | 15.0 ± 0.3 | <.001 |
| Female gender, % ± SE                              | 47.0 ± 2.0             | 47.0 ± 1.0 | 60.0 ± 2.0 | .01   |
| Race/ethnicity, % ± SE                             |                        |            |            |       |
| Non-Hispanic white                                 | 82.0 ± 2.0             | 57.0 ± 3.0 | 19.0 ± 3.0 | <.001 |
| Non-Hispanic black                                 | 3.0 ± 0.4              | 14.0 ± 2.0 | 55.0 ± 3.0 | <.001 |
| Mexican American                                   | 11.0 ± 2.0             | 22.0 ± 3.0 | 17.0 ± 3.0 | <.001 |
| Other  | 4.0 ± 1.0              | 6.0 ± 0.7  | 10.0 ± 2.0 | .02   |
| Country of birth, % ± SE                           |                        |            |            |       |
| Born in United States                              | 97.0 ± 0.9             | 91.0 ± 0.8 | 89.0 ± 2.0 | <.001 |
| Born outside United States                         | 3.0 ± 0.8              | 9.0 ± 0.8  | 11.0 ± 2.0 | <.001 |
| PIR, % ± SE  |                        |            |            |       |
| ≥5.00  | 19.0 ± 2.0             | 11.0 ± 0.9 | 7.0 ± 2.0  | <.001 |
| 1.10-4.99  | 64.0 ± 2.0             | 62.0 ± 2.0 | 52.0 ± 3.0 | .01   |
| 0.00-1.00  | 17.0 ± 2.0             | 27.0 ± 2.0 | 40.0 ± 3.0 | <.001 |
| Obese, % ± SE                                      |                        |            |            |       |
| No   | 91.0 ± 1.0             | 82.0 ± 1.0 | 72.0 ± 2.0 | <.001 |
| Yes  | 9.0 ± 1.0              | 18.0 ± 1.0 | 28.0 ± 2.0 | <.001 |
| Milk intake, % ± SE                                |                        |            |            |       |
| Daily  | 82.0 ± 1.0             | 76.0 ± 1.0 | 56.0 ± 2.0 | <.001 |
| More than once per week                            | 14.0 ± 1.0             | 18.0 ± 1.0 | 28.0 ± 2.0 | <.001 |
| Less than once per week                            | 4.0 ± 0.6              | 6.0 ± 0.6  | 17.0 ± 2.0 | <.001 |
| Fish eater (n = 3790), % ± SE                      |                        |            |            |       |
| Yes  | 26.0 ± 2.0             | 21.0 ± 2.0 | 27.0 ± 3.0 | .47   |
| No   | 74.0 ± 2.0             | 79.0 ± 2.0 | 73.0 ± 3.0 |       |
| Television and computer use, hours per day, % ± SE |                        |            |            |       |
| None   | 1.0 ± 0.5              | 1.0 ± 0.3  | 2.0 ± 0.7  | .54   |
| ≤2 h   | 42.0 ± 2.0             | 33.0 ± 1.0 | 26.0 ± 2.0 | <.001 |
| 3-4 h  | 39.0 ± 2.0             | 40.0 ± 1.0 | 34.0 ± 2.0 | .32   |
| >4 h   | 18.0 ± 2.0             | 26.0 ± 1.0 | 38.0 ± 3.0 | <.001 |

# Low 25-hydroxyvitamin D levels in adolescents: race, season, adiposity, physical activity, and fitness

**PEDIATRICS**

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatrics. 2010 Jun;125(6):1104-11



# High prevalence of vitamin D insufficiency and its association with BMI-for-age among primary school children in Kuala Lumpur, Malaysia



BMC Public Health. 2011 Feb 11;11:95

## Correlazione tra BMI per l'età e i Livelli di Vit D

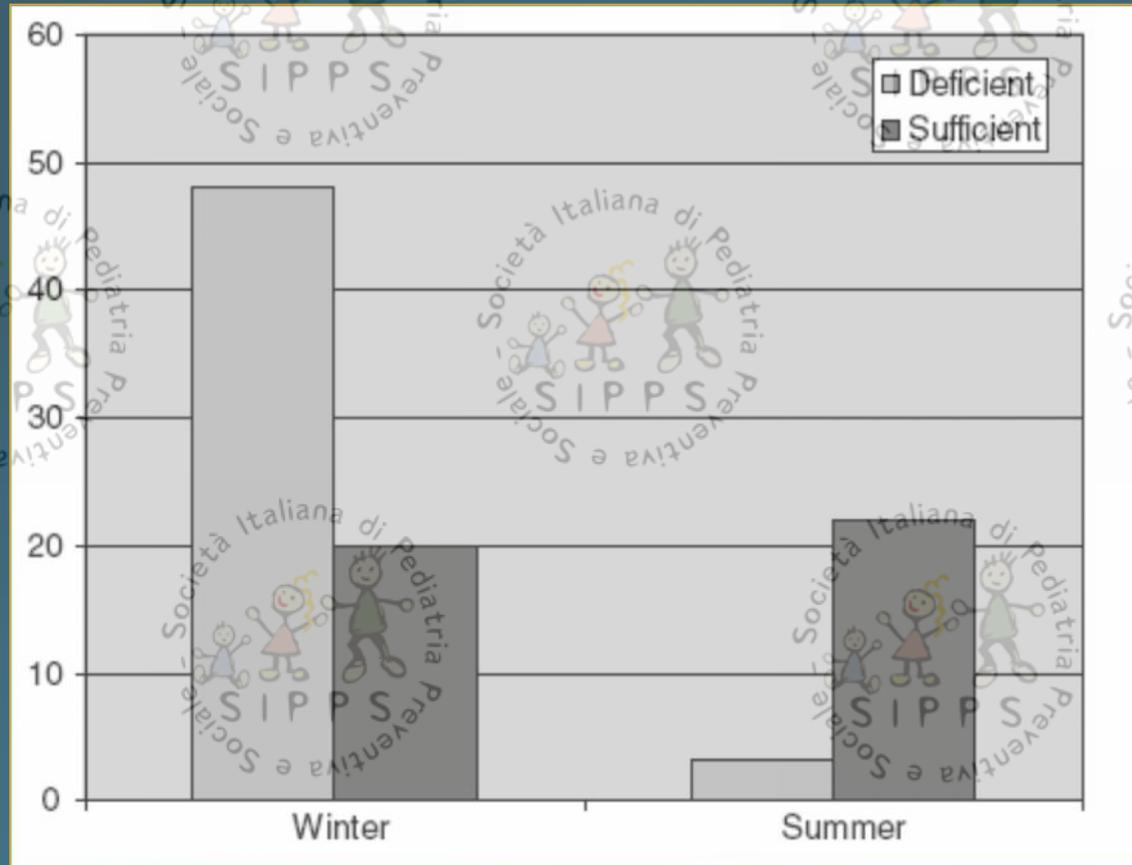
| BMI-for-age Status    | Boys (n = 180)   |      |          |      | Girls (n = 222)  |      |          |      | Total (n = 402)  |      |          |      |
|-----------------------|------------------|------|----------|------|------------------|------|----------|------|------------------|------|----------|------|
|                       | Vitamin D status |      |          |      | Vitamin D status |      |          |      | Vitamin D status |      |          |      |
|                       | *Low             |      | **Normal |      | *Low             |      | **Normal |      | *Low             |      | **Normal |      |
|                       | N                | %    | N        | %    | N                | %    | N        | %    | N                | %    | N        | %    |
| Severe thinness       | 3                | 2.5  | 2        | 3.3  | 1                | 0.6  | 0        | 0.0  | 4                | 1.2  | 2        | 3.4  |
| Thinness              | 6                | 5    | 5        | 8.2  | 10               | 5.8  | 4        | 8.0  | 20               | 5.8  | 5        | 8.6  |
| Normal                | 54               | 45.4 | 34       | 55.7 | 109              | 63.4 | 36       | 72.0 | 194              | 56.4 | 39       | 67.2 |
| Overweight            | 20               | 16.8 | 11       | 18.0 | 34               | 19.8 | 7        | 14.0 | 66               | 19.2 | 6        | 10.3 |
| Obese                 | 36               | 30.3 | 9        | 14.8 | 18               | 10.5 | 3        | 6.0  | 60               | 17.4 | 6        | 10.3 |
| $\chi^2$ (df = 1)     | 5.958            |      |          |      | 1.160            |      |          |      | 5.832            |      |          |      |
| p-trend (Monte Carlo) | 0.016            |      |          |      | 0.330            |      |          |      | 0.013            |      |          |      |

# Is vitamin D status known among children living in Northern Italy?

European Journal of  
**Nutrition**

Eur J Nutr. 2012 Mar;51(2):143-9.

## Serum 25(OH) D in Winter (November-May) and in Summer (June-October)



# Is vitamin D status known among children living in Northern Italy?

European Journal of  
**Nutrition**

Eur J Nutr. 2012 Mar;51(2):143-9.

## Different characteristics associated to 25(OH) D status

|                                      | OR    | 95% CI       | p-value       |
|--------------------------------------|-------|--------------|---------------|
| Children (vs. infants)               | 0.89  | 0.22 3.57    | 0.8769        |
| Adolescents (vs. infants)            | 4.19  | 0.62 28.19   | 0.1405        |
| Non-Caucasian race (vs. caucasian)   | 35.00 | 1.34 912.66  | 0.0326        |
| Non-catholic religion (vs. catholic) | 6.12  | 0.33 113.24  | 0.2233        |
| Italian (vs. other)                  | 1.05  | 0.18 6.00    | 0.9520        |
| Malabsorption (yes vs. no)           | 1.23  | 0.20 7.40    | 0.8212        |
| <u>Obesity (yes vs. no)</u>          | 39.47 | 1.17 >999.99 | <b>0.0405</b> |
| <u>Season (November–May)</u>         | 26.77 | 4.73 151.52  | <b>0.0002</b> |

# Prevalence of hypovitaminosis D and predictors of vitamin D status in Italian healthy adolescents



Ital J Pediatr. 2014 Jun 5;40:54

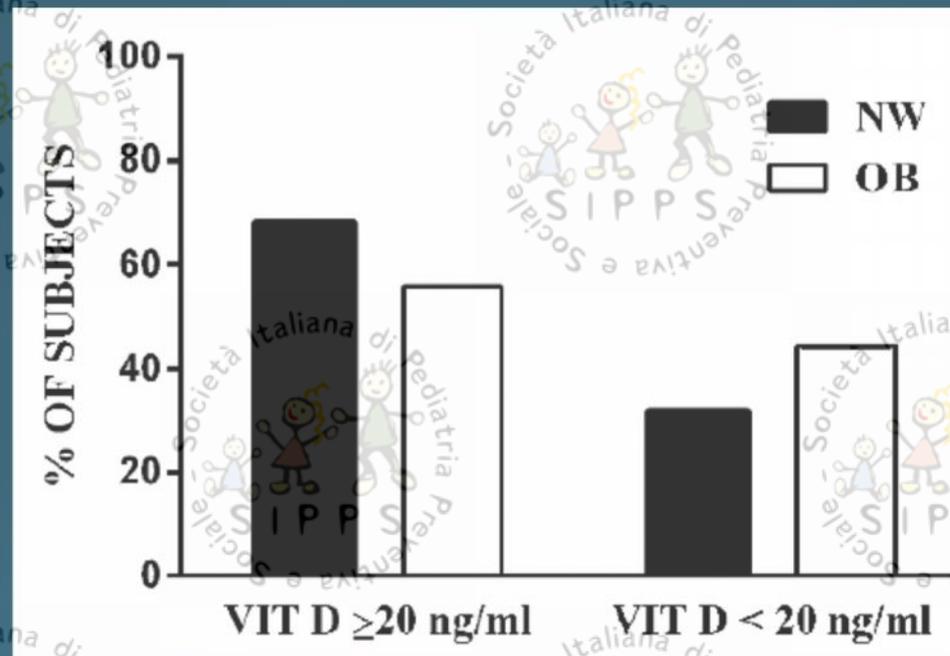
|  | Vitamin D deficiency |      |            |         | Hypovitaminosis D |      |            |         |
|--|----------------------|------|------------|---------|-------------------|------|------------|---------|
|  | B (SE)               | OR   | C.I. 95%   | p       | B (SE)            | OR   | C.I. 95%   | p       |
| Gender<br>(female vs male)                                   | -0.52 (0.28)         | 0.60 | 0.34-1.03  | 0.063   | -0.43 (0.37)      | 0.65 | 0.31-1.36  | 0.251   |
| Residence<br>(urban vs rural)                                | 0.01 (0.28)          | 1.01 | 0.58-1.76  | 0.975   | 0.27 (0.37)       | 1.30 | 0.63-2.70  | 0.477   |
| Season of blood withdrawal<br>(winter-spring vs summer-fall) | 1.19 (0.30)          | 3.31 | 1.82-6.01  | <0.0001 | 1.73 (0.40)       | 5.64 | 2.59-12.27 | <0.0001 |
| <b>BMI<br/>(normal vs overweight-obese)</b>                  | 0.41 (0.29)          | 1.50 | 0.84-2.67  | 0.167   | 1.36 (0.48)       | 3.89 | 1.54-9.88  | 0.004   |
| Sun exposure<br>(low vs moderate-good)                       | 1.57 (0.41)          | 4.78 | 2.15-10.63 | <0.0001 | 1.78 (0.79)       | 5.94 | 1.25-28.17 | 0.025   |
| Use of sunscreens<br>(regular vs non regular)                | 0.63 (0.31)          | 1.87 | 1.02-3.41  | 0.042   | 1.77 (0.54)       | 5.89 | 2.05-16.94 | 0.001   |
| Outdoor physical exercise<br>(< 3 vs ≥ 3 hours/week)         | 0.34 (0.30)          | 1.40 | 0.78-2.52  | 0.261   | 0.25 (0.38)       | 1.28 | 0.60-2.71  | 0.522   |
| History of fractures<br>(positive vs negative)               | -0.25 (0.33)         | 0.78 | 0.41-1.49  | 0.448   | 0.38 (0.49)       | 1.46 | 0.56-3.81  | 0.445   |

$\chi^2 = 49.62, p < 0.0001$ ; Cox  $R^2 = 0.173$ ; Nagelkerke  $R^2 = 0.231$ ;  $\chi^2 = 62.33, p < 0.0001$ ; Cox  $R^2 = 0.212$ ; Nagelkerke  $R^2 = 0.341$ ;  
 Hosmer and Lemeshow test  $p = 0.482$ 
Hosmer and Lemeshow test  $p = 0.564$

# Vitamin D levels in a paediatric population of normal weight and obese subjects



J Endocrinol Invest. 2014 Sep;37(9):805-9

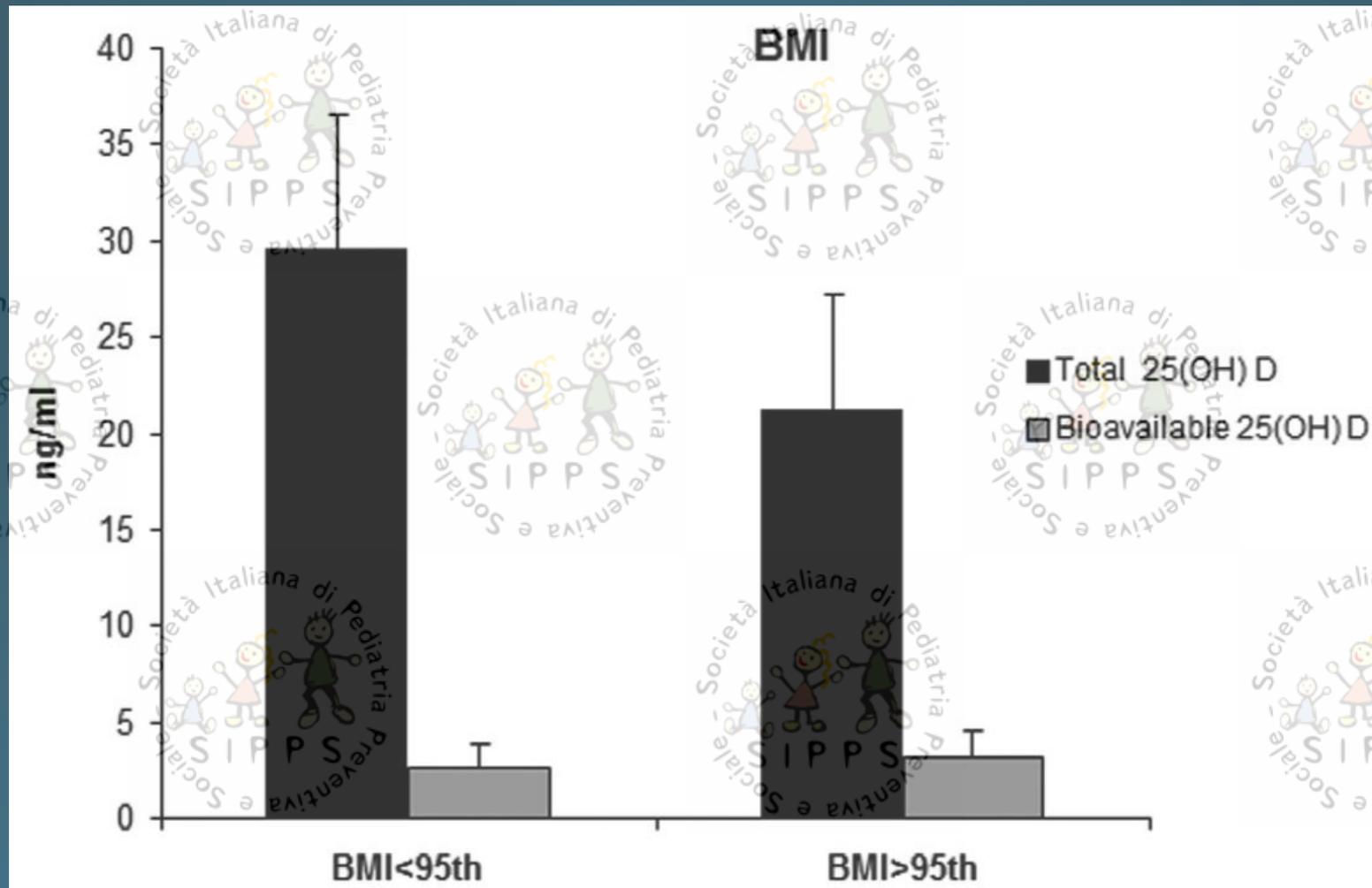


- I soggetti normopeso mostrano dei livelli medi di Vitamina D significativamente maggiori rispetto agli obesi ( $p < 0,0001$ )

# Bioavailable Vitamin D in Obese Children: The Role of Insulin Resistance

JCEM

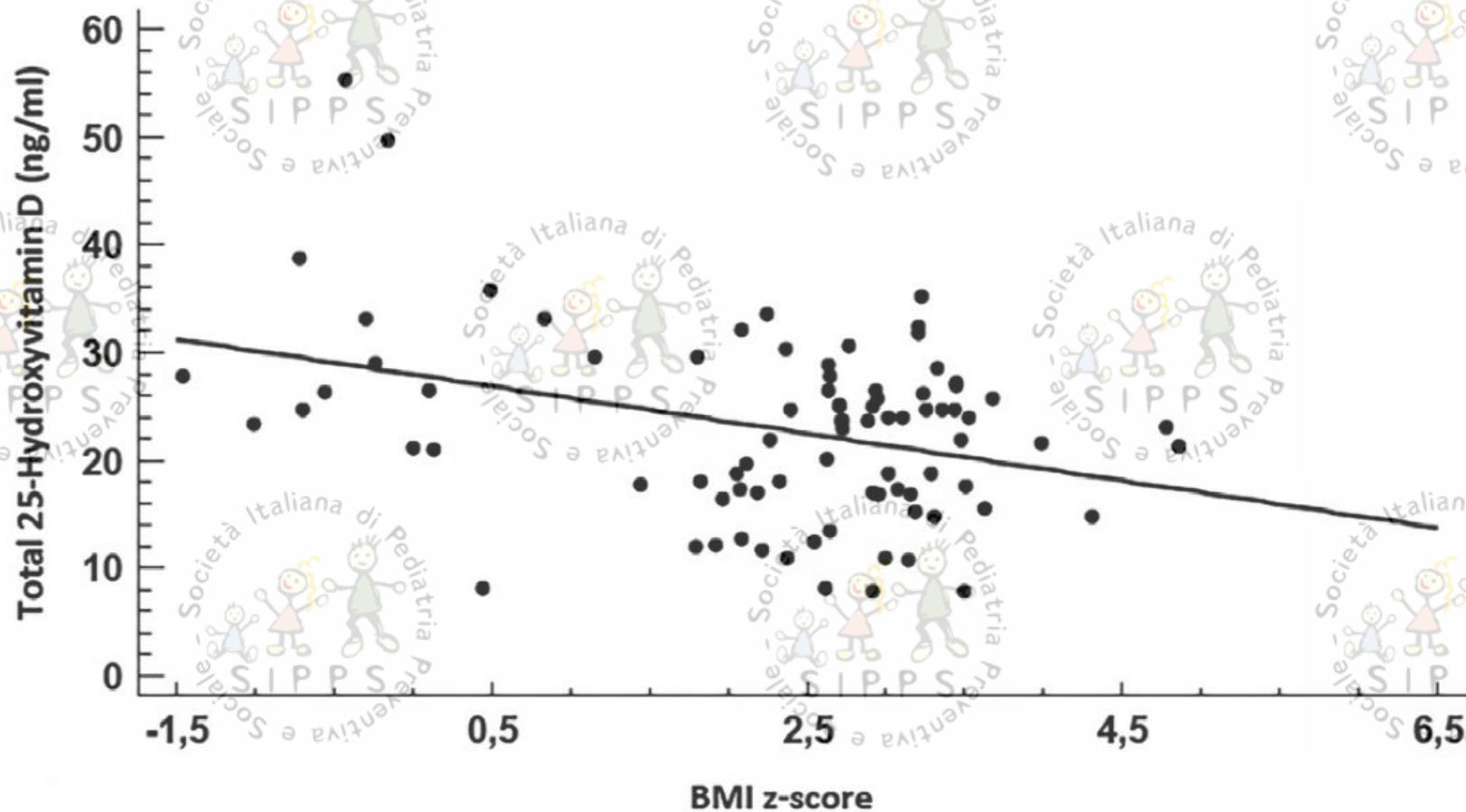
J Clin Endocrinol Metab. 2015 Oct;100(10):3949-55



# Bioavailable Vitamin D in Obese Children: The Role of Insulin Resistance

JCEM

J Clin Endocrinol Metab. 2015 Oct;100(10):3949-55



# I bambini obesi sono a rischio di ipovitaminosi D?

**Numerose evidenze epidemiologiche mostrano come i soggetti obesi rappresentino una categoria a rischio di ipovitaminosi D**

**Quale di queste due condizioni  
(obesità e ipovitaminosi D)  
rappresenta il primum movens nella  
loro associazione?**





# LIVELLI DI VITAMINA D E OBESITÀ

## LIVELLI DI VITAMINA D CAUSANO OBESITÀ

- 1) Effetto della Vit D su geni che regolano la differenziazione degli adipociti
- 1) Effetto della Vit D su geni espressi negli adipociti e coinvolti nella lipolisi

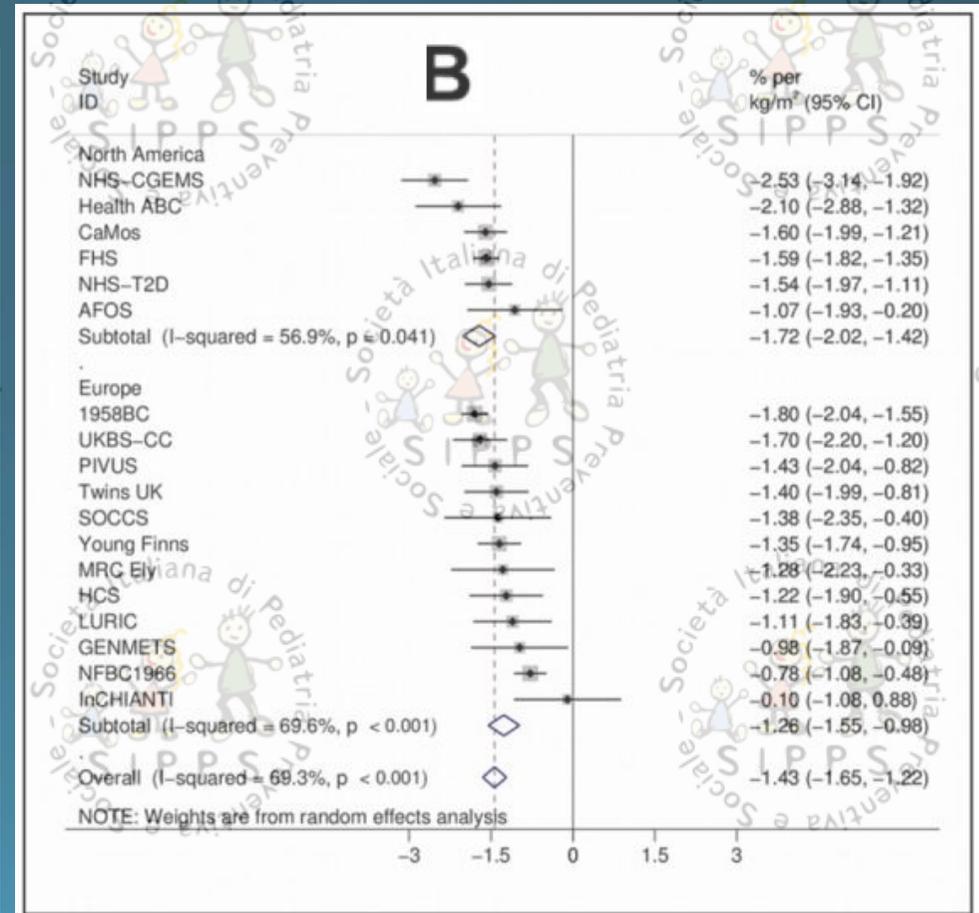
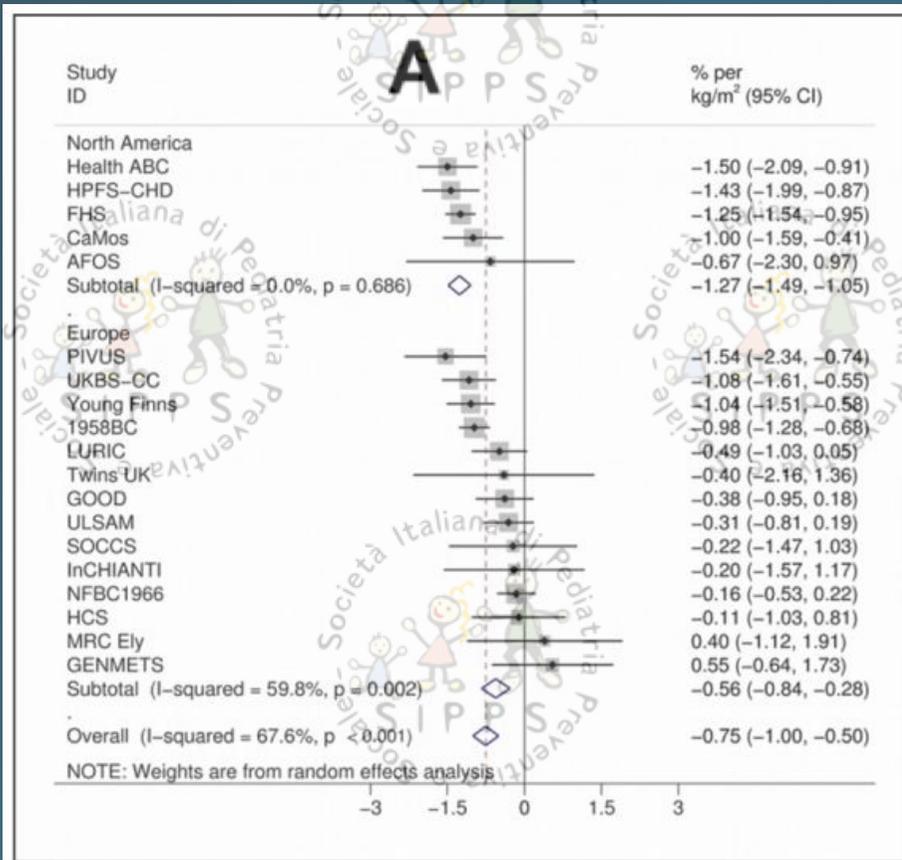


## LIVELLI DI VITAMINA D CONSEGUONO ALL'OBESITÀ

- 1) Sequestro di Vit D da parte del tessuto adiposo (*aumento dei livelli di Vit D nelle prime fasi della perdita di peso*)
- 2) Riduzione della sintesi epatica di 25(OH) Vit D a causa della NAFLD
- 3) Minore esposizione alla luce solare per stile di vita sedentario

# Causal Relationship between Obesity and Vitamin D Status: Bi-Directional Mendelian Randomization Analysis of Multiple Cohorts

## Random effects meta-analysis of the BMI association with 25(OH)D in men (A) (n=20,950) and women (B) (n=21,074).

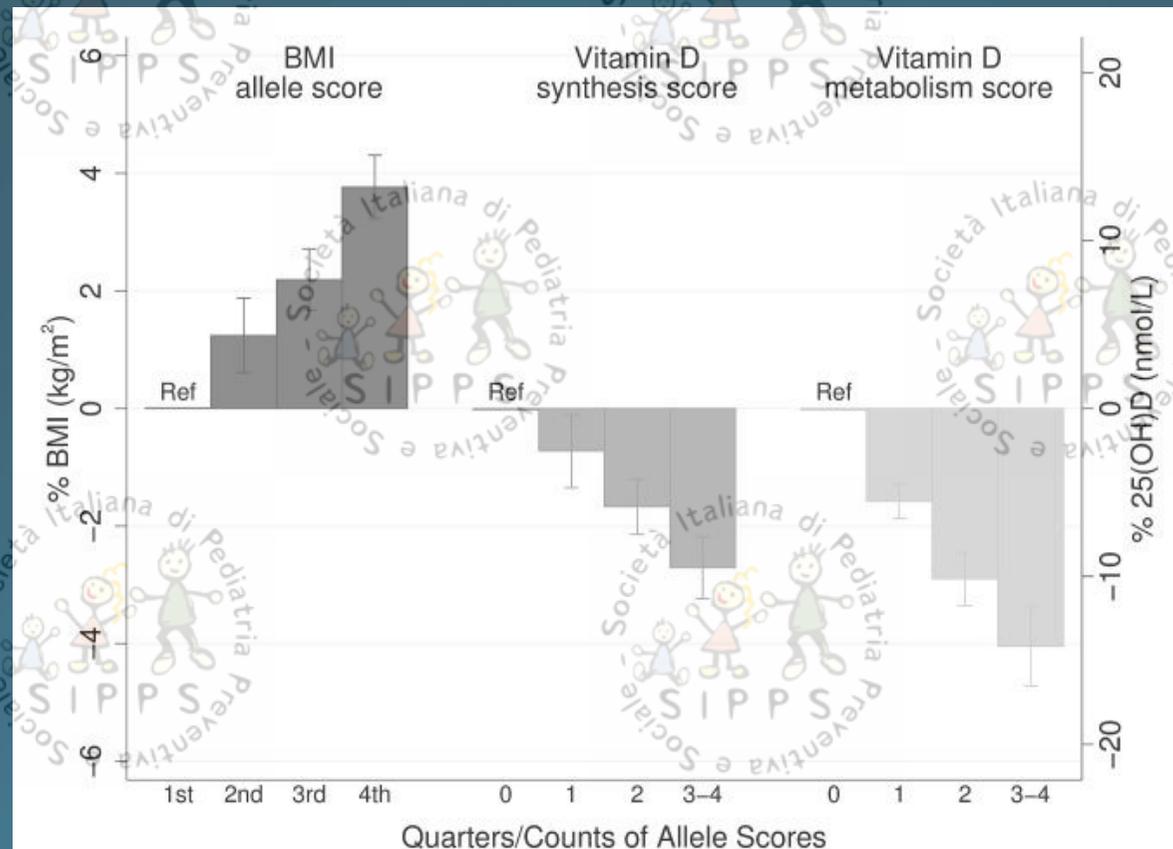


# Causal Relationship between Obesity and Vitamin D Status: Bi-Directional Mendelian Randomization Analysis of Multiple Cohorts

**PLOS** | MEDICINE A Peer-Reviewed, Open Access Journal

PLoS Med. 2013 February; 10(2): e1001383.

Meta-analysis of the BMI allele score association with BMI (n=32,391), and the vitamin D synthesis (n=35,873) and metabolism (n=38,191) allele score association with 25(OH)D.

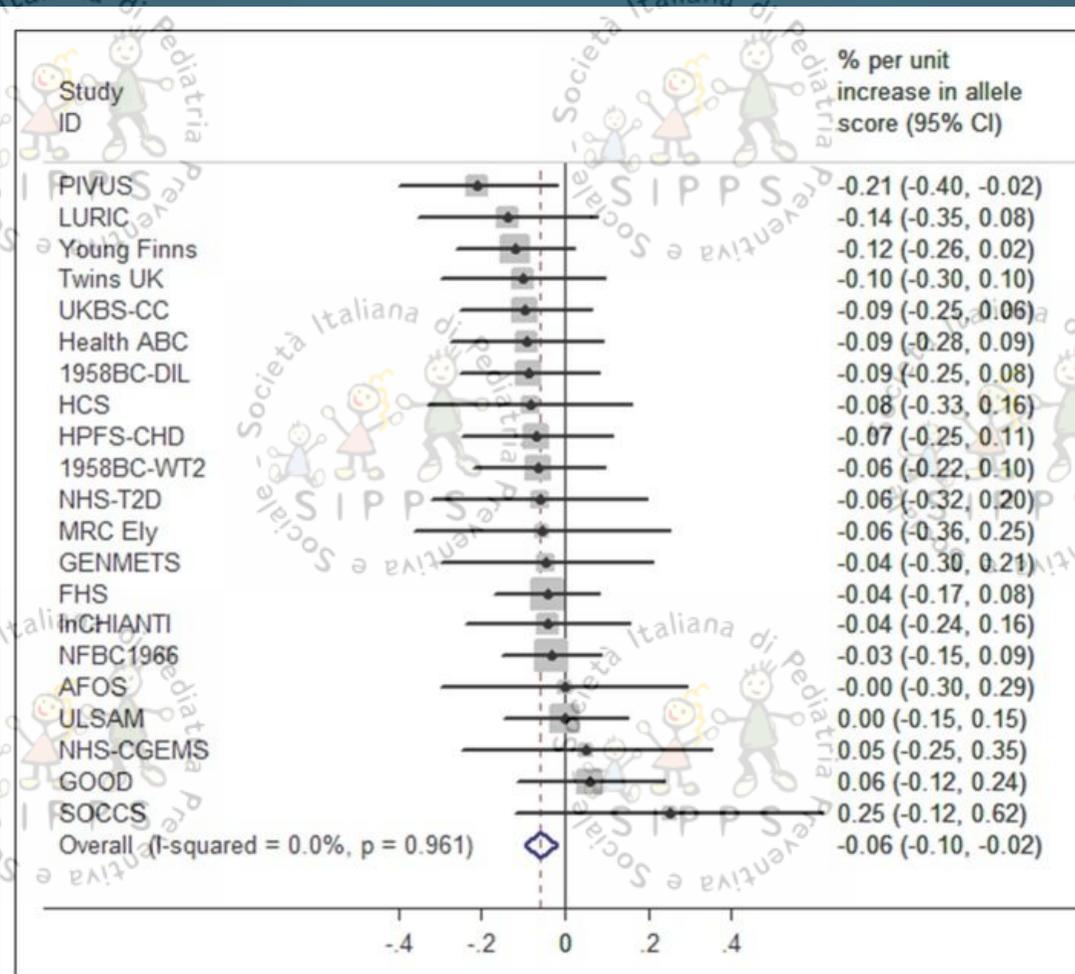


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**PLOS** | MEDICINE A Peer-Reviewed, Open Access Journal

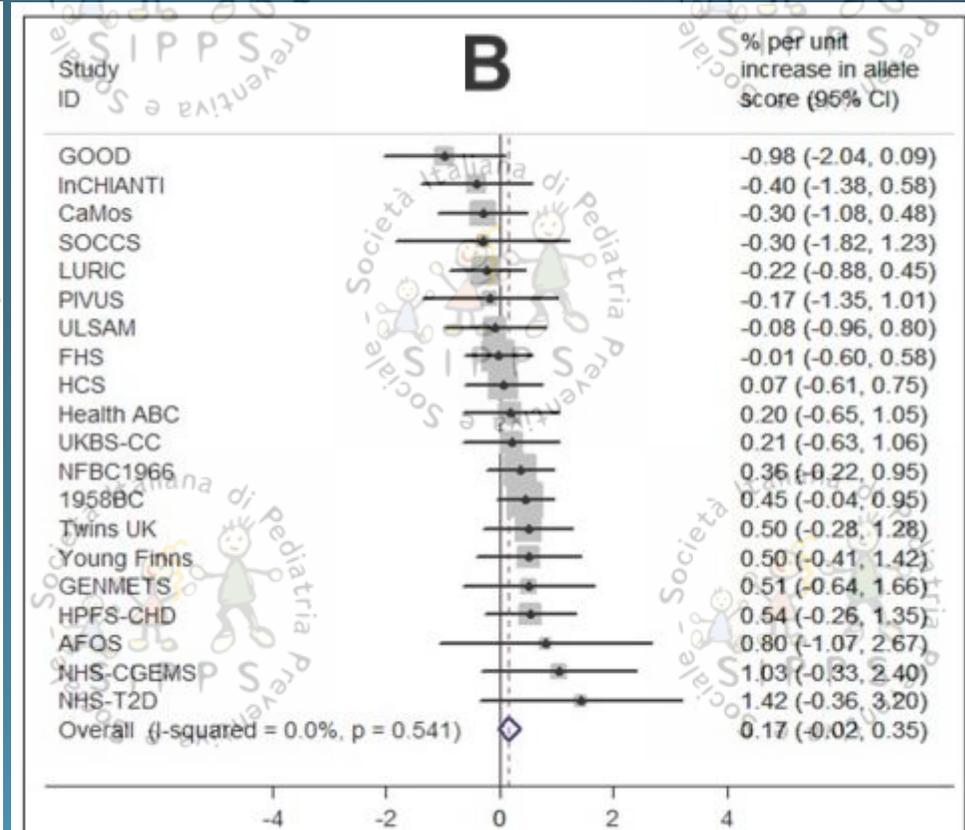
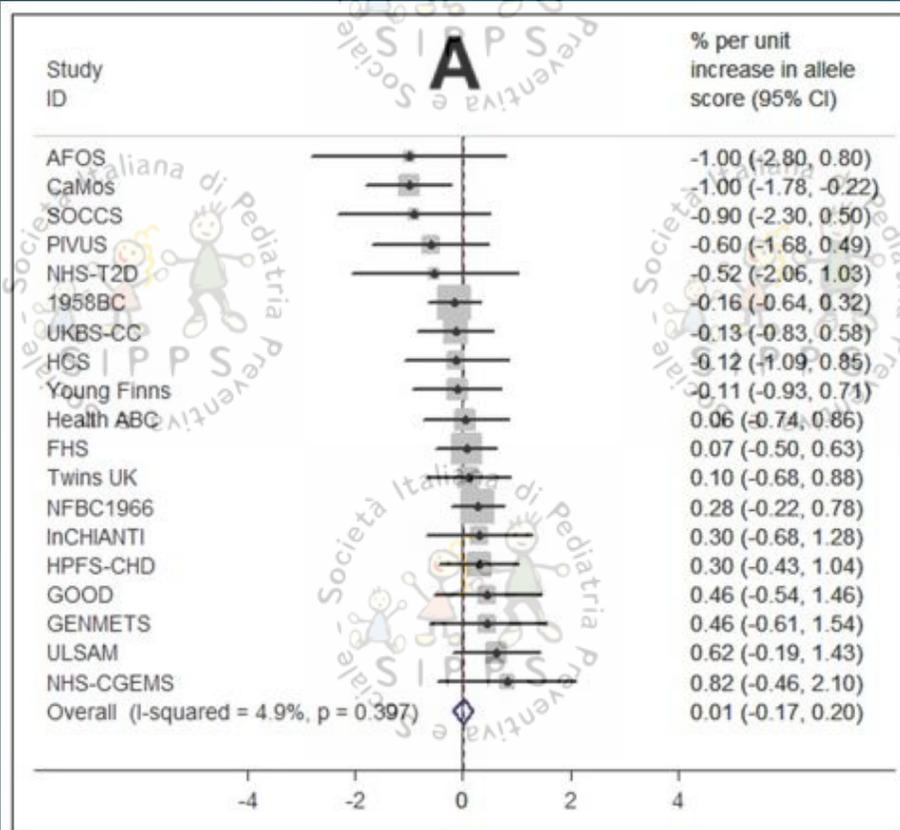
PLoS Med. 2013 February; 10(2): e1001383.

Meta-analysis of the BMI allele score association with 25(OH)D (n=31,120).



# Causal Relationship between Obesity and Vitamin D Status: Bi-Directional Mendelian Randomization Analysis of Multiple Cohorts

Meta-analysis of the Vit D synthesis score association with BMI (A) (n=36,553) and of the Vit D metabolism score association with BMI (B) (n=40,367).



**Quale di queste due condizioni  
rappresenta il primum movens della  
loro associazione?**

**L'obesità rappresenta la causa e non l'effetto di  
tale associazione; il tessuto adiposo costituisce  
il sito di deposito della 25(OH)D che quindi si  
trova in concentrazioni ridotte nel siero.**

**L'ipovitaminosi D conferisce al  
bambino obeso un rischio maggiore  
per lo sviluppo delle complicanze?**



# Le **COMPLICANZE** dell'**OBESITÀ** PEDIATRICA

## Psicosociale

- Scarsa autostima
- Isolamento sociale e stigmatizzazione
- Disturbi del comportamento alimentare
- Depressione

## Endocrino-metaboliche

- **Sindrome Metabolica**
  - Resistenza Insulinica*
  - Intolleranza glicemica*
  - Dislipidemia*
  - Iperensione arteriosa*
- Diabete Mellito di tipo II
- Sindrome dell'ovaio policistico

## Ortopediche

- Piede piatto
- Ginocchio valgo
- Distorsioni della caviglia
- Epifisiolisi della testa del femore
- Fratture dell'avambraccio
- Tibia vara (M. di Blount)

## Neurologiche

• Sindrome di Prader-Willi

## Cardiovascolari

- Iperensione arteriosa
- Aterosclerosi

## Respiratorie

- Asma
- Apnee ostruttive del sonno
- Scarsa tolleranza all'esercizio

## Gastrointestinali

- Calcolosi
- Reflusso gastroesofageo
- Steato-epatite non alcolica



C. Brienza

# CRITERI DIAGNOSTICI DELLA SINDROME METABOLICA in età pediatrica

| Definizione da:    | Obesità                      | Pressione Arteriosa | Trigliceridi    | Colesterolo HDL | Intolleranza Glicemica                           |
|--------------------|------------------------------|---------------------|-----------------|-----------------|--|
| <b>Weiss et al</b> | ZS BMI 2                     | >95° percentile     | >95° percentile | <5° percentile  | Intolleranza glicemica                           |
| <b>Cook et al</b>  | Circonf. vita 90° percentile | 90° percentile      | 110 mg/dl       | 40 mg/dl        | Glic a digiuno 110mg/dl o Intolleranza glicemica |
| <b>Ford et al</b>  | Circonf. vita 90° percentile | 90° percentile      | 110 mg/dl       | 10° percentile  | Glic a digiuno 100mg/dl o Intolleranza glicemica |

Per la diagnosi di Sindrome Metabolica è necessaria la presenza di 3 criteri su 5

# Prevalence and associations of 25-hydroxyvitamin D deficiency in US children: NHANES 2001-2004

**PEDIATRICS**<sup>®</sup>

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatrics. 2009 Sep;124(3):e362-70

## RISCHIO CARDIOVASCOLARE E CARENZA DI VIT D

| Outcome  | 25 (OH)D Levels 15–29 ng/mL |                       |             | 25 (OH)D Levels <15 ng/mL |                       |             |
|--|-----------------------------|-----------------------|-------------|---------------------------|-----------------------|-------------|
|  | Data                        | 95% CI                | P           | Data                      | 95% CI                | P           |
| Serum calcium, mg/dL (n = 3926)                  | -0.03 <sup>a</sup>          | -0.09 to 0.02         | .21         | -0.09 <sup>a</sup>        | -0.15 to -0.04        | .002        |
| Serum phosphate, mg/dL (n = 3926)                | -0.03 <sup>a</sup>          | -0.10 to 0.04         | .39         | -0.04 <sup>a</sup>        | -0.15 to 0.06         | .40         |
| <u>Systolic blood pressure, mm Hg (n = 4989)</u> | 0.78 <sup>a</sup>           | -0.08 to 1.64         | .08         | <b>2.24<sup>a</sup></b>   | 0.98 to 3.50          | <b>.00</b>  |
| Diastolic blood pressure, mm Hg (n = 4989)       | 1.68 <sup>a</sup>           | 0.20 to 3.16          | .03         | 1.60 <sup>a</sup>         | -0.54 to 3.75         | .14         |
| Total cholesterol, mg/dL (n = 6036)              | -3.66 <sup>a</sup>          | -7.09 to -0.23        | .04         | -2.92 <sup>a</sup>        | -8.15 to 2.30         | .26         |
| <u>HDL cholesterol, mg/dL (n = 6036)</u>         | <b>-2.29<sup>a</sup></b>    | <b>-3.57 to -1.01</b> | <b>.001</b> | <b>-3.03<sup>a</sup></b>  | <b>-5.02 to -1.04</b> | <b>.004</b> |
| PTH >65 pg/mL (n = 2664)                         | 2.0 <sup>b</sup>            | 1.10 to 3.80          | .04         | 3.6 <sup>b</sup>          | 1.80 to 7.10          | .001        |
| Hypertension (n = 4989)                          | 1.0 <sup>b</sup>            | 0.50 to 2.00          | .06         | 2.5 <sup>b</sup>          | 1.00 to 5.90          | .04         |
| Diabetes mellitus (n = 6275)                     | 2.8 <sup>b</sup>            | 0.80 to 10.40         | .12         | 1.9 <sup>b</sup>          | 0.40 to 9.70          | .41         |
| Elevated CRP (n = 6275)                          | 0.7 <sup>b</sup>            | 0.50 to 0.90          | .003        | 0.7 <sup>b</sup>          | 0.50 to 1.00          | .07         |
| Albuminuria (n = 6275)                           | 1.2 <sup>b</sup>            | 0.80 to 1.80          | .32         | 1.3 <sup>b</sup>          | 0.70 to 2.40          | .47         |

Data were multivariable adjusted for age, gender, race/ethnicity, obesity, PIR, television and computer use, milk intake, and vitamin D supplementation.

<sup>a</sup> Data show  $\Delta$ , which represents the difference between those with 25 (OH)D levels <15 ng/mL or 15 to 29 ng/mL compared with those with levels  $\geq 30$  ng/mL and OR is compared to those with 25 (OH)D  $\geq 30$  ng/mL.

<sup>b</sup> Data show odds ratio, which represents the difference between those with 25 (OH)D levels <15 ng/mL or 15 to 29 ng/mL compared with those with 25 (OH)D  $\geq 30$  ng/mL.

# Vitamin D status and cardiometabolic risk factors in the United States adolescent population

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Pediatrics. 2009 Sep;124(3):e371-9

## Fattori di Rischio Cardiovascolare e Livelli di Vit D negli adolescenti

|   | Quartile of Serum 25(OH)D, ng/mL |                   |                   |                   | P <sub>trend</sub> |
|---|----------------------------------|-------------------|-------------------|-------------------|--------------------|
|   | I (<15.0)                        | II (15.0–21.0)    | III (21.1–26.0)   | IV (>26.0)        |                    |
| <b>Body mass index ≥ 95<sup>th</sup> percentile*</b>                |                                  |                   |                   |                   |                    |
| Prevalence, %   | 30.7 (25.8, 36.1)                | 22.6 (19.6, 25.9) | 16.5 (13.9, 19.4) | 10.4 (7.9, 13.6)  | <0.001             |
| Adjusted OR (95% CI) <sup>†</sup>                                   | 5.24 (3.47, 7.91)                | 2.99 (1.98, 4.53) | 2.02 (1.34, 3.06) | 1.00 (referent)   | <0.001             |
| <b>Waist circumference ≥ 90<sup>th</sup> percentile<sup>‡</sup></b> |                                  |                   |                   |                   |                    |
| Prevalence, %   | 26.9 (22.1, 32.4)                | 20.8 (18.1, 23.8) | 16.1 (13.7, 18.8) | 9.7 (7.7, 12.1)   | <0.001             |
| Adjusted OR (95% CI) <sup>†</sup>                                   | 7.21 (4.36, 11.94)               | 3.64 (2.14, 6.20) | 2.19 (1.25, 3.83) | 1.00 (referent)   | <0.001             |
| <b>High blood pressure<sup>‡</sup></b>                              |                                  |                   |                   |                   |                    |
| Prevalence, %   | 11.2 (7.6, 16.2)                 | 6.7 (5.1, 8.7)    | 4.4 (3.1, 6.3)    | 3.7 (2.5, 5.3)    | 0.013              |
| Adjusted OR (95% CI) <sup>§</sup>                                   | 2.36 (1.33, 4.19)                | 1.26 (0.65, 2.44) | 1.04 (0.55, 1.97) | 1.00 (referent)   | 0.046              |
| <b>Fasting glucose ≥ 100 mg/dL</b>                                  |                                  |                   |                   |                   |                    |
| Prevalence, %   | 6.4 (3.8, 10.7)                  | 2.9 (2.0, 4.4)    | 3.0 (1.9, 4.8)    | 1.3 (0.7, 2.3)    | 0.144              |
| Adjusted OR (95% CI) <sup>§</sup>                                   | 2.54 (1.01, 6.40)                | 1.18 (0.50, 2.79) | 0.85 (0.39, 1.88) | 1.00 (referent)   | 0.101              |
| <b>HDL cholesterol ≤ 40 mg/dL</b>                                   |                                  |                   |                   |                   |                    |
| Prevalence, %   | 29.9 (25.8, 34.3)                | 20.9 (17.9, 24.4) | 18.8 (15.7, 22.3) | 12.5 (10.2, 15.2) | <0.001             |
| Adjusted OR (95% CI) <sup>§</sup>                                   | 1.54 (0.99, 2.39)                | 1.33 (0.89, 1.99) | 1.10 (0.72, 1.70) | 1.00 (referent)   | 0.084              |
| <b>Triglycerides ≥ 110 mg/dL</b>                                    |                                  |                   |                   |                   |                    |
| Prevalence, %   | 23.0 (18.1, 28.8)                | 20.7 (17.4, 24.5) | 17.6 (15.1, 20.4) | 17.0 (14.6, 19.7) | 0.119              |
| Adjusted OR (95% CI) <sup>§</sup>                                   | 1.00 (0.49, 2.04)                | 1.03 (0.59, 1.80) | 0.91 (0.66, 1.26) | 1.00 (referent)   | 0.371              |
| <b>Metabolic syndrome<sup>  </sup></b>                              |                                  |                   |                   |                   |                    |
| Prevalence, %   | 14.6 (10.4, 20.1)                | 6.9 (5.2, 9.2)    | 5.2 (3.6, 7.5)    | 2.2 (1.5, 3.2)    | <0.001             |
| Adjusted OR (95% CI) <sup>§</sup>                                   | 3.88 (1.57, 9.58)                | 2.35 (1.09, 5.07) | 2.05 (0.89, 4.70) | 1.00 (referent)   | 0.003              |

# Vitamin D deficiency in obese children and its relationship to glucose homeostasis

JCEM

J Clin Endocrinol Metab. 2012 Jan;97(1):279-85

## Livelli di 25(OH) Vit D e Omeostasi Glicemica /Pressione Arteriosa

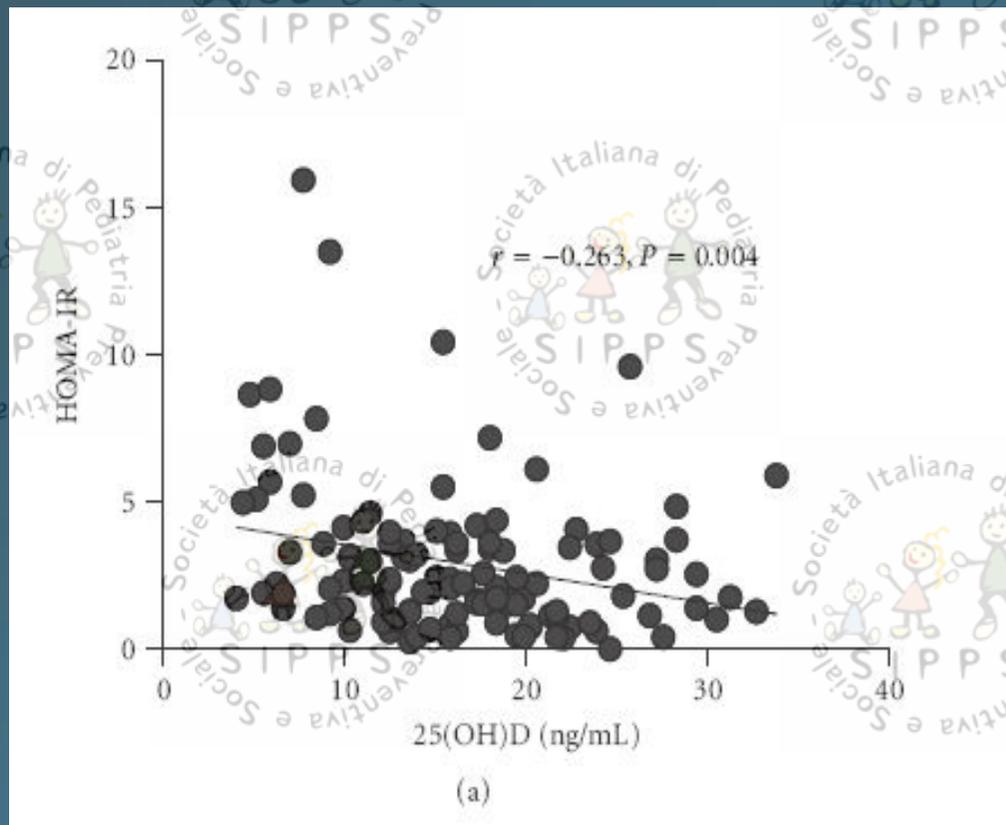
| Variable    | n   | Unadjusted |         | Adjusted <sup>a</sup> |       |
|-------------|-----|------------|---------|-----------------------|-------|
|             |     | r          | P       | R                     | P     |
| HOMA-IR     | 327 | -0.27      | <0.0001 | -0.19                 | 0.001 |
| 2-h Glucose | 298 | -0.14      | 0.02    | -0.12                 | 0.04  |
| HgbA1c      | 384 | -0.11      | 0.04    | -0.07                 | 0.18  |
| SBP         | 406 | -0.10      | 0.04    | -0.07                 | 0.14  |
| DBP         | 406 | 0.01       | 0.77    | -0.01                 | 0.86  |

# Vitamin d deficiency in obese children and its relationship to insulin resistance and adipokines.

Journal of Obesity

J Obes. 2011;2011:495101. doi: 10.1155/2011/495101.

## 25(OH) D levels and HOMA-IR



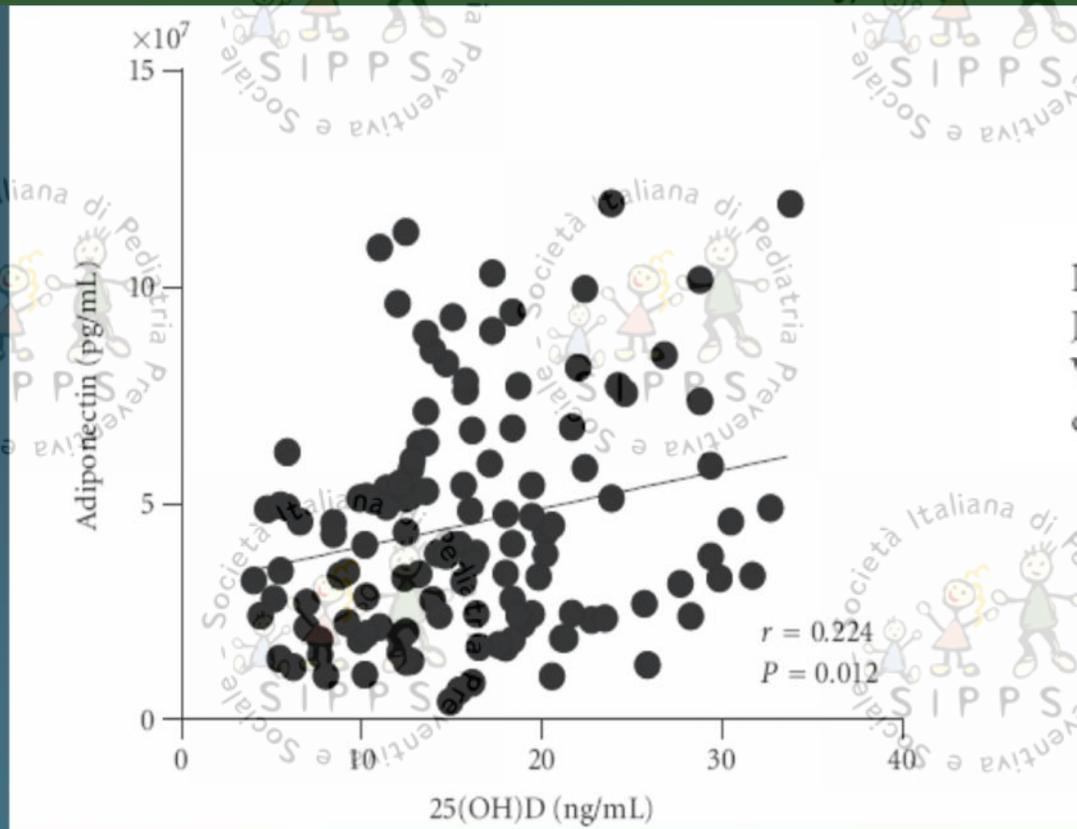
Hindawi Publishing Corporation  
Journal of Obesity  
Volume 2011, Article ID 495101, 7 pages  
doi:10.1155/2011/495101

# Vitamin d deficiency in obese children and its relationship to insulin resistance and adipokines.

Journal of Obesity

J Obes. 2011;2011:495101. doi: 10.1155/2011/495101.

## 25(OH) D levels and Adiponectin



Hindawi Publishing Corporation  
Journal of Obesity  
Volume 2011, Article ID 495101, 7 pages  
doi:10.1155/2011/495101

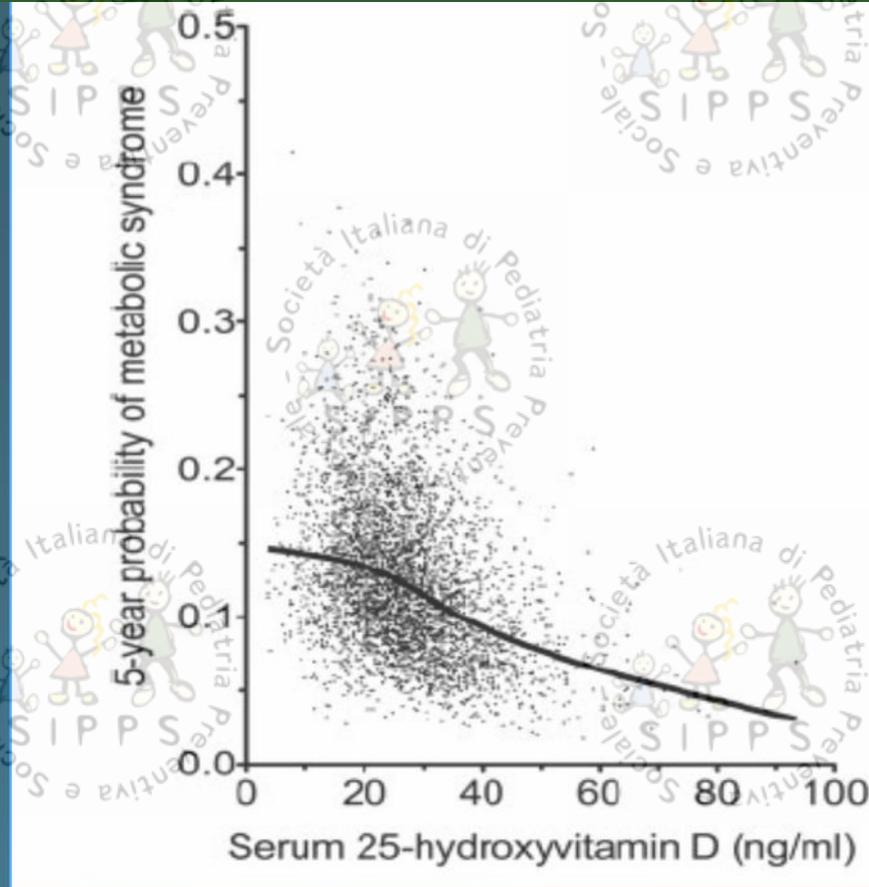
# Low serum 25-hydroxyvitamin D is associated with increased risk of the development of the metabolic syndrome at five years: results from a national, population-based prospective study (The Australian Diabetes, Obesity and Lifestyle Study: AusDiab).

**JCEM**

THE JOURNAL OF CLINICAL ENDOCRINOLOGY & METABOLISM

J Clin Endocrinol Metab. 2012 Jun;97(6):1953-61.

## Serum 25(OH) D and risk of MS development at 5 yr



# 25-Hydroxyvitamin D in Obese Youth Across the Spectrum of Glucose Tolerance From Normal to Prediabetes to Type 2 Diabetes

Diabetes Care

Diabetes Care. 2013 Jul;36(7):2048-53.

|                               | NGT           | IGT           | Type 2 diabetes | P       | NGT-IGT | NGT-type 2 diabetes | IGT-type 2 diabetes |
|-------------------------------|---------------|---------------|-----------------|---------|---------|---------------------|---------------------|
| n                             | 105           | 43            | 27              |         |         |                     |                     |
| Age (years)                   | 14.2 ± 2.0    | 14.3 ± 2.4    | 15.1 ± 1.7      | 0.104   |         |                     |                     |
| Puberty Tanner II and III     | 38 (36.2%)    | 6 (14%)       | 3 (11.1%)       | 0.003*  |         |                     |                     |
| Tanner IV and V               | 67 (63.8%)    | 37 (86%)      | 24 (88.9%)      |         |         |                     |                     |
| Sex                           |               |               |                 |         |         |                     |                     |
| Male                          | 51 (48.6%)    | 11 (25.6%)    | 12 (44.4%)      | 0.036*  |         |                     |                     |
| Female                        | 54 (51.4%)    | 32 (74.4%)    | 15 (55.6%)      |         |         |                     |                     |
| Race                          |               |               |                 |         |         |                     |                     |
| White                         | 54 (51.4%)    | 26 (60.5%)    | 14 (51.9%)      | 0.758   |         |                     |                     |
| Black                         | 51 (48.6%)    | 17 (39.5%)    | 13 (48.1%)      |         |         |                     |                     |
| Season                        |               |               |                 |         |         |                     |                     |
| WS                            | 45 (42.9%)    | 26 (60.5%)    | 13 (48.1%)      | 0.150   |         |                     |                     |
| SF                            | 60 (57.1%)    | 17 (39.5%)    | 14 (51.9%)      |         |         |                     |                     |
| Body composition              |               |               |                 |         |         |                     |                     |
| BMI (kg/m <sup>2</sup> )      | 35.2 ± 5.3    | 36.6 ± 6.5    | 36.8 ± 5.5      | 0.224   |         |                     |                     |
| BMI percentile                | 99.0 (1.0)    | 99.0 (1.2)    | 99.0 (0.5)      | 0.723   |         |                     |                     |
| Fat mass (kg)                 | 40.0 ± 9.7    | 42.0 ± 11.2   | 40.1 ± 9.9      | 0.540   |         |                     |                     |
| Percent body fat (%)          | 44.1 (7.1)    | 44.6 (6.7)    | 43.4 (7.3)      | 0.331   |         |                     |                     |
| VAT (cm <sup>2</sup> )        | 72.5 ± 35.6   | 80.1 ± 34.2   | 89.0 ± 39.8     | 0.098   |         |                     |                     |
| SAT (cm <sup>2</sup> )        | 517.6 ± 155.7 | 539.5 ± 159.3 | 535.9 ± 138.9   | 0.697   |         |                     |                     |
| Metabolic profile             |               |               |                 |         |         |                     |                     |
| Fasting glucose (mmol/L)      | 5.3 ± 0.4     | 5.4 ± 0.5     | 6.7 ± 1.3       | <0.001* | 1.000   | <0.001*             | <0.001*             |
| Fasting insulin (pmol/L)      | 213.8 ± 109.4 | 294.0 ± 170.2 | 244.8 ± 131.4   | <0.001* | 0.004*  | 0.880               | 0.431               |
| IS (μmol/kg/min per pmol/L)   | 2.1 (1.4)     | 1.2 (1.6)     | 1.0 (1.1)       | <0.001* | 0.002*  | 0.002*              | 1.000               |
| First-phase insulin (pmol/L)  | 1,157 (967)   | 1,308 (874)   | 445 (312)       | <0.001* | 1.000   | <0.001*             | <0.001*             |
| Second-phase insulin (pmol/L) | 1,420 (905)   | 1,783 (1,235) | 550 (713)       | <0.001* | 0.073   | <0.001*             | <0.001*             |
| DI (μmol/kg/min)              | 2,230 (2,202) | 1,578 (1,481) | 504 (463)       | <0.001* | 0.001*  | <0.001*             | 0.004*              |
| HbA <sub>1c</sub> (%)         | 5.3 ± 0.5     | 5.5 ± 0.4     | 6.7 ± 0.8       | <0.001* | 0.288   | <0.001*             | <0.001*             |
| Vitamin D                     |               |               |                 |         |         |                     |                     |
| 25(OH)D (nmol/L)              | 44.8 ± 20.3   | 39.5 ± 18.3   | 44.8 ± 13.5     | 0.289   |         |                     |                     |
| 25(OH)D status                |               |               |                 |         |         |                     |                     |
| Deficient                     | 70 (66.7%)    | 35 (81.4%)    | 16 (59.3%)      | 0.277   |         |                     |                     |
| Insufficient                  | 25 (23.8%)    | 6 (14.0%)     | 9 (33.3%)       |         |         |                     |                     |
| Sufficient                    | 10 (9.5%)     | 2 (4.6%)      | 2 (7.4%)        |         |         |                     |                     |

# Is the Association between Vitamin D and Cardiovascular Disease Risk Confounded by Obesity? Evidence from the Andhra Pradesh Children and Parents Study (APCAPS)



PLoS One. 2015 Jun 16;10(6):e0129468

Si suggerisce che l'associazione tra bassi livelli di vitamina D e fattori di rischio cardiovascolare sia non causale, ma dipenda piuttosto da fattori confondenti quali l'obesità e la scarsa attività fisica.

**L'ipovitaminosi D conferisce al bambino obeso un rischio maggiore per lo sviluppo delle complicanze?**

**Attualmente i dati derivanti dalla letteratura non consentono di affermare con certezza che l'ipovitaminosi D costituisca un'aggravante del quadro metabolico di un soggetto obeso.**

**La somministrazione di vitamina D è  
in grado di migliorare il profilo  
metabolico dei bambini obesi?**



# Effect of moderate-dose vitamin D supplementation on insulin sensitivity in vitamin D-deficient non-Western immigrants in the Netherlands: a randomized placebo-controlled trial

The American Journal of  
**CLINICAL NUTRITION**

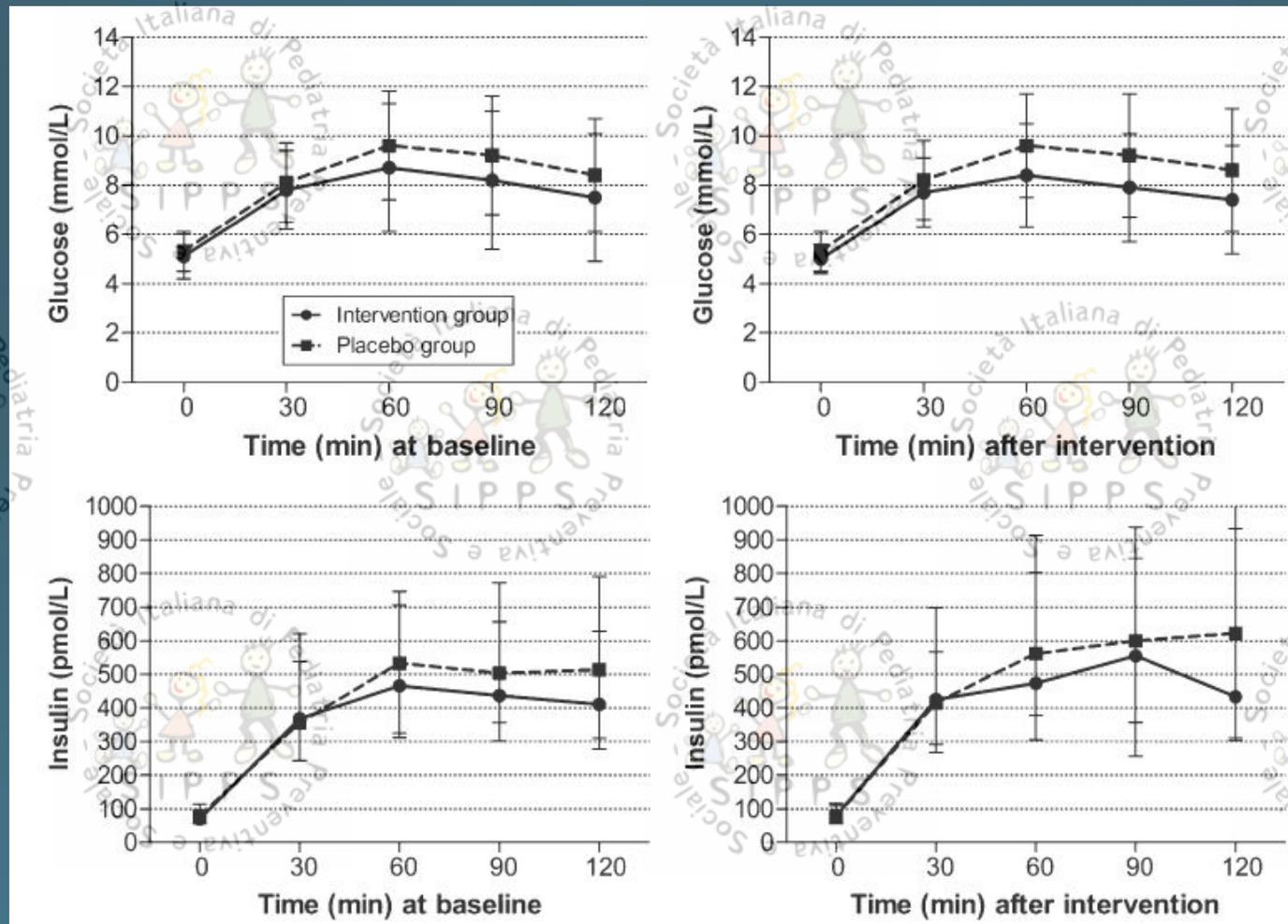
Am J Clin Nutr. 2014 Jul;100(1):152-60

- 130 adulti con BMI > 27 e vitamina D < 50 nmol/L
- 65 pazienti hanno assunto 1,200 UI/d di Vitamina D per 4 mesi e sono stati confrontati con 65 pazienti assegnati a placebo
- Obiettivo dello studio: valutare l'influenza della vitamina sulla funzione della beta-cellula pancreaticca e azione insulinica

# Effect of moderate-dose vitamin D supplementation on insulin sensitivity in vitamin D-deficient non-Western immigrants in the Netherlands: a randomized placebo-controlled trial

The American Journal of  
**CLINICAL NUTRITION**

Am J Clin Nutr. 2014 Jul;100(1):152-60



# No effect of high-dose vitamin D supplementation on glycemic status or cardiovascular risk factors in subjects with prediabetes



Diabetes Care. 2014 Aug;37(8):2123-31

- **511** soggetti affetti da IFG o IGT
- Randomizzati a 20.000UI/w di vitamina D o placebo per un anno
- End-point: miglioramento del rischio cardiovascolare e metabolico

# No effect of high-dose vitamin D supplementation on glycemic status or cardiovascular risk factors in subjects with prediabetes



Diabetes Care. 2014 Aug;37(8):2123-31

- La somministrazione di Vit. D non ha comportato alcun miglioramento significativo di:
  1. HbA<sub>1c</sub>
  2. HOMA e QUICKI
  3. IFG e IGT
  4. PCR
  5. Pressione Arteriosa
  6. Assetto lipidico

# Effects of combined calcium and vitamin D supplementation on insulin secretion, insulin sensitivity and $\beta$ -cell function in multi-ethnic vitamin D-deficient adults at risk for type 2 diabetes: a pilot randomized, placebo-controlled trial



PLoS One. 2014 Oct 9;9(10):e109607

- 80 adulti a rischio di diabete e deficit di Vitamina D
- 35 pazienti hanno assunto Vitamina D (2000-6000UI/d) e Calcio (1,2gr/d) per 6 mesi e sono stati confrontati con 45 pazienti assegnati a placebo
- Obiettivo dello studio: valutare l'influenza della vitamina sulla funzione della beta-cellula pancreatica, azione insulinica, markers infiammatori e metabolici

# Effects of combined calcium and vitamin D supplementation on insulin secretion, insulin sensitivity and $\beta$ -cell function in multi-ethnic vitamin D-deficient adults at risk for type 2 diabetes: a pilot randomized, placebo-controlled trial



PLoS One. 2014 Oct 9;9(10):e109607

|   | Baseline       | 6 months       | Mean Change<br>(95% CI) | P value*    |             |             |
|---|----------------|----------------|-------------------------|-------------|-------------|-------------|
|   |                |                |                         | Time        | Treatment   | Interaction |
| <b>HOMA2%<sup>†</sup></b>   |                |                |                         |             |             |             |
| Treatment (n = 34)  | 63.9 (29.0)    | 61.1 (25.6)    | -2.8 (-9.2, 3.5)        | 0.01 (0.29) | 0.96 (0.10) | 0.11 (0.68) |
| Placebo (n = 45)  | 55.1 (30.4)    | 52.5 (27.7)    | -2.6 (-8.2, 3.0)        |             |             |             |
| <b>Matsuda index</b>  |                |                |                         |             |             |             |
| Treatment (n = 33)  | 49.0 (25.8)    | 47.3 (21.5)    | -1.7 (-7.3, 3.8)        | 0.40 (0.37) | 0.89 (0.12) | 0.59 (0.87) |
| Placebo (n = 45)  | 40.5 (25.8)    | 39.3 (22.3)    | -1.2 (-5.1, 2.8)        |             |             |             |
| <b>Insulinogenic index, <math>\mu\text{U}/\text{mL}/\text{mmol}/\text{L}</math> <math>\mu\text{U}/\text{mL}</math> <math>\mu\text{U}/\text{mL}</math></b> |                |                |                         |             |             |             |
| Treatment (n = 33)  | 0.51 (0.28)    | 0.52 (0.25)    | 0.01 (-0.07, 0.10)      | 0.22 (0.67) | 0.47 (0.47) | 0.67 (0.89) |
| Placebo (n = 45)  | 0.55 (0.23)    | 0.56 (0.30)    | 0.01 (-0.05, 0.06)      |             |             |             |
| <b>AUC for C-peptide, <math>\text{nmol}/\text{L} \times 120 \text{ min}</math></b>  |                |                |                         |             |             |             |
| Treatment (n = 33)  | 410.8 (138.8)  | 418.0 (123.2)  | 7.2 (-14.1, 28.5)       | 0.71 (0.97) | 0.39 (0.10) | 0.75 (0.44) |
| Placebo (n = 43)  | 463.8 (132.7)  | 455.8 (97.3)   | -8.0 (-38.6, 22.7)      |             |             |             |
| <b>Disposition index, <math>\text{nmol}/\text{L} \times 120 \text{ min}^{\ddagger}</math></b>   |                |                |                         |             |             |             |
| Treatment (n = 33)  | 17 568 (4 936) | 17 863 (5 010) | 295 (-861, 1 451)       | 0.90 (0.70) | 0.30 (0.09) | 0.71 (0.31) |
| Placebo (n = 43)  | 16 926 (7 605) | 16 656 (7 356) | -270 (-1 502, 960)      |             |             |             |

# Effects of combined calcium and vitamin D supplementation on insulin secretion, insulin sensitivity and $\beta$ -cell function in multi-ethnic vitamin D-deficient adults at risk for type 2 diabetes: a pilot randomized, placebo-controlled trial



PLoS One. 2014 Oct 9;9(10):e109607

|                   | Mean Change from Baseline (95% CI) |                     |                     |                     | P value      |             |             |
|-------------------|------------------------------------|---------------------|---------------------|---------------------|--------------|-------------|-------------|
|                   | Baseline                           | $\Delta$ 2 months   | $\Delta$ 4 months   | $\Delta$ 6 months   | Time         | Treatment   | Interaction |
| <b>Weight, kg</b> |                                    |                     |                     |                     |              |             |             |
| Treatment (n=35)  | 85.7 (18.2)                        | -0.05 (-0.56, 0.46) | -0.03 (-0.75, 0.69) | -0.02 (-0.79, 0.75) | 0.13 (0.41)  | 0.68 (0.35) | 0.05 (0.29) |
| Placebo (n=45)    | 87.9 (21.2)                        | 0.69 (0.31, 1.07)   | 0.54 (-0.06, 1.14)  | 0.49 (-0.27, 1.25)  |              |             |             |
| <b>WC, cm</b>     |                                    |                     |                     |                     |              |             |             |
| Treatment (n=35)  | 103.0 (11.5)                       | 0.56 (-0.29, 1.42)  | 0.30 (-0.51, 1.11)  | -0.85 (-1.78, 0.07) | 0.66 (<0.01) | 0.28 (0.06) | 0.69 (0.95) |
| Placebo (n=45)    | 108.4 (15.3) <sup>†</sup>          | 0.84 (-0.01, 1.69)  | 0.22 (-0.48, 0.93)  | -0.59 (-1.60, 0.42) |              |             |             |
| <b>SBP, mmHg</b>  |                                    |                     |                     |                     |              |             |             |
| Treatment (n=35)  | 120.8 (14.0)                       | -0.11 (-4.90, 4.68) | 0.91 (-3.73, 5.56)  | 2.44 (-0.95, 5.83)  | 0.06 (0.99)  | 0.38 (0.11) | 0.68 (0.39) |
| Placebo (n=45)    | 126.8 (12.1) <sup>†</sup>          | -0.49 (-4.16, 3.19) | -1.20 (-5.10, 2.69) | -2.18 (-6.16, 1.80) |              |             |             |
| <b>DBP, mmHg</b>  |                                    |                     |                     |                     |              |             |             |
| Treatment (n=35)  | 73.1 (10.0)                        | -0.11 (-4.15, 3.92) | -0.66 (-5.65, 4.32) | -0.20 (-3.71, 3.30) | 0.38 (0.54)  | 0.24 (0.23) | 0.31 (0.30) |
| Placebo (n=45)    | 76.8 (8.9) <sup>†</sup>            | 2.24 (-0.67, 5.15)  | -1.36 (-3.93, 1.22) | -1.56 (-4.33, 1.22) |              |             |             |

# Obesità e Sindrome Metabolica

## Studi RCT in età Pediatrica

**Tabella 1. Studi randomizzati controllati atti a valutare l'efficacia della supplementazione con vitamina D sulle componenti della sindrome metabolica.**

| <b>Autori</b>  | <b>Età, anni</b> | <b>Efficacia della vitamina D*</b> | <b>Numero di soggetti arruolati (casi + controlli)</b> | <b>Paese</b> |
|----------------|------------------|------------------------------------|--|--------------|
| Dong 2010      | 14-16            | Si                                 | 44 (23 + 21)   | USA          |
| Kelishadi 2013 | 10-16            | Si                                 | 43 (21 + 22)   | Iran         |
| Belenchia 2013 | 9-19             | Si                                 | 35 (18 + 17)   | USA          |
| Nader 2014     | 12-18            | No                                 | 44 (20 + 24)   | USA          |
| Shah 2015      | 11-17            | No                                 | 31 (14 + 17)   | USA          |
| Javed 2015     | 13-17            | No                                 | 46 (23 + 23)   | USA          |

# A 16-week randomized clinical trial of 2000 international units daily vitamin D3 supplementation in black youth: 25-hydroxyvitamin D, adiposity, and arterial stiffness

JCEM

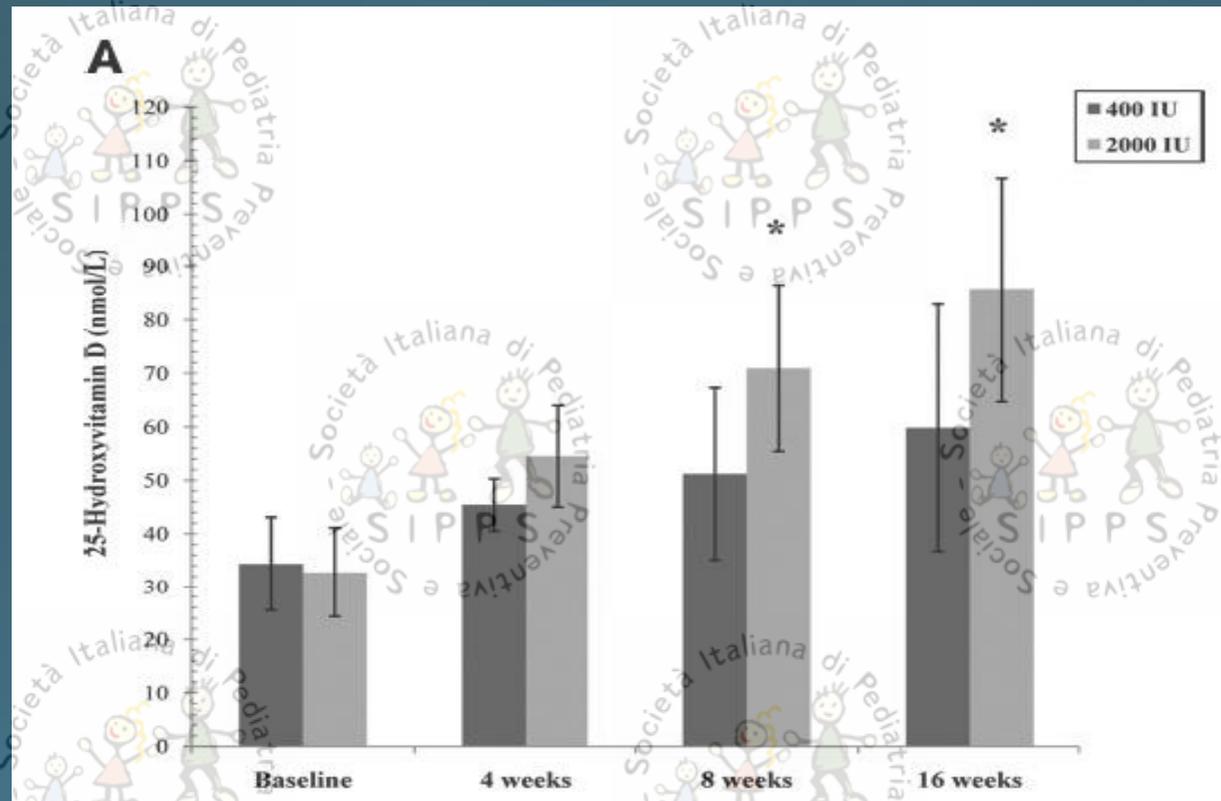
J Clin Endocrinol Metab. 2010 Oct;95(10):4584-91

- **49 Adolescenti Afro-Americani, età media  $16.3 \pm 1.4$  aa**
- **24 pazienti hanno assunto 400UI/d di Vitamina D per 16w e sono stati confrontati con 25 pazienti che hanno assunto 2000UI/d**
- **Gli autori hanno valutato: Pressione arteriosa sistolica (PAS) e diastolica (PAD), Stiffness arteriosa**

# A 16-week randomized clinical trial of 2000 international units daily vitamin D3 supplementation in black youth: 25-hydroxyvitamin D, adiposity, and arterial stiffness

JCEM

J Clin Endocrinol Metab. 2010 Oct;95(10):4584-91



- I pazienti che hanno assunto 400UI/d a 16w risultavano ancora in parte insufficienti o deficienti

# A 16-week randomized clinical trial of 2000 international units daily vitamin D3 supplementation in black youth: 25-hydroxyvitamin D, adiposity, and arterial stiffness

JCEM

J Clin Endocrinol Metab. 2010 Oct;95(10):4584-91

| PWV                   | Control (400 IU; n = 17) |             | Experimental (2000 IU; n = 18) |             | Time × group interaction<br>P value |
|-----------------------|--------------------------|-------------|--------------------------------|-------------|-------------------------------------|
|                       | Baseline                 | 16 wk       | Baseline                       | 16 wk       |                                     |
| Carotid-femoral       | 5.38 ± 0.53              | 5.71 ± 0.75 | 5.41 ± 0.73                    | 5.33 ± 0.79 | 0.019                               |
| Carotid-radial        | 7.77 ± 1.64              | 7.92 ± 0.89 | 7.83 ± 1.14                    | 7.81 ± 0.98 | 0.93                                |
| Carotid-distal (foot) | 6.87 ± 0.64              | 7.22 ± 0.79 | 6.75 ± 0.64                    | 6.71 ± 0.63 | 0.46                                |

## Correcting vitamin D insufficiency improves insulin sensitivity in obese adolescents: a randomized controlled trial

 The American Journal of  
**CLINICAL NUTRITION**

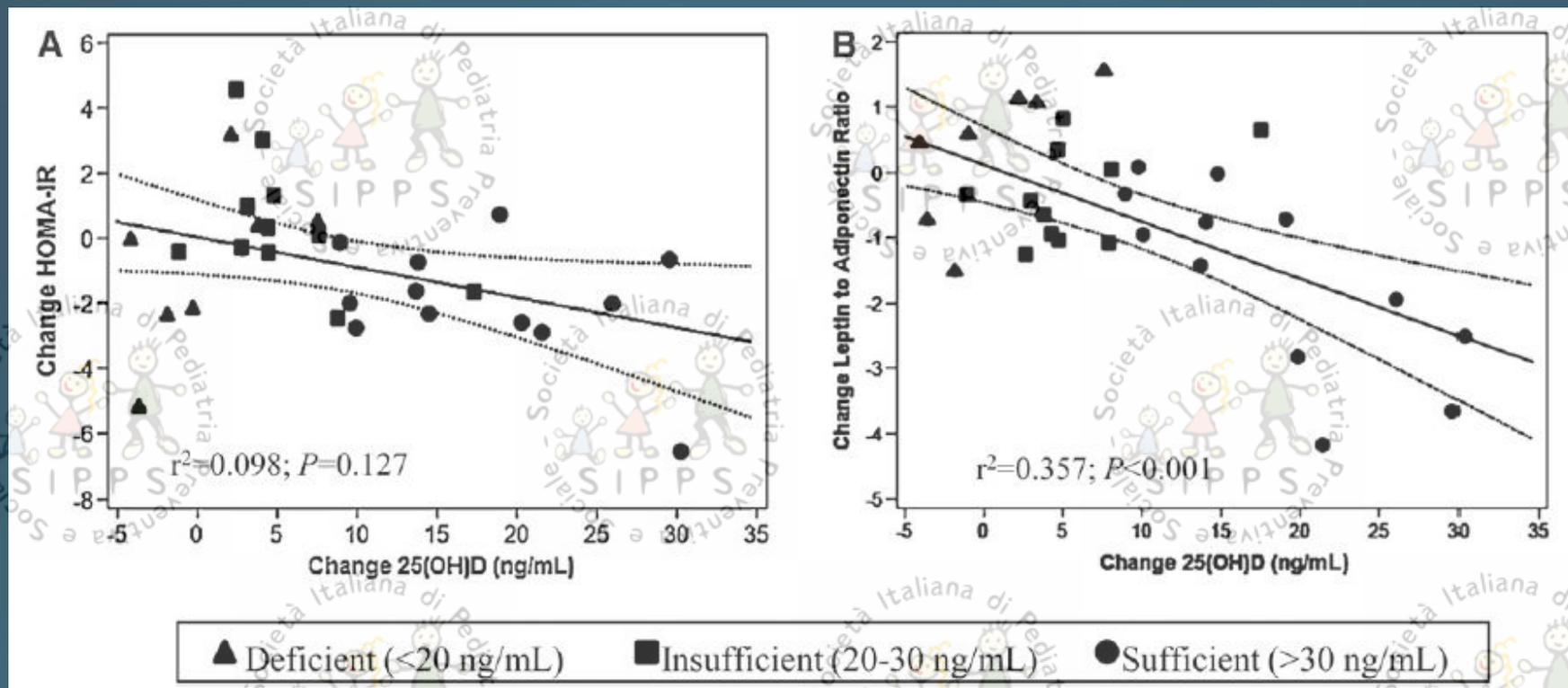
Am J Clin Nutr. 2013 Apr;97(4):774-81

- 35 pazienti, età media  $14.1 \pm 2.8$  aa, con  $BMI > 85^{\circ}pc$
- 18 pazienti hanno assunto 4.000UI/d di Vitamina D per 6 mesi e sono stati confrontati con 17 pazienti assegnati a placebo
- Scopo dello studio: riduzione dell'insulino-resistenza (HOMA-IR e QUICKI), dei markers infiammatori (IL-6, TNF- $\alpha$ , PCR) e delle adipokine (leptina e adiponectina)

# Correcting vitamin D insufficiency improves insulin sensitivity in obese adolescents: a randomized controlled trial

The American Journal of  
**CLINICAL NUTRITION**

Am J Clin Nutr. 2013 Apr;97(4):774-81



- Riduzione dell'Insulino-Resistenza ( $p=0,033$ )
- Riduzione del rapporto Leptina/Adiponectina ( $p=0,045$ )
- Nessuna riduzione significativa dei markers infiammatori

# Effects of vitamin D supplementation on insulin resistance and cardiometabolic risk factors in children with metabolic syndrome: a triple-masked controlled trial

The JOURNAL  
of PEDIATRICS

J Pediatr (Rio J). 2014 Jan-Feb;90(1):28-34

- 43 pazienti obesi, di età compresa tra 10 e 16aa
- 21 pazienti hanno assunto 300.000UI di Vitamina D in 12w e sono stati confrontati con 22 pazienti assegnati a placebo
- End-point: miglioramento del profilo cardio-metabolico dei pazienti dopo terapia

# Effects of vitamin D supplementation on insulin resistance and cardiometabolic risk factors in children with metabolic syndrome: a triple-masked controlled trial

The JOURNAL  
of PEDIATRICS

J Pediatr (Rio J). 2014 Jan-Feb;90(1):28-34

**A 12 settimane i casi hanno mostrato:**

- **Riduzione significativa dei livelli di Trigliceridi ( $p=0,02$ ) rispetto ai controlli**
- **Riduzione dell' HOMA-IR ( $p=0,02$ )**
- **Riduzione del rischio cardio-metabolico, espresso come score cMet (incluso: circonferenza vita, glicemia basale, HDL, Trigliceridi e pressione arteriosa media) ( $p=0,04$ )**
- **Nessun miglioramento significativo della PAS, PAD, Glicemia basale, colesterolo totale e frazionato**

# Effect of vitamin D3 supplementation on serum 25(OH)D, lipids and markers of insulin resistance in obese adolescents: a prospective, randomized, placebo-controlled pilot trial



Horm Res Paediatr. 2014;82(2):107-12

- 44 adolescenti obesi (12-18 aa)
- 20 pazienti hanno assunto 2.000UI/d di Vitamina D per 3 mesi e sono stati confrontati con 24 pazienti assegnati a placebo
- Gli autori hanno indagato le variazioni dei livelli sierici della vitamina e il miglioramento del profilo metabolico

# Effect of vitamin D3 supplementation on serum 25(OH)D, lipids and markers of insulin resistance in obese adolescents: a prospective, randomized, placebo-controlled pilot trial



Horm Res Paediatr. 2014;82(2):107-12

- Il gruppo di pazienti assegnato alla Vitamina D ha mostrato un'elevazione significativa dei livelli sierici della vitamina rispetto ai controlli
- Gli autori non hanno rilevato alcuna differenza statisticamente significativa tra i due gruppi per nessuno dei parametri presi in esame: Glicemia a digiuno, Insulinemia basale, PCR, Trigliceridi, Colesterolo totale, LDL ed HDL

# Cholecalciferol supplementation does not influence $\beta$ -cell function and insulin action in obese adolescents: a prospective double-blind randomized trial



J Nutr. 2015 Feb;145(2):284-90

- 46 adolescenti obesi (12-18 aa)
- 23 pazienti hanno assunto 2.000UI/d di Vitamina D per 12 settimane e sono stati confrontati con 23 pazienti assegnati a 400UI/d di Vitamina D
- Obiettivo dello studio: valutare l'influenza dei due schemi posologici sulla funzione della beta-cellula pancreaticca e azione insulinica

# Cholecalciferol supplementation does not influence $\beta$ -cell function and insulin action in obese adolescents: a prospective double-blind randomized trial



J Nutr. 2015 Feb;145(2):284-90

- L'assunzione di 400UI/d di vitamina D non induce un innalzamento dei livelli plasmatici
- I pazienti non mostrano alcun miglioramento del quadro metabolico rispetto alla valutazione basale in entrambi gli schemi posologici

# Large Doses of Vitamin D Fail to Increase 25-Hydroxyvitamin D Levels or to Alter Cardiovascular Risk Factors in Obese Adolescents: A Pilot Study



J Adolesc Health. 2015 Jul;57(1):19-23

- **31 pazienti, età compresa tra 11-18aa, con BMI>85°pc**
- **14 pazienti hanno assunto 150.000UI/12w di Vitamina D per 2 volte e sono stati confrontati con 17 pazienti assegnati a placebo**
- **Scopo dello studio: riduzione dei markers infiammatori (IL-6, IL-10, TNF- $\alpha$ ), dell'adiponectina e miglioramento del profilo metabolico (HbA<sub>1c</sub>, Trigliceridi, HDL)**

# Large Doses of Vitamin D Fail to Increase 25-Hydroxyvitamin D Levels or to Alter Cardiovascular Risk Factors in Obese Adolescents: A Pilot Study

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J Adolesc Health. 2015 Jul;57(1):19-23

- La somministrazione di Vitamina D secondo la posologia 150.000UI/d ogni 12 settimane non ha comportato un'elevazione significativa dei livelli sierici della vitamina nei casi rispetto ai controlli
- Gli autori non hanno rilevato alcuna differenza statisticamente significativa tra i due gruppi per nessuno dei parametri presi in esame

**La somministrazione di vitamina D è  
in grado di migliorare il profilo  
metabolico dei pazienti?**

**Data l'incoerenza e l'esiguo numero di studi  
prodotti, non si può concludere circa l'efficacia  
della supplementazione con vitamina D nel  
migliorare le complicanze dell'obesità.**

I pazienti obesi devono essere sottoposti a profilassi con vitamina D?



# I pazienti obesi devono essere sottoposti a profilassi con vitamina D?

- 1. Nel bambino e nell'adolescente obeso si consiglia la profilassi con vitamina D alla dose di 1.000-1.500 UI/die durante il periodo compreso tra il termine dell'autunno e l'inizio della primavera (novembre-aprile). Nel soggetto obeso, infatti, per garantire uno stato vitaminico D adeguato sono necessari apporti di vitamina D 2-3 volte superiori rispetto ai fabbisogni consigliati per l'età.**

**2. Nei soggetti obesi si ribadisce inoltre l'importanza di promuovere l'esposizione alla luce solare e l'attività fisica all'aria aperta durante il periodo estivo.**

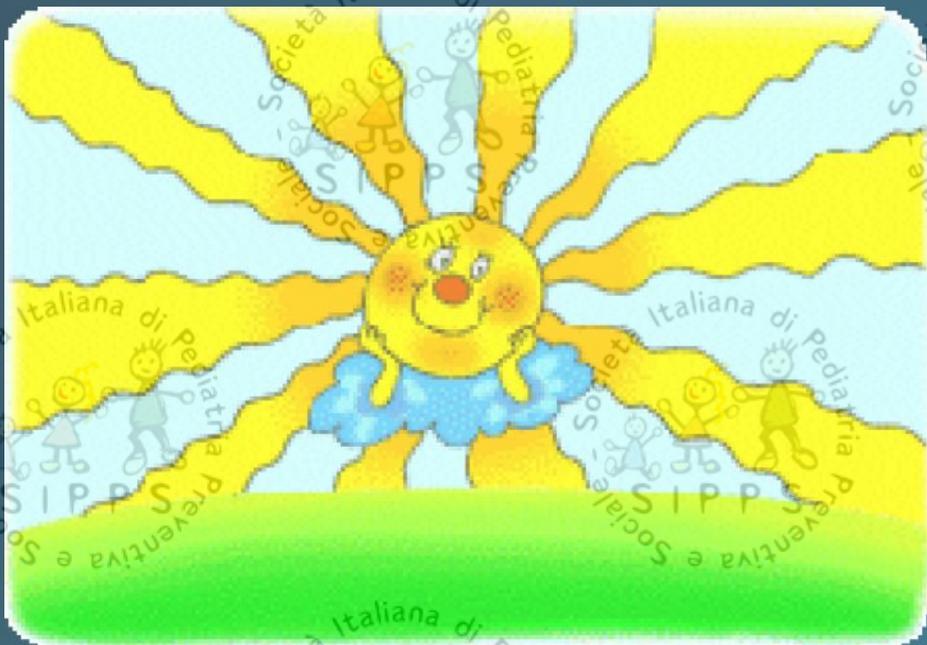
E' indicato eseguire il dosaggio sierico della vitamina D nel soggetto obeso?



**E' indicato eseguire il dosaggio sierico della vitamina D nel soggetto obeso?**

**Non si consiglia il dosaggio routinario dei livelli di 25(OH)D prima o durante la profilassi con vitamina D nel soggetto obeso. Nel caso in cui il soggetto non riceva la profilassi e segua uno stile di vita sedentario prevalentemente indoor, si consiglia di effettuare il dosaggio sierico per individuare un eventuale deficit.**

**GRAZIE PER L'ATTENZIONE!**



**Emanuele Miraglia del Giudice**  
Seconda Università degli Studi di Napoli  
Dipartimento della Donna del Bambino e di Chirurgia Generale e Specialistica

