



Consensus Vitamina D in età pediatrica

Salute ossea



Francesco Vierucci, S.C. Pediatria, Lucca

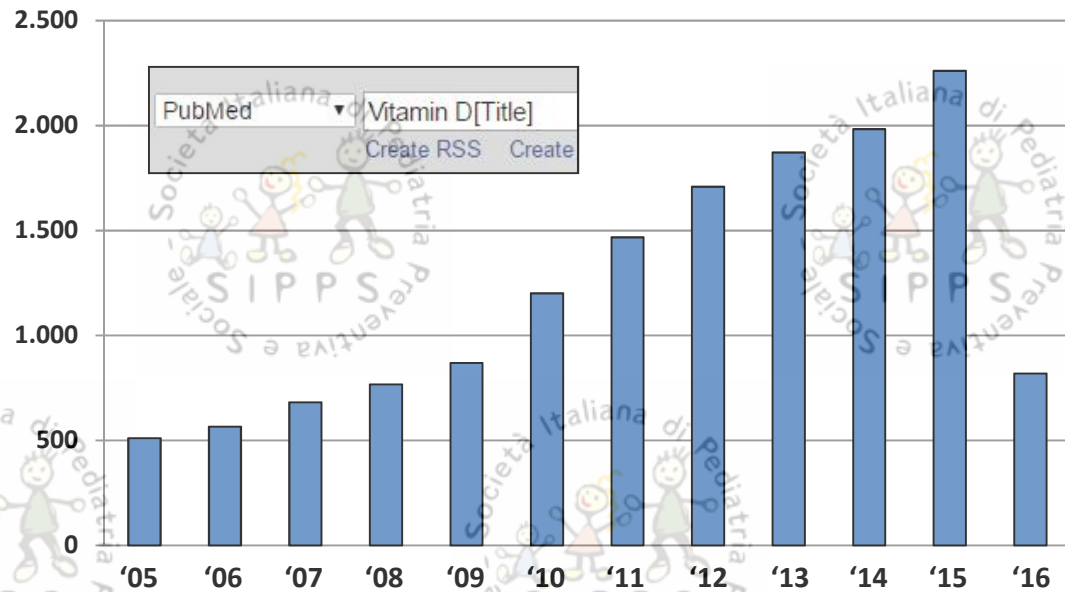
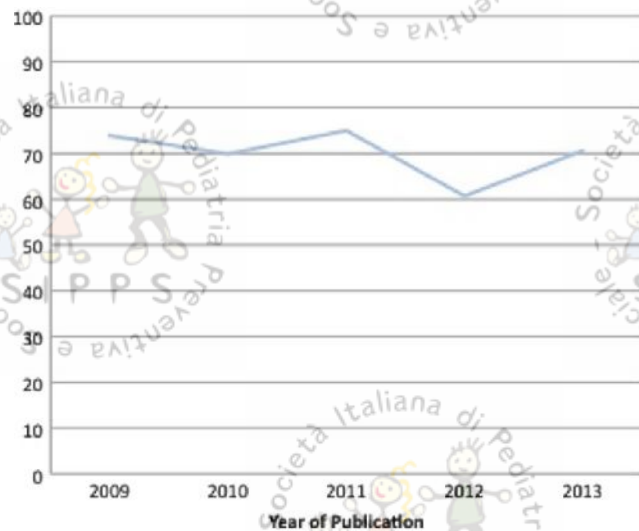


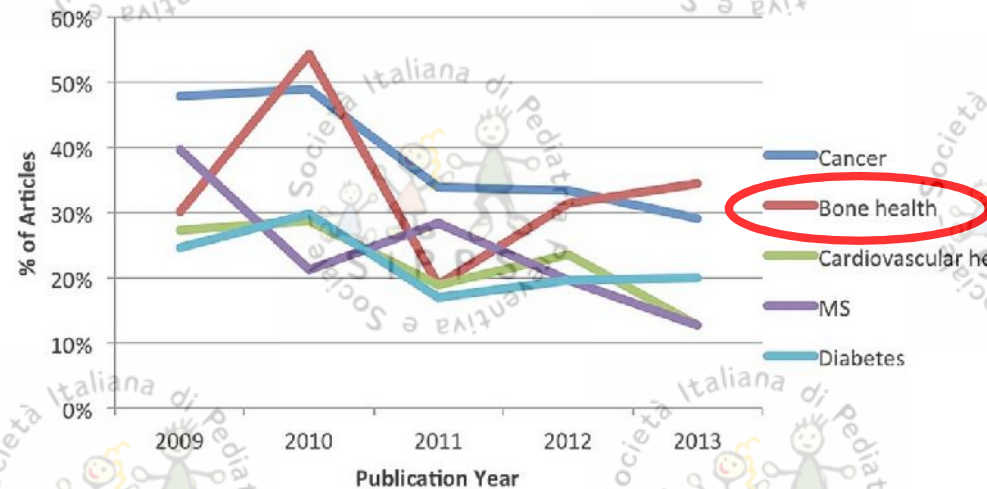
Table 1 Newspapers included in sample

Newspaper title	Country	Number of articles
Globe and Mail	Canada	45
Montreal Gazette	Canada	9
National Post	Canada	12
Toronto Star	Canada	19
Vancouver Sun	Canada	18
The Los Angeles Times	USA	11
The New York Times	USA	15
USA Today	USA	11
The Wall Street Journal	USA	24
The Washington Post	USA	26
The Daily Telegraph	UK	9
Financial Times	UK	8
The Guardian	UK	19
The Independent	UK	11
The Times (London)	UK	57
Total		294

Print articles appearing in elite newspapers that addressed vitamin D in 2009-2014 period.



% of articles that utilized one or both of the frames "supplementation may be beneficial" and/or "supplementation is necessary" by year.



Most frequently named health conditions discussed in relationship to vitamin D in newspapers.

alfemminile

(30 settembre 2011)



Forum

Angy 2255

...siamo tornati in
no e ha
appa (porzioni un

giornalmente la
strano che in
hanno
o ma siccome non
li volevo sapere
eno, la vostra
Ciaooo

Vitamina d

...ciao io sono mamma di un bambino di 2 mesi e anche io gli do la vitamina D
è molto importante nel primo anno di vita...

Soraya il gatto

Il giappone

e' un paese modello, per l'educazione scolastica e per la dieta, infatti e' uno dei paesi con il tasso di longevita maggiore al mondo!
la loro alimentazione e' del tutto priva di latticini ma le donne non hanno nessuna l'osteoporosi, malattia presente invece in occidente...idem in cina.
Il calcio e la vitamina D sono presenti in eccellenti dosi anche nelle alghe (i giapponesi le usano molto crude e cotte) nei molluschi e nel pesce in generale... inoltre, i bimbi giapponesi praticano tutti sport all'aria aperta, il che favorisce la calcificazione e l'assorbimento di vit. D.

Solo che siamo in italia, e se vuoi seguire lo stile "giapponese" devi essere coerente fino alla fine: tantissimo sole e vita all'aerto, anche a gennaio ovviamente e anche col tempo brutto, alimentazione varia con tanti cibi macrobiotici (alghe soprattutto) con lo svezzamento, e assunzione minima di latticini (a parte il tuo latte).

Io anche sono contro le vitamine e alla mia non ho mai dato vit. D, ma da gennaio (quando e' nata) la espongo regolarmente al sole ogni giorno...ovviamente senza filtri senno non serve a niente (eccezione fatta per le ore centrali della giornata).

se pensi di non riuscire a tenere questo ritmo, devi sopperire con vit. D e K...

cmque non tutti i pediatri la consigliano, la mia per esemoio, vedendo la vita che le facevo fare, non me li ha mai consigliati.

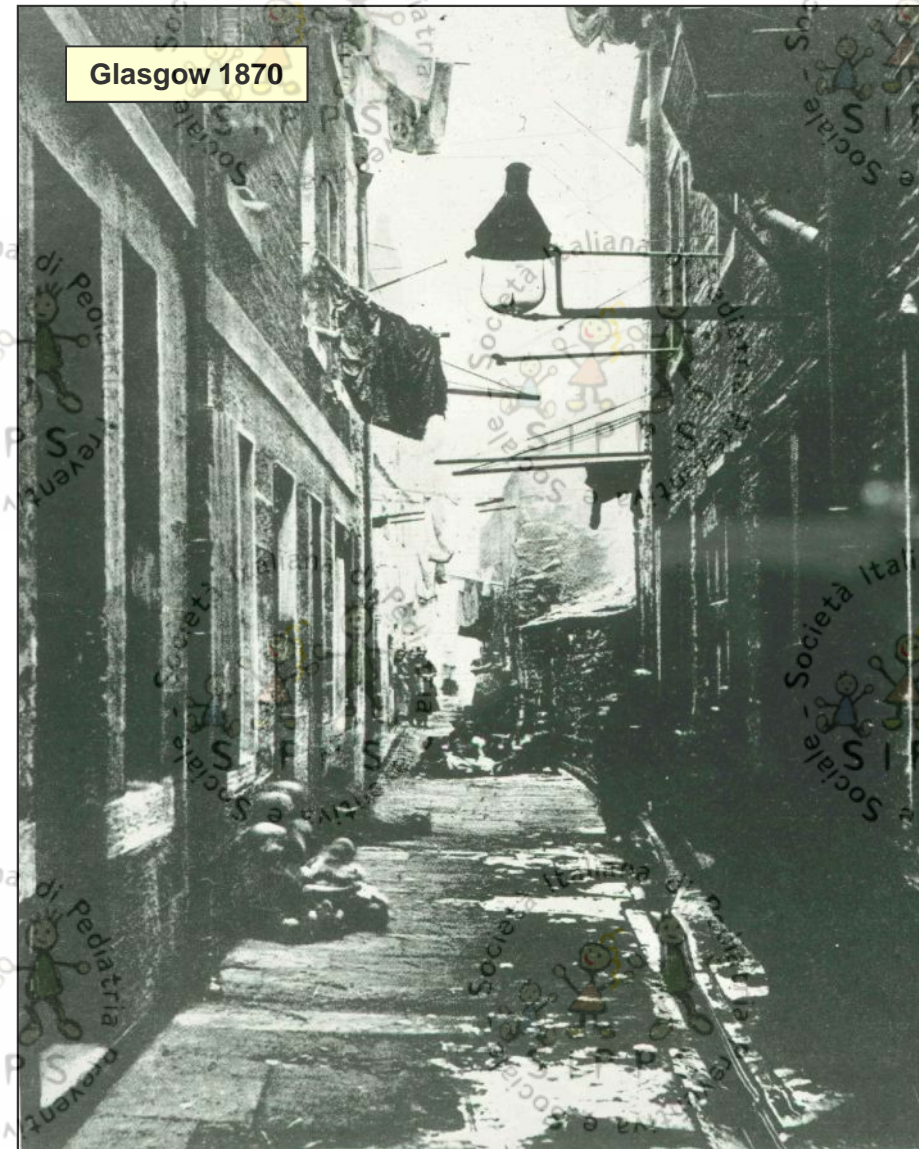


1634: prima comparsa del termine "rickets"

A generall Bill for this present yeere, ending the 18. of December 1634. according to the report made to the Kings most excellent Ma^{ty} By the Company of Parish Clerks of London, &c.

The Diseases and Casualties this yeere.

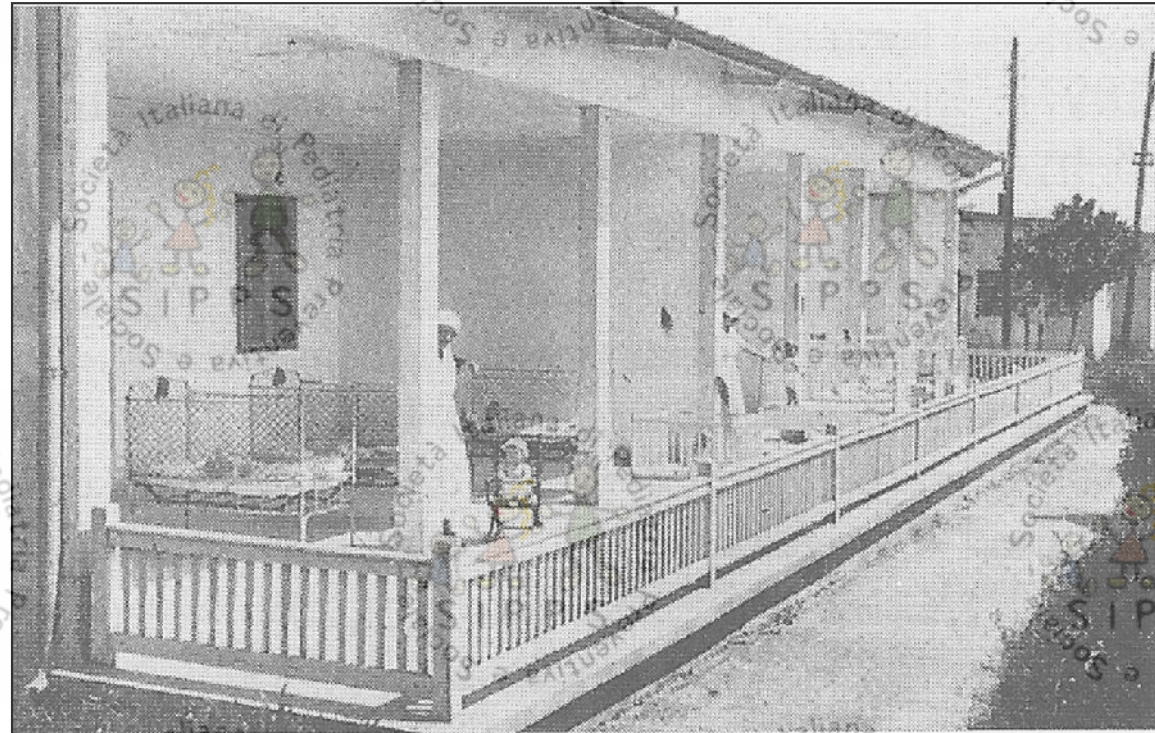
A Bortive and Stilborne	475	Falling Sicknesse	5	Plague	1
Aged	612	Feaver	1279	Plannet	4
Ague	11	Fistula	11	Plurisie and Splene	21
Appoplex and Meagrome	35	Flocks and small Pox	1354	Poysoned	2
Bit with a mad dogge	1	French Pox	17	Purples and spotted Feaver	125
Bleeding	3	Gangrene	10	Quintane	4
Bloody flux scowring & flux	512	Goute	5	Rickets	14
Burnt and scalded	3	Greene sicknes	2	Rifings of the lights and	
Cancer and Canker	9	Griefe	15	Mother	84
Childbed	123	Hanged themselves	3	Rupture	3
Chrifomes and Infants	2315	laundies and Yellowes	45	Scurvey, Swine Pox and	
Cold and Cough	54	lawfalne	19	Bleach	9
Collicke Stone & Strangury	49	Impostume	62	Sores, broken and bruifed	
Consumption	1955	Kild by severall accidents,	41	Limbes	19
Convulsion and Crampe	386	Kings Evill	20	Suddenly	63
Cut of the Stone	5	Livergrowne	77	Surfet	114
Dead in the streete & fields,		Lunatique	2	Teeth	454
and starved	8	Measles	33	Thrush and Sore mouth	31
Dropfie and Swelling	233	Murtherd	6	Timpany	17
Drowned	32	Over-laid & starved at nurse	14	Tiffike	15
Executed	13	Palfe	21	Vomiting	5
		Piles	1	Wormes	28
Males	5035				
Christened Females	4820				
In all	9855				
Males	5676				
Buried Females	5224				
In all	10900				
		Whereof, of the Plague	1		
		Increased in the Burials in the 122 Parishes & at the Pesthouse this yeere.	2508		
		Increased of the Plague in the 122 Parishes and at the Pesthouse this yeere.	1		



Rickets before the discovery of vitamin D: cod liver oil and heliotherapy



The use of cod liver oil in the treatment of **tuberculosis** was widely practiced in the late 19th and early 20th centuries.



The veranda of the Meidling Hospital in Vienna with infants “receiving outdoor treatment in sun and shade respectively” (1923).

American Journal of Public Health and THE NATION'S HEALTH

Volume 26

July, 1936

Number 7

Vitamin D in Child Health*

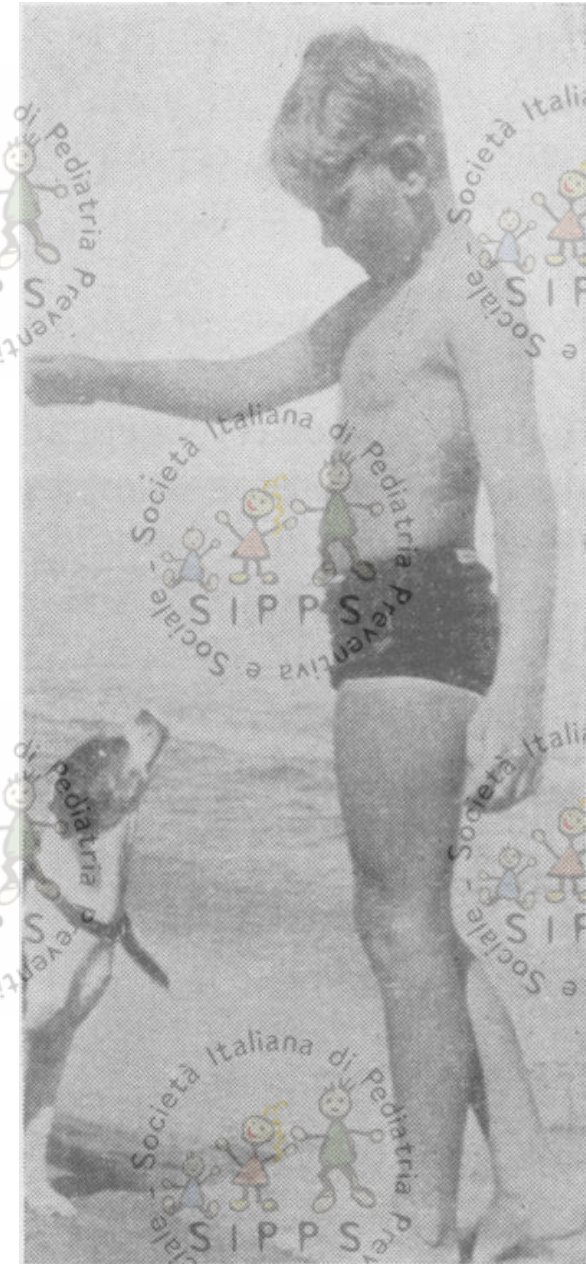
FRED O. TONNEY, M.D., F.A.P.H.A.

The influence of vitamin D upon the child's physical development is viewed from the standpoint of:

- growth,
- **bone development,**
- tooth development,
- posture,
- **resistance to the infections.**



A rachitic child in typical lax posture



A normal child with good muscle tonus

27 June 1964

BRITISH
MEDICAL JOURNAL

Vitamin D as a Public Health Problem

Vitamin D deficiency in Europe: pandemic?

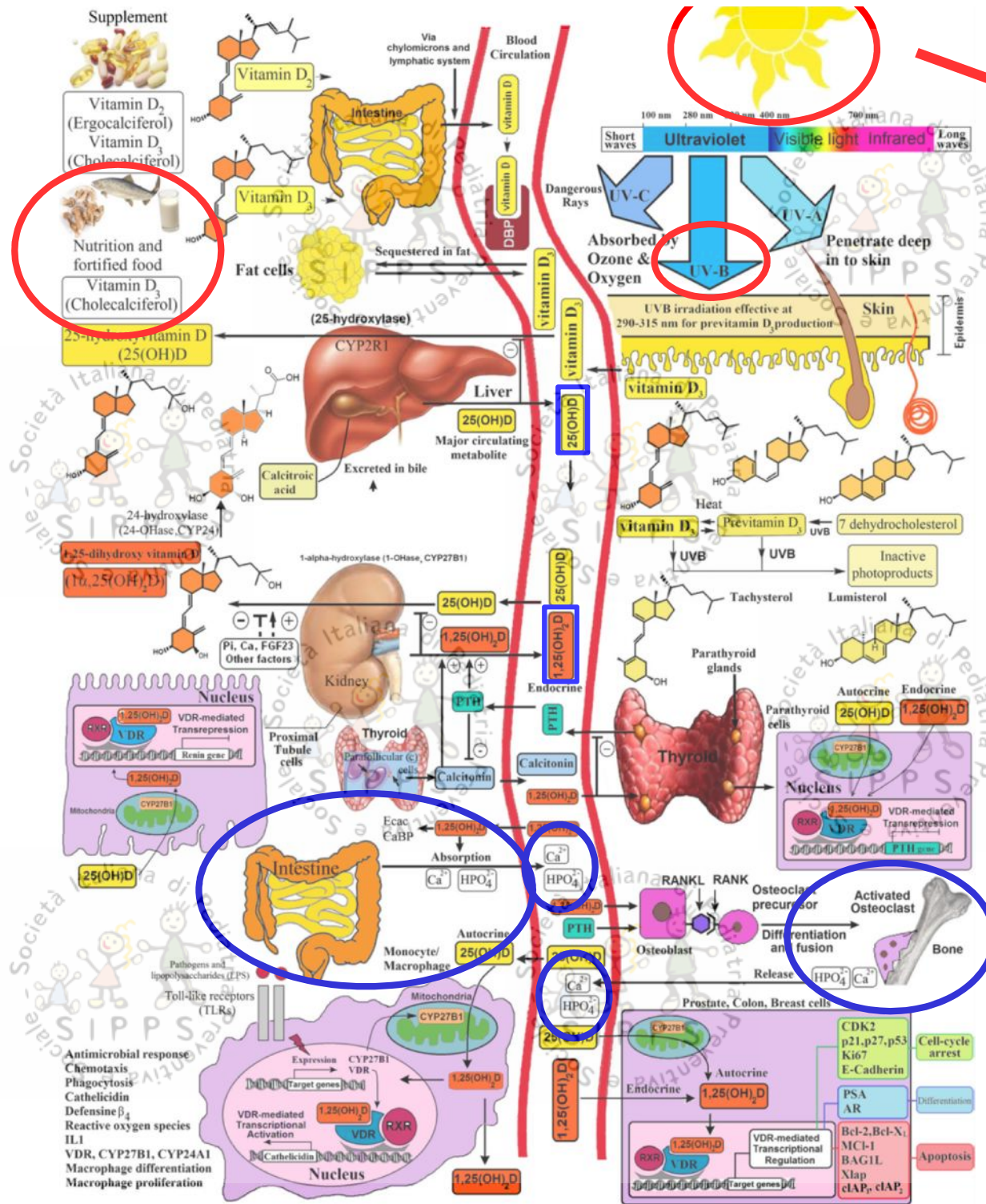
Low vitamin D status in Europe: moving from evidence to sound public health policies¹

Sadeq A Quraishi,² Carlos A Camargo Jr,³ and JoAnn E Manson^{4}*

Am J Clin Nutr, Apr 2016

10%

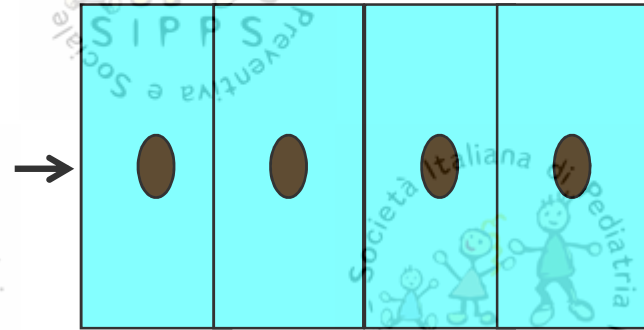
90%



(Saggese G, Vierucci F, et al. Eur J Pediatr 2015)

Ipofosfatemia: denominatore comune di tutti i rachitismi

↓ Pi



Osteoblasti

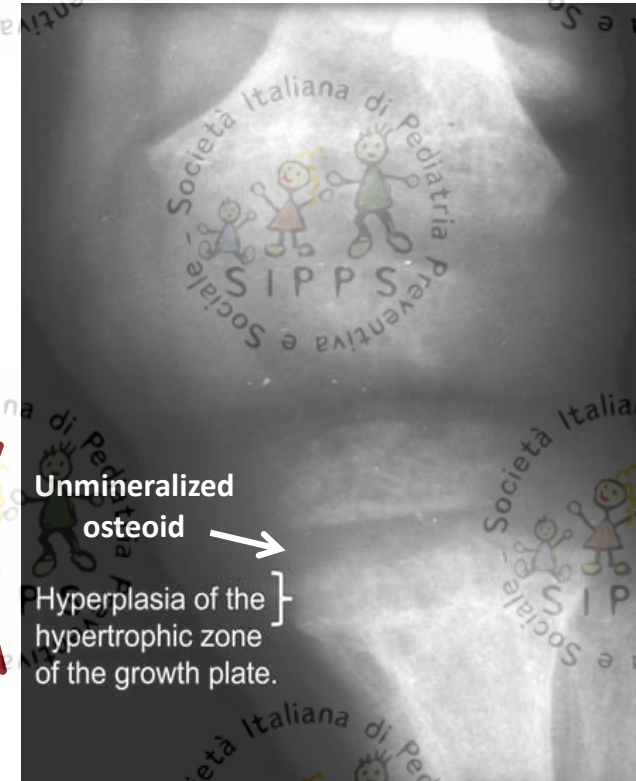
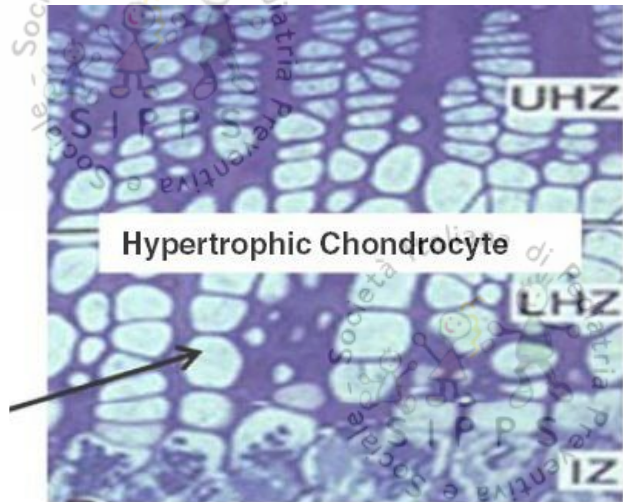
Alterazione del prodotto
calcio-fosforo

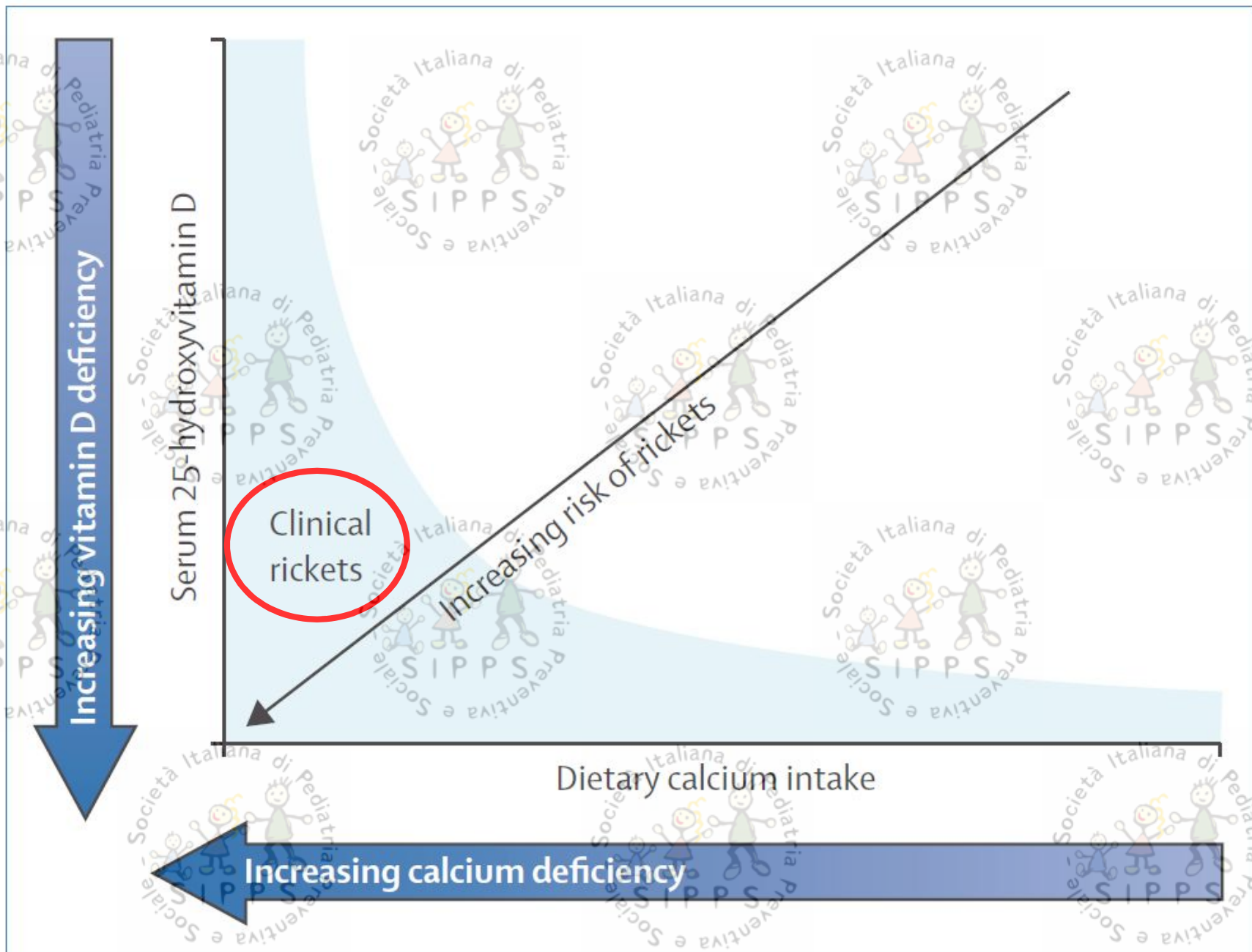
Alterazioni della
mineralizzazione ossea
(OSTEOMALACIA)

↓ Apoptosi dei condrociti

Iperplasia zona ipertrofica
cartilagine di accrescimento
(RACHITISMO)

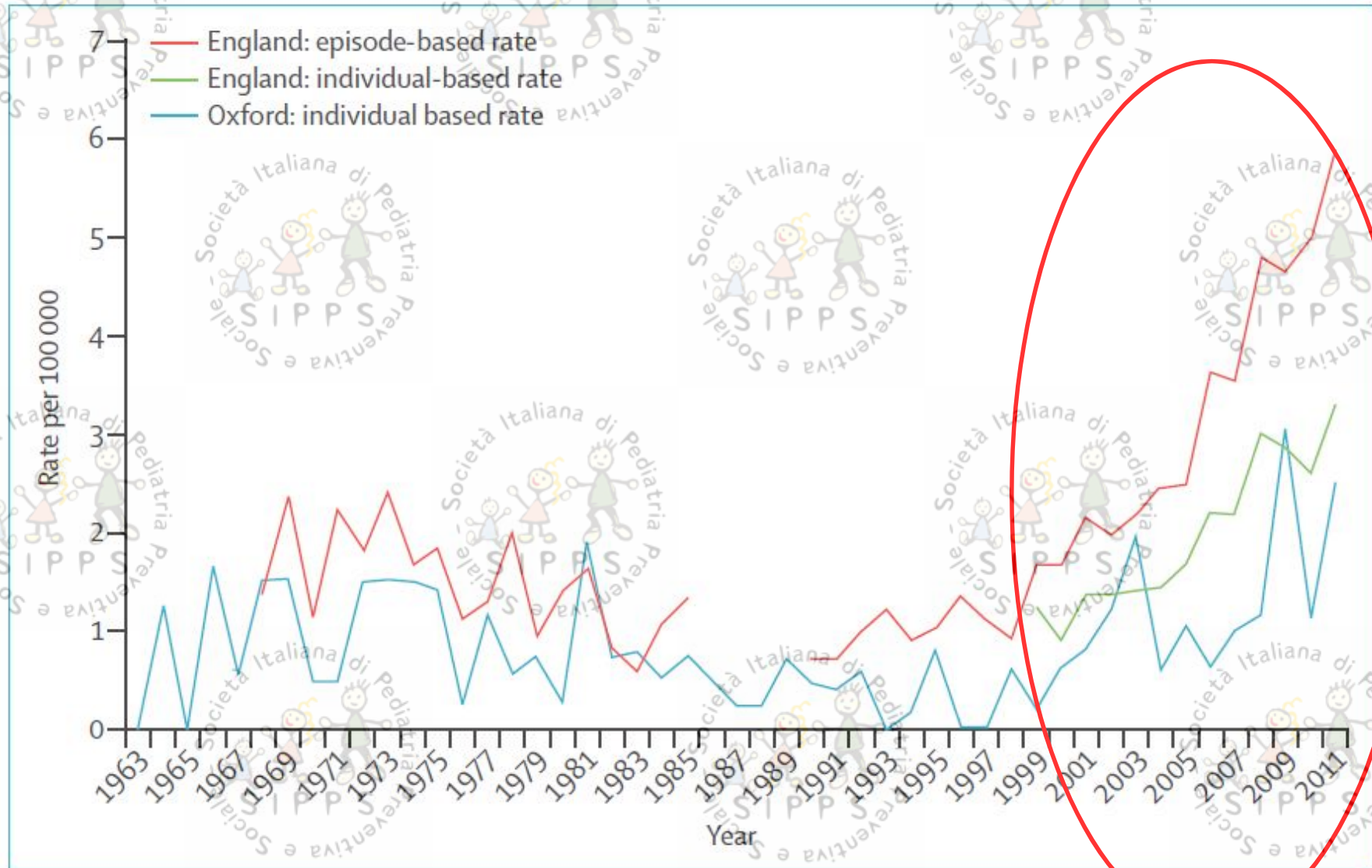
↓ Pi





(Högler , Munns. Lancet Glob Health Apr 2016)

Hospitalization for children with rickets in England: a historical perspective



(Goldacre et al. Lancet 2014)

Diagnosi di rachitismo carenziale

Anamnesi

Fattori di rischio di deficit di vitamina D

Esame obiettivo

Segni scheletrici
Sintomi-segni non scheletrici

Esami ematici

RX metafisi
(per conferma)

- No profilassi materna con vitamina D in gravidanza
- **Allattamento al seno esclusivo prolungato, in assenza di profilassi con vitamina D**
- Ridotta esposizione solare
- Elevata pigmentazione melanica della cute
- Insufficiente apporto di calcio con la dieta (dieta vegana, dieta ricca in fitati)

Segni scheletrici

10 mesi
Origine senegalese



Braccialetto rachitico

Bozze frontali, solco di Harrison

2,5 anni
Origine marocchina



Caviglia rachitica

Rosario rachitico, valgismo

Biochemical findings in different stages of vitamin D deficiency

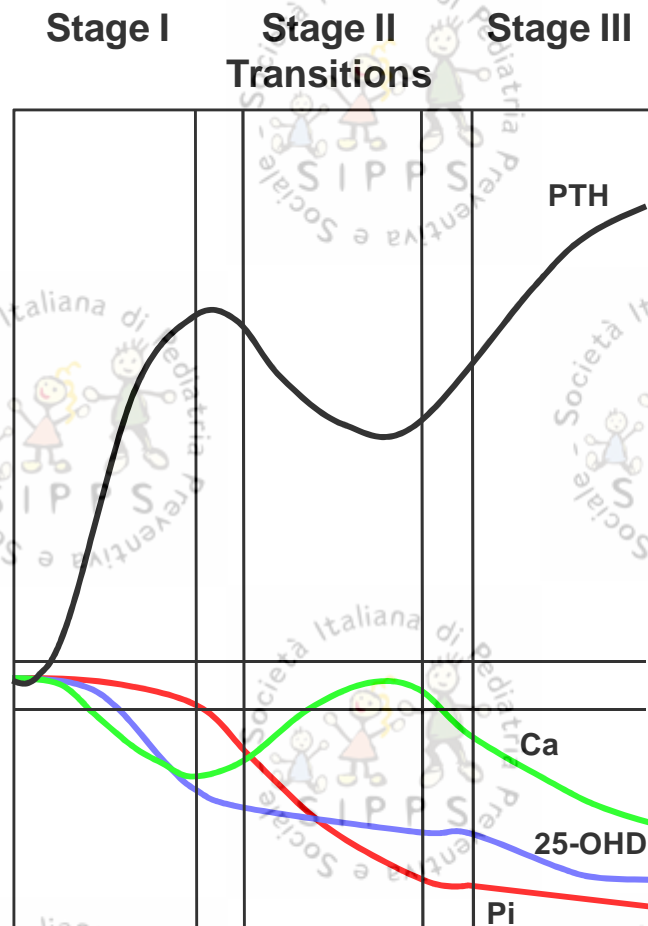
Ipofofatemia

Ipocalcemia

Incremento fosf. alcalina

IperPTH

Deficit di vitamina D



(Arnaud et al. Vitamin D and problems of uremic bone disease 1975)

	Plasma Ca ⁺⁺	Plasma PO ₄	ALP	PTH	25(OH)-D	1,25(OH) ₂ -D	Radiograph Changes
Early	N/↓	N/↓	↑	↑	↓	N	Osteopenia
Moderate	N/↓	↓	↑↑	↑↑	↓↓	↑	Rachitic changes +
Severe	↓↓	↓↓	↑↑↑	↑↑↑	↓↓↓	↑/N/↓	Rachitic changes ++

Segni radiologici a carico degli arti (metafisi)



M. M. (10 mesi): rachitismo con ipocalcemia

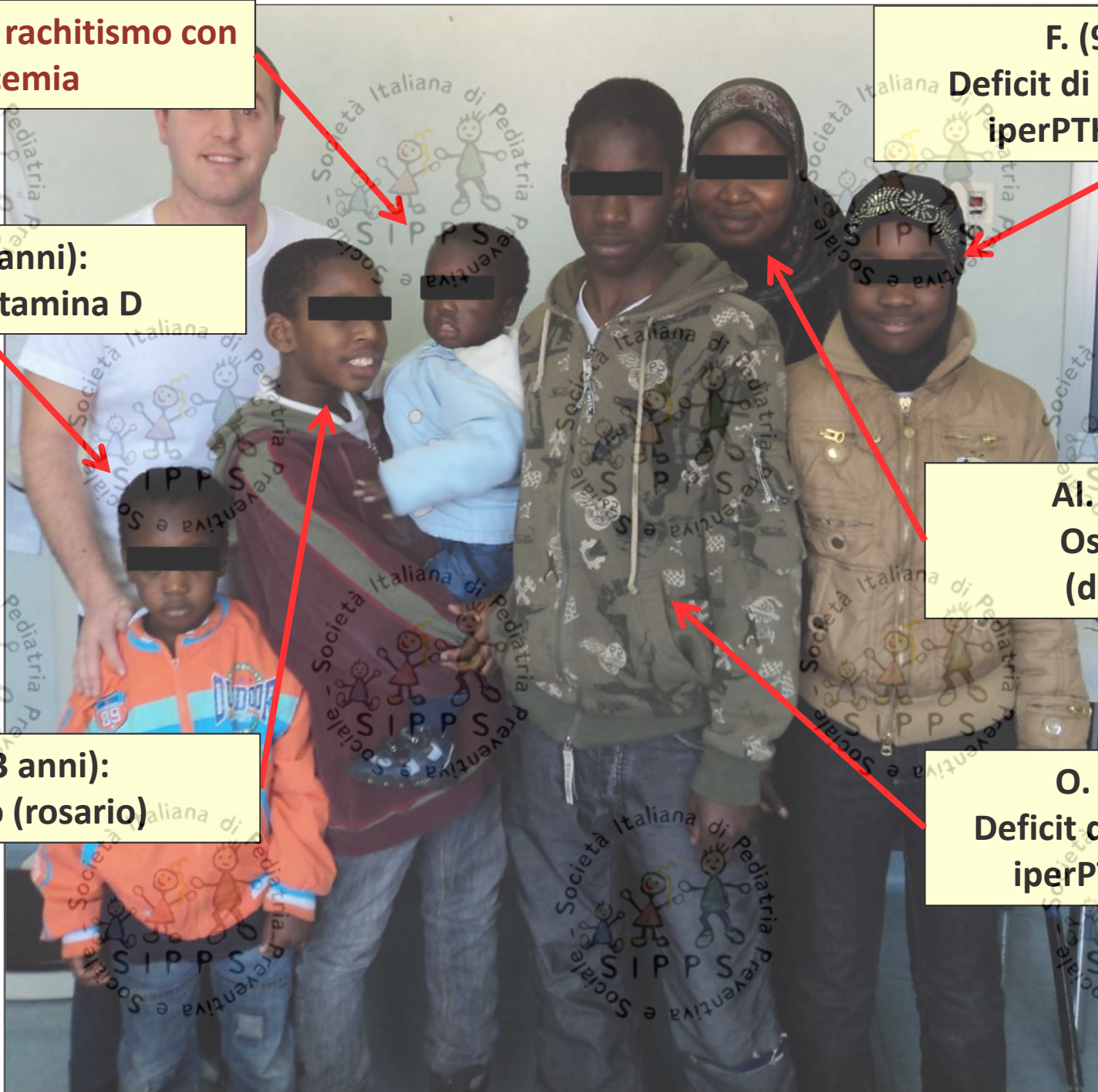
**M. (4.5 anni):
Deficit di vitamina D**

**F. (9.8 anni):
Deficit di vitamina D con
iperPTH secondario**

**Al. (45.2 anni):
Osteomalacia
(dolori ossei)**

**Ab. (11.3 anni):
Rachitismo (rosario)**

**O. (13.4 anni):
Deficit di vitamina D con
iperPTH secondario**



Paziente	Fattori di rischio
<p>M. M. (10 mesi)</p> <p>Rachitismo con ipocalcemia</p>	<ul style="list-style-type: none"> - No supplementazione materna durante la gravidanza - Nato in aprile (2° e 3° trimestre in inverno e primavera) - Allattamento al seno esclusivo prolungato (8.5 mesi) - Crescita rapida (prima infanzia)
<p>F. (9.8 anni)</p> <p>Deficit di vit. D con iperPTH</p>	<ul style="list-style-type: none"> - Crescita rapida (sviluppo puberale) - Portatrice di velo
<p>Ab. (11.3 years)</p> <p>Rachitismo</p>	<ul style="list-style-type: none"> - Crescita rapida (sviluppo puberale)
<p>O. (13.4 years)</p> <p>Deficit di vit. D con iperPTH</p>	<ul style="list-style-type: none"> - Crescita rapida (sviluppo puberale)
<p>Al. (45.2 years)</p> <p>Osteomalacia</p>	<ul style="list-style-type: none"> - Portatrice di velo
<p>Comuni a tutti i membri della famiglia</p>	<ul style="list-style-type: none"> - Fototipo cutaneo VI e ridotto tempo trascorso all'aperto - Dieta ricca in fitati e scarso apporto dietetico di calcio - No supplementazione con vitamina D

APRIL 20, 1963

BRITISH
MEDICAL JOURNAL

RICKETS IN IMMIGRANT CHILDREN
IN LONDON

BY

P. F. BENSON, M.B., B.S., M.R.C.P., D.C.H.

*Senior Lecturer, Paediatric Research Unit,
Guy's Hospital Medical School, London*



Rickets and osteomalacia: a call for action to protect immigrants and ethnic risk groups

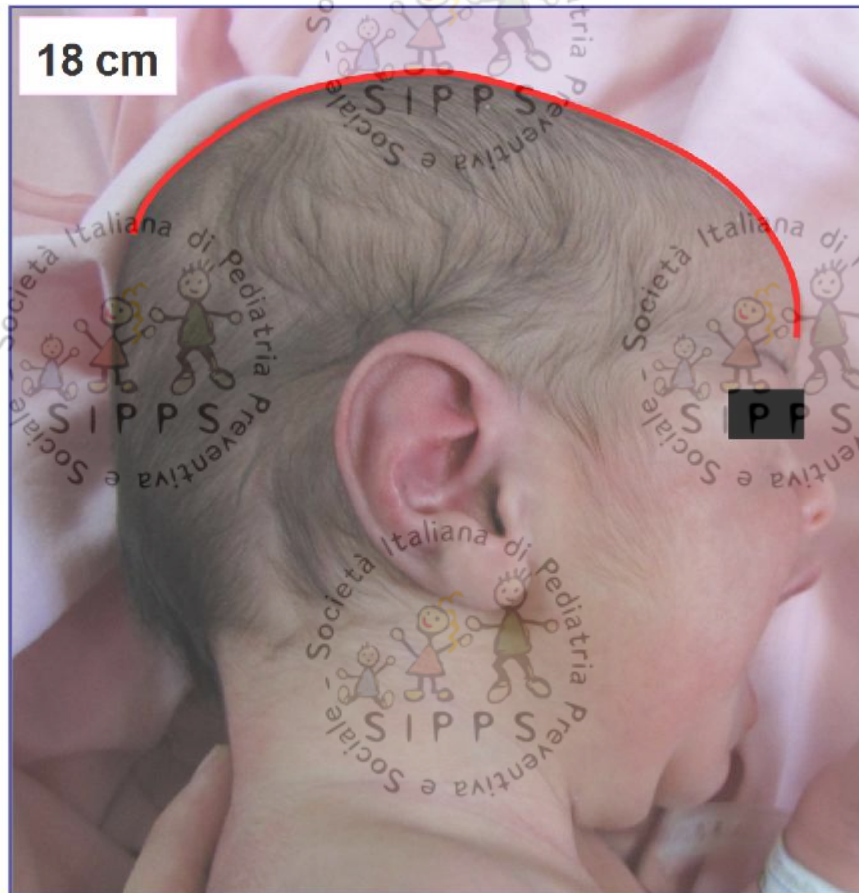


- Two deficiencies particularly prevalent in refugees are **vitamin D** and **dietary calcium deficiency**, which in combination cause nutritional **rickets** in children and **osteomalacia** in adults.
- Vitamin D deficiency is also **vertically transmitted** from mother to child.
- **Screening** and **prevention programs** for refugees from at-risk ethnic populations should include vitamin D **supplementation on arrival**, as well as during **every winter and spring** in all areas of northern or southern **latitudes greater than 34 degrees**.

(Högler , Munns. Lancet Glob Health Apr 2016)

Rachitismo congenito in nato a termine

- Nato a termine da TC, origine **algerina**.
- Fontanella anteriore e posteriore **ampie**, senza soluzione di continuo.
- **Platibasia**, rosario rachitico.



- Madre portatrice di velo
- No profilassi in gravidanza
- Nato ad inizio primavera

- **Neonato: 25-OH-D: 9 ng/ml**
- **Madre: 25-OH-D 8 ng/ml**

- La profilassi con vitamina D durante il primo anno di vita è fondamentale per garantire uno stato vitaminico D adeguato e la **prevenzione del rachitismo carenziale**.
- Si raccomanda la profilassi con vitamina D in tutti i bambini **indipendentemente dal tipo di allattamento (400 UI/die** in assenza di fattori di rischio).
- Si raccomanda di iniziare la profilassi con vitamina D **fin dai primi giorni** di vita.
- La profilassi deve essere proseguita **per tutto il primo anno di vita**.
- Si raccomanda di sottoporre a profilassi con vitamina D bambini oltre il primo anno di vita ed adolescenti con **fattori di rischio** di deficit di vitamina D.



HORMONE RESEARCH IN PÆDIATRICS

Consensus Statement

Horm Res Paediatr
DOI: 10.1159/000443136

Received: April 24, 2015
Accepted: September 17, 2015
Published online: January 8, 2016

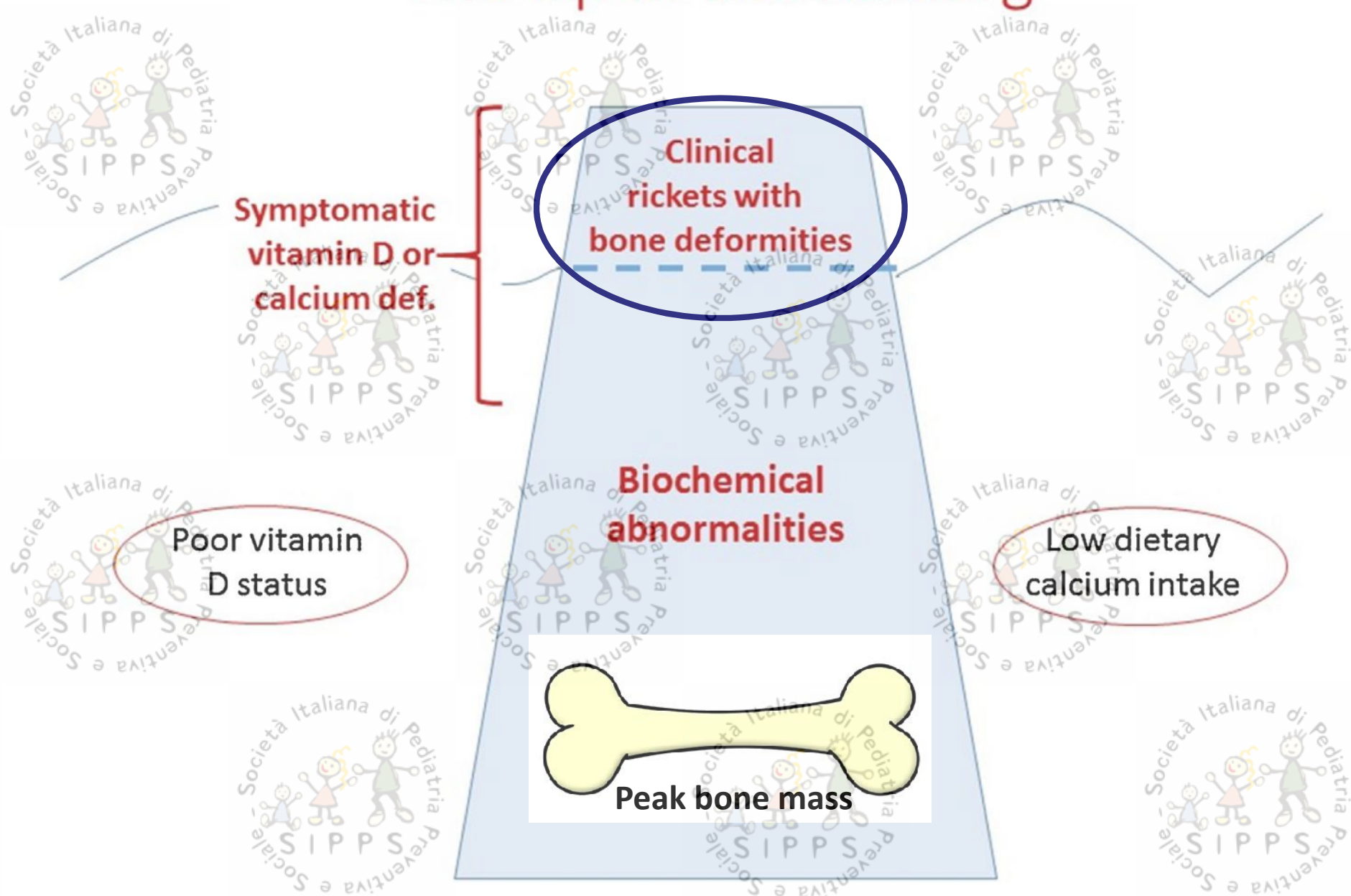
Global Consensus Recommendations on Prevention and Management of Nutritional Rickets

The consensus group represented 11 international scientific organizations (33 participants)

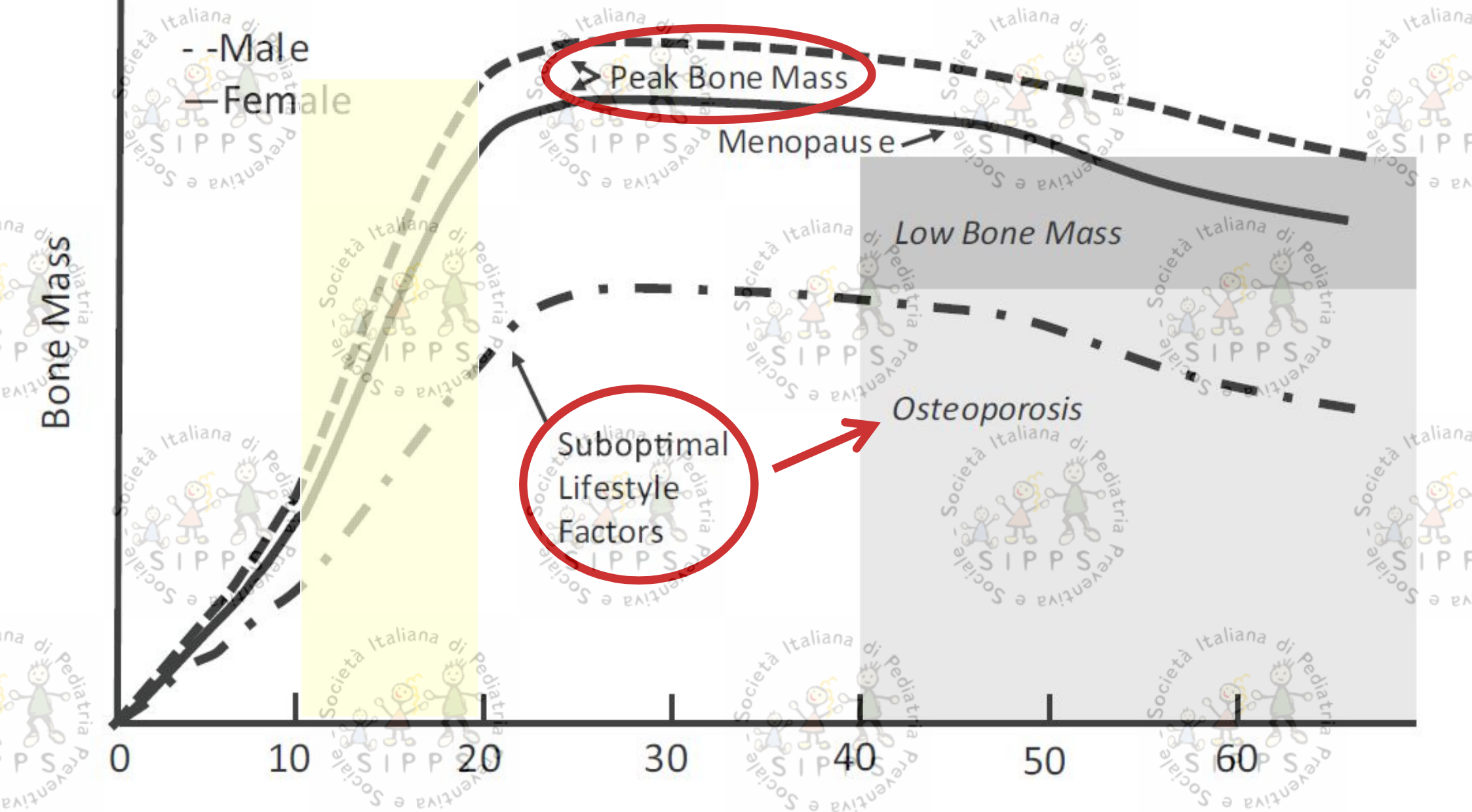
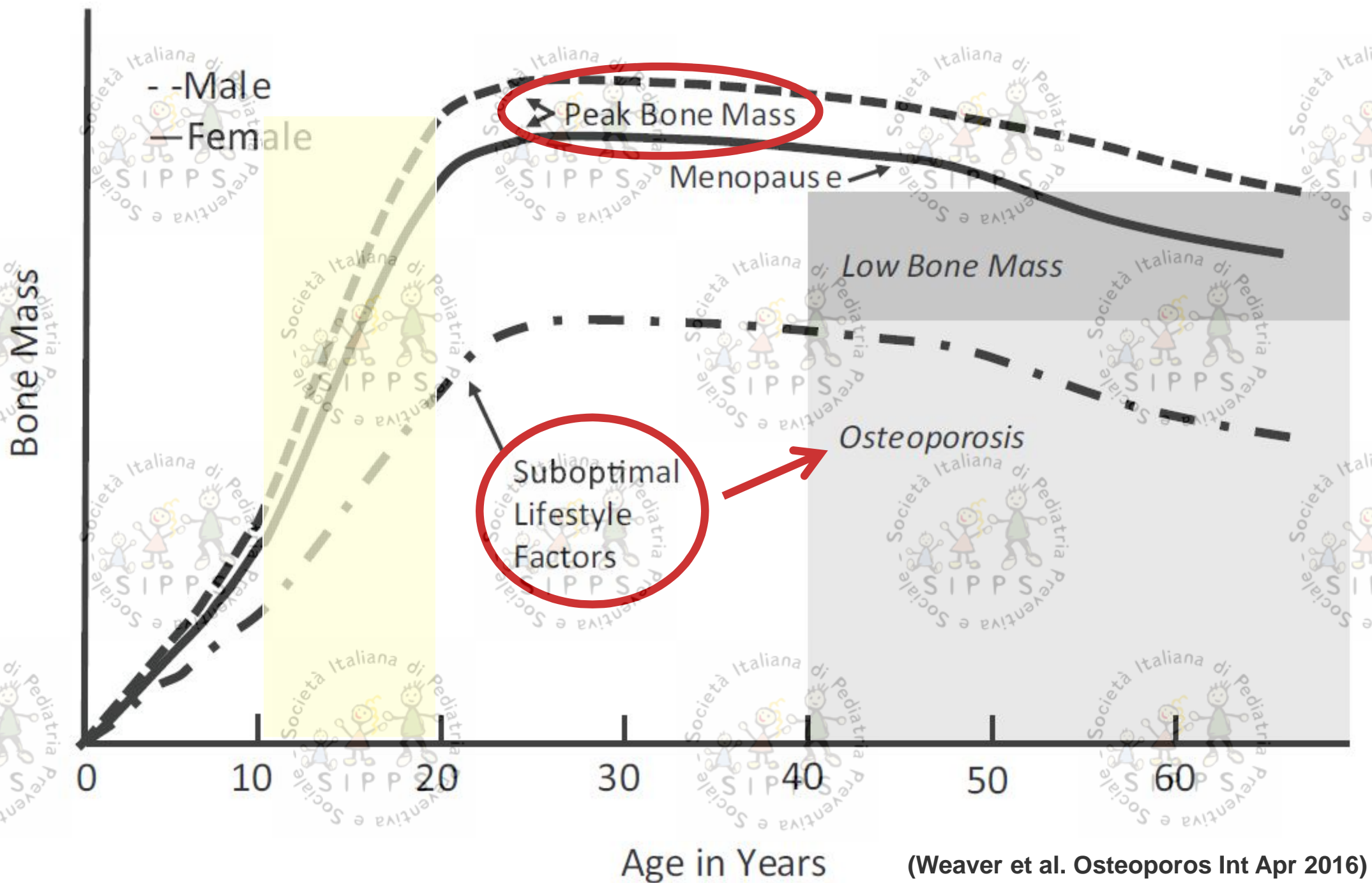
- **400 IU/day (10 µg)** is adequate to **prevent rickets** and is recommended **for all infants from birth to 12 months of age, independently of their mode of feeding (1 ⊕ ⊕ ⊕)**.
- Children at **high risk of vitamin D deficiency** are candidates for preventative vitamin D supplementation beyond 12 months of age (1 ⊕ ⊕ ⊕).



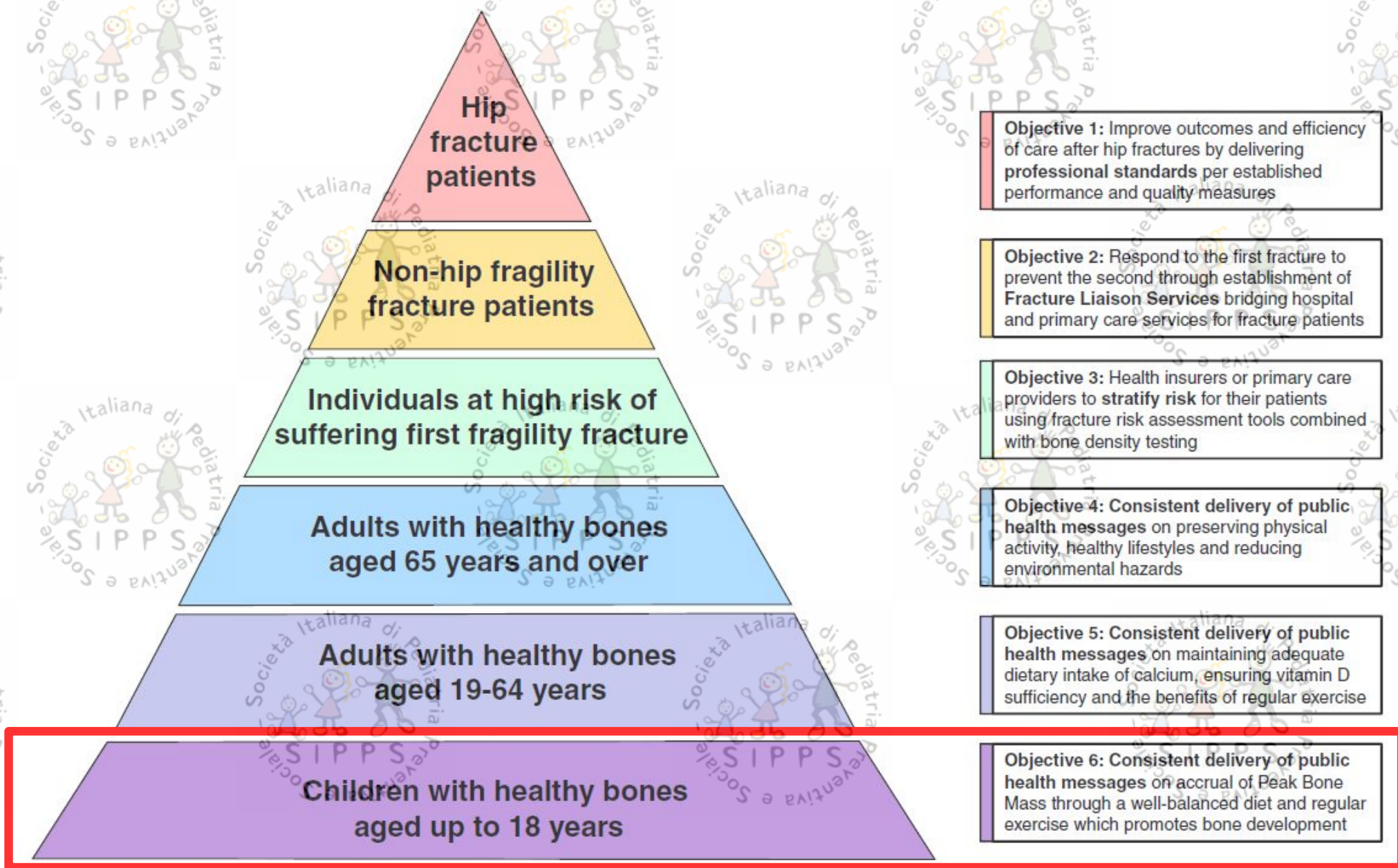
The tip of the iceberg



(Pettifor. J Steroid Biochem Mol Biol Sep 2015)

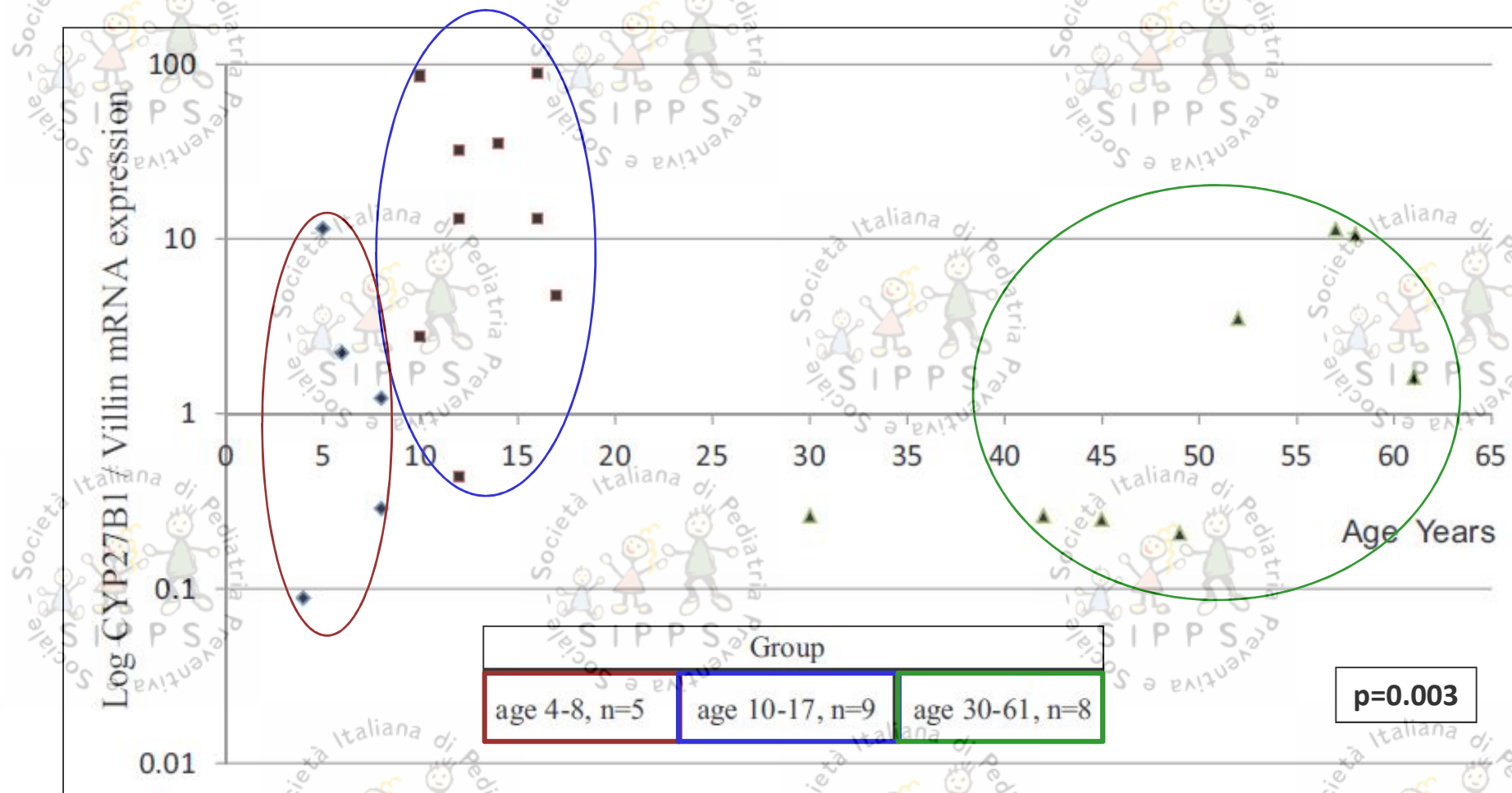


National Osteoporosis Foundation systematic approach to fragility fracture care and prevention for the USA



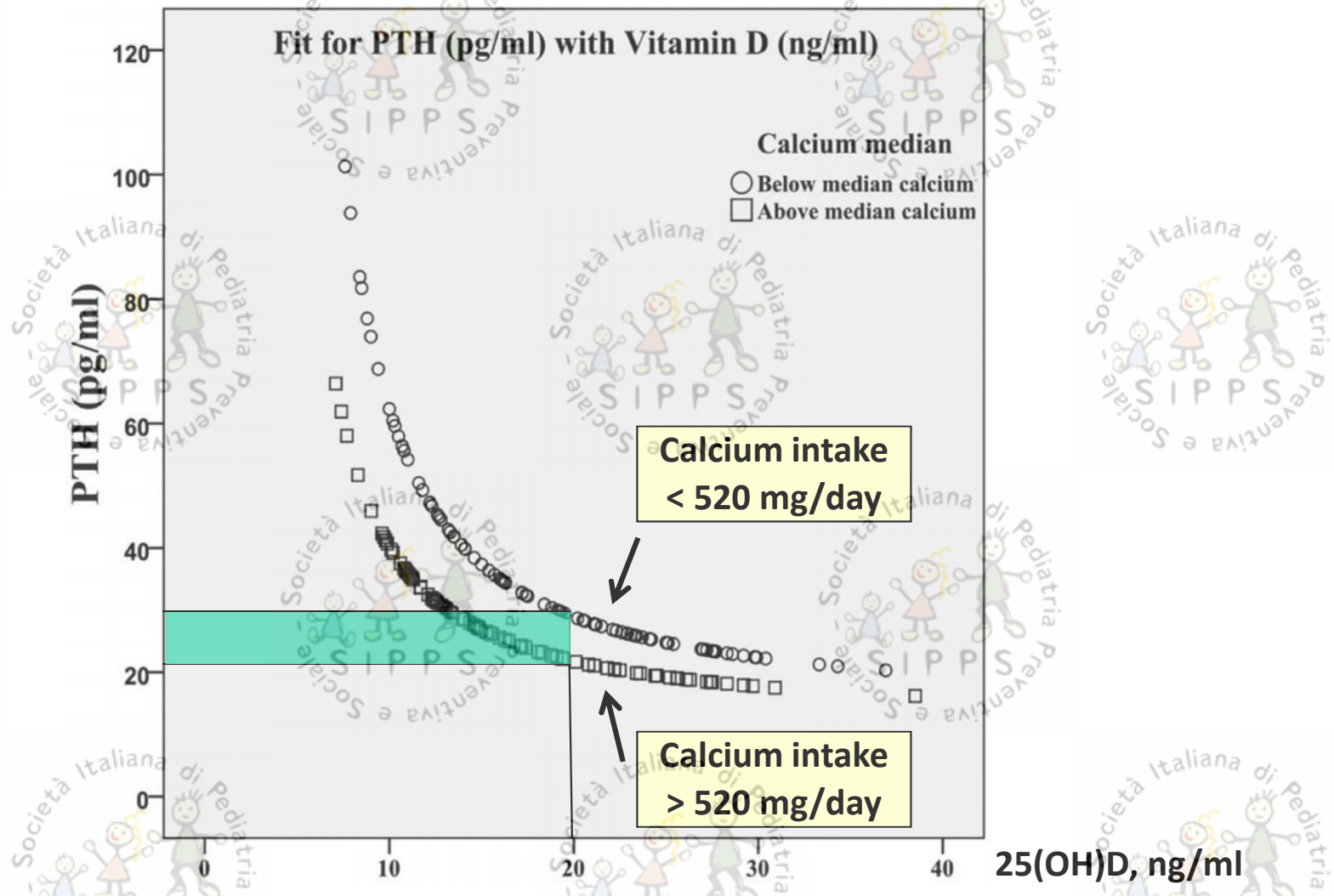
(Mitchell et al. Osteoporos Int Dec 2015)

Duodenal expression of 25 hydroxyvitamin D3-1 α -hydroxylase (CYP27B1) is higher in adolescents than in children and adults



Pubertal increased CYP27B1 expression and local duodenal 1,25(OH)₂D₃ production may be a metabolic adaptation that promotes dietary calcium absorption for the growing bone.

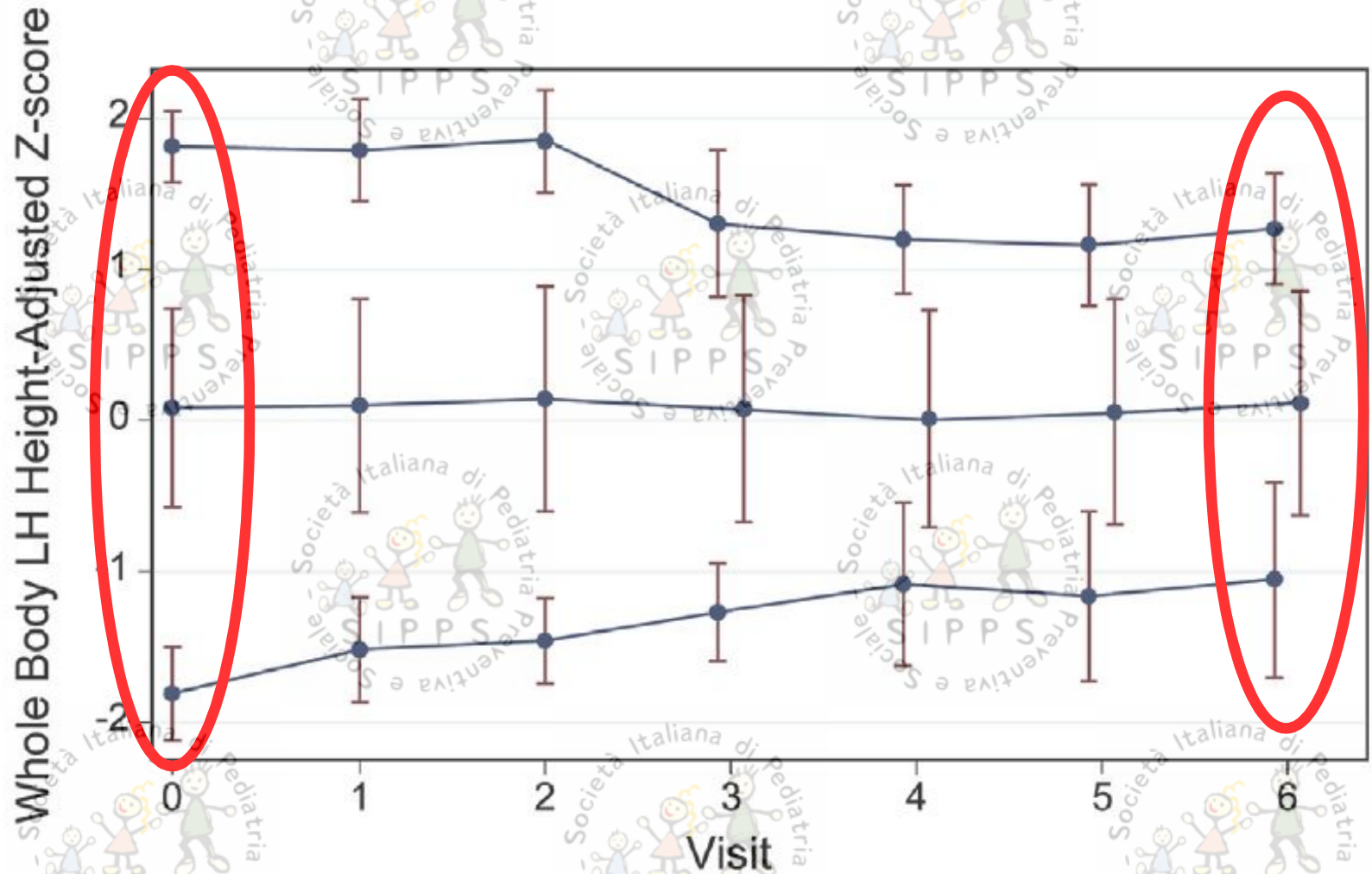
Dietary calcium intake influences the relationship between serum 25(OH)D and PTH concentration (n = 181, 10-14 yr)



- Dietary calcium intake modifies the relationship between 25(OH)D and PTH concentrations.
- Dietary calcium intake should be taken into account when assessing an individual's vitamin D status.

(Patel et al. Arch Dis Child 2015)

**Longitudinal tracking of DXA bone measures over 6 years in children and adolescents:
persistence of low bone mass to maturity
(240 male and 293 female, age 6-17 years, yearly DXA evaluations for 6 years)**

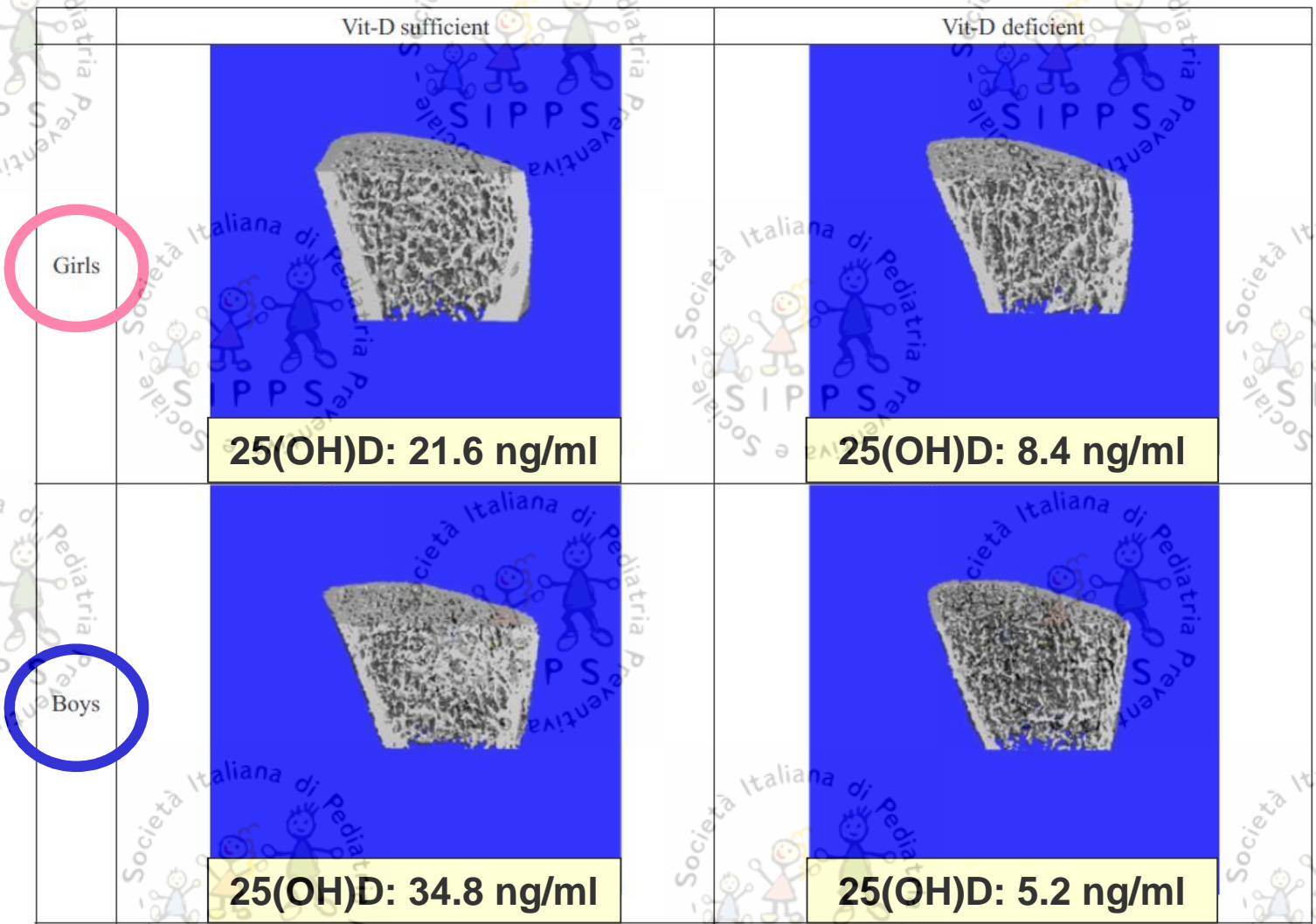


Baseline Z-score

- < 1.5
- -1.5 to 1.5
- > 1.5

Bone status during childhood is a strong predictor of bone status in young adulthood, when peak bone mass is achieved.

HR-pQCT images of non-dominant distal radius of subjects (n = 333 girls and 230 boys, 12-16 years old) with different vitamin D statuses living in Hong Kong



Serum 25(OH)D levels correlated with key bone density and bone quality parameters

(Cheung et al. Osteoporos int Mar 2016)

Consensus - Vitamina D e massa ossea

La vitamina D influenza i processi di acquisizione della massa ossea sia **direttamente** contribuendo alla regolazione del metabolismo fosfo-calcico che **indirettamente** stimolando lo sviluppo del tessuto muscolare.

L'**evidenza** attuale basata sugli studi di associazione e di supplementazione disponibili sembra confermare un **effetto positivo** della supplementazione con vitamina D sui processi di acquisizione della massa ossea in bambini ed adolescenti con **deficit di vitamina D** [25(OH)D < 20 ng/ml].



The National Osteoporosis Foundation's position statement on peak bone mass development and lifestyle factors: a systematic review and implementation recommendations

Lifestyle Factor	Grade
<i>Macronutrients</i>	
Fat	D
Protein	C
<i>Micronutrients</i>	
Calcium	A
Vitamin D	B
Micronutrients other than calcium and vitamin D	D
<i>Food Patterns</i>	
Dairy	B
Fiber	C
Fruits and vegetables	C
Detriment of cola and caffeinated beverages	C
<i>Infant Nutrition</i>	
Duration of breastfeeding	D
Breastfeeding versus formula feeding	D
Enriched formula feeding	D
<i>Adolescent Special Issues</i>	
Detriment of oral contraceptives	D
Detriment of DMPA injections	B
Detriment of alcohol	D
Detriment of smoking	C
<i>Physical Activity and Exercise</i>	
Effect on bone mass and density	A
Effect on bone structural outcomes	B

Level of evidence:

A: strong

B: moderate

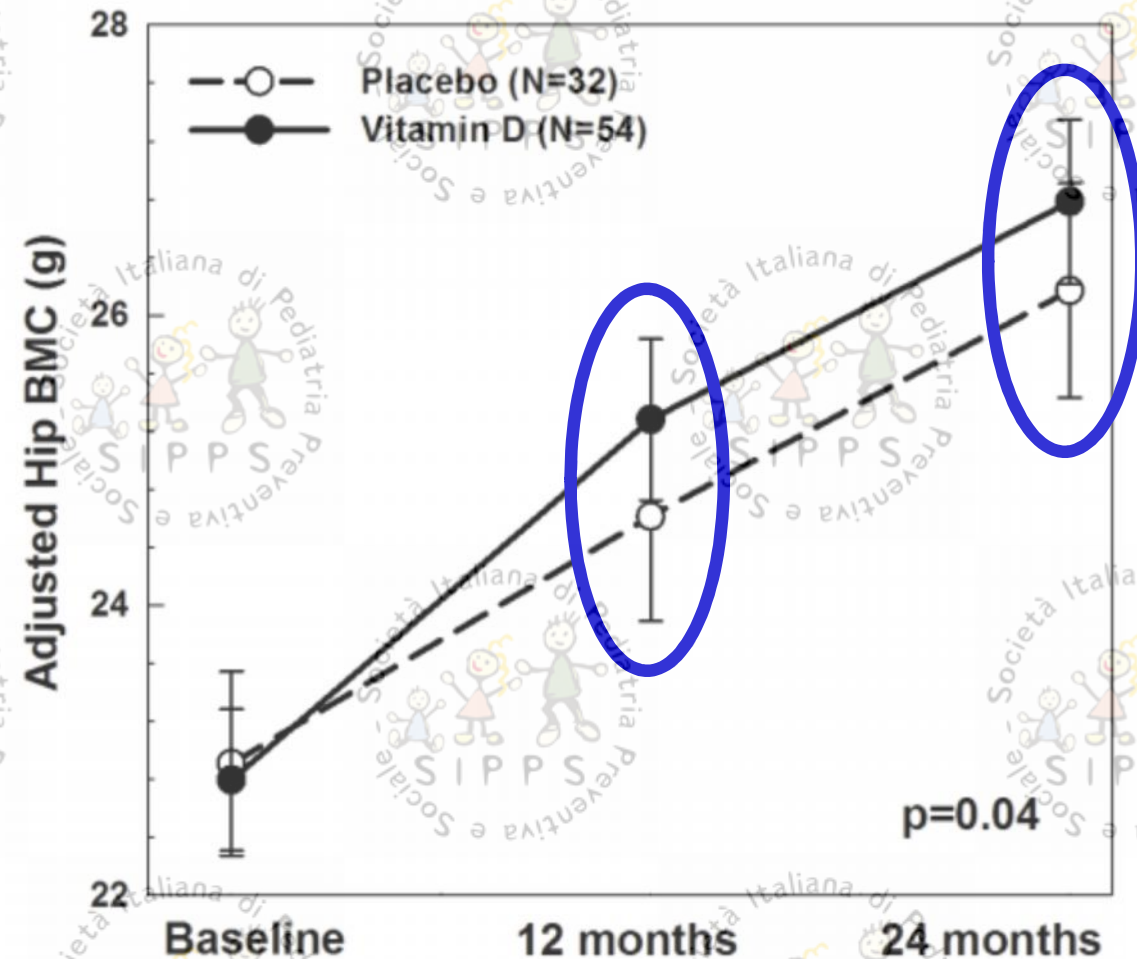
C: limited

D: inadequate

- 9 publications from 8 RCTs (tutti citati nella Consensus), 1 prospective study, and 3 cross sectional studies published since 2000, encompassing 2.962 individuals.
- 4 of the 8 RCTs provide evidence for a beneficial effect of vitamin D supplementation on bone accrual.
- Several unanswered questions remain (male sex, critical times during which supplementation may be most effective).

Persistent effect of vitamin D supplementation on musculoskeletal parameters in girls (n = 86, 19 pre-menarcheal) one year after trial completion (age 13.9 ± 2 yr)

- Vitamin D group:
 - 1.400 IU/week (200 IU/day) or
 - 14.000 IU/week (2.000 IU/day) for 1 yr
- 25(OH)D levels at 12 months:
 - Placebo group: 12.7 ng/ml
 - Vitamin D group: 20.8 ng/ml



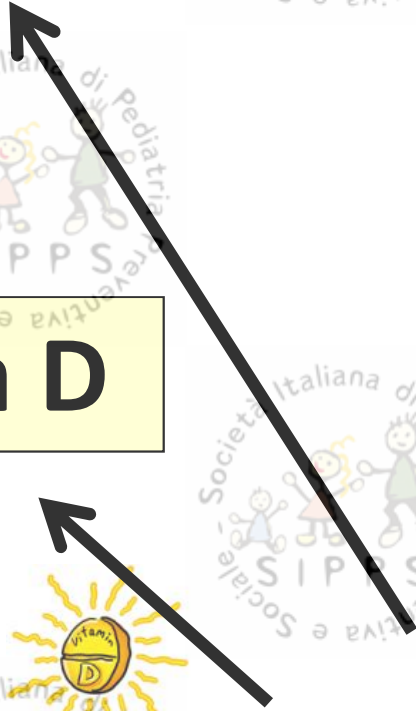
The effect of vitamin D supplementation on hip bone mass **persisted one year** post-trial completion, with possible important implications on **optimizing peak bone mass** accretion in adolescent **girls**.

Calcio



Massa ossea

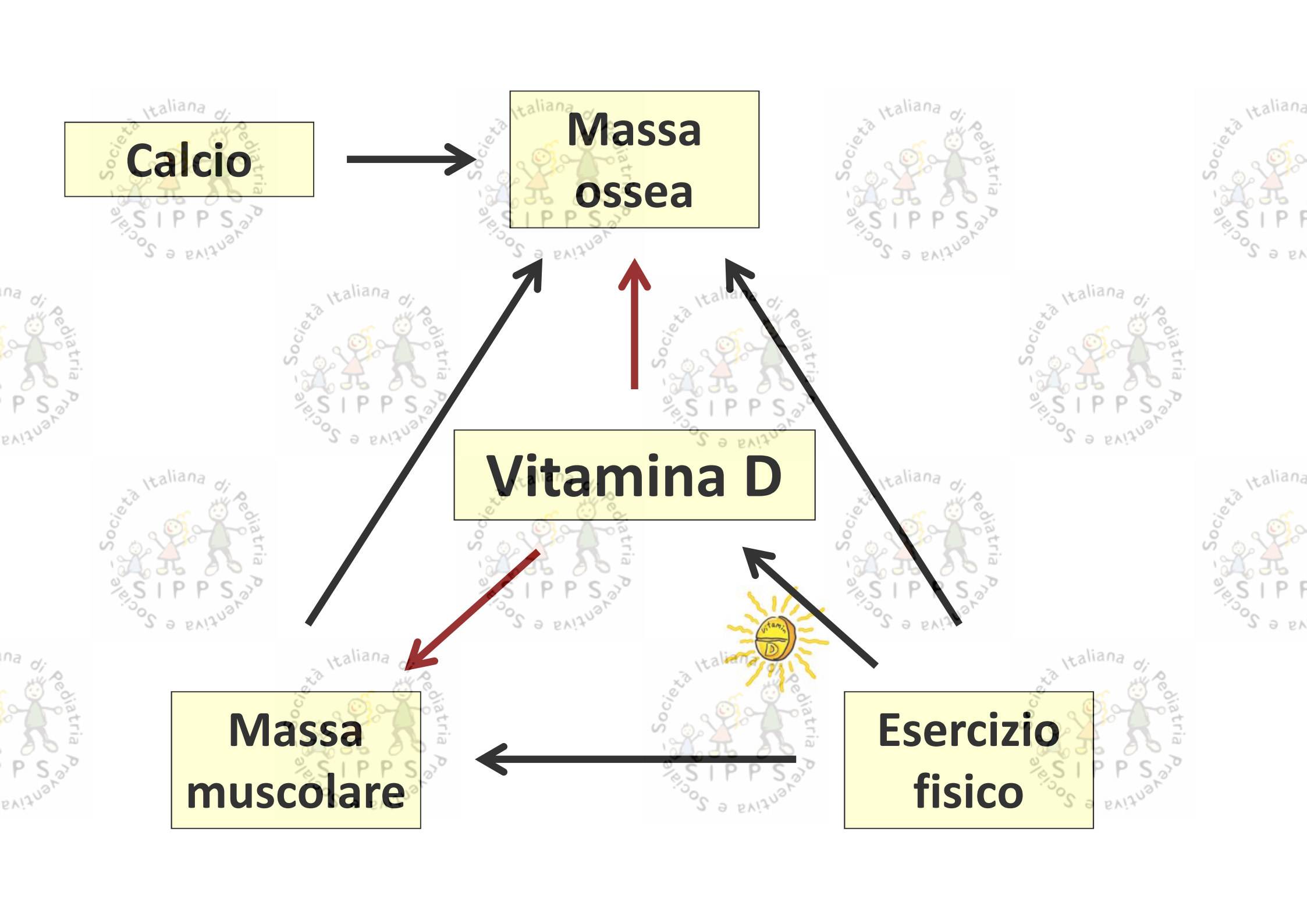
Vitamina D



Massa muscolare



Esercizio fisico



Vitamina D e salute ossea dopo il primo anno di vita

Asintomatico
No fattori di rischio



Monitorare stile di vita (esposizione solare, calcio, esercizio fisico)

Asintomatico
Fattori di rischio



Stile di vita corretto
Profilassi

Sintomatico e/o
malattie croniche
interferenti con vit. D

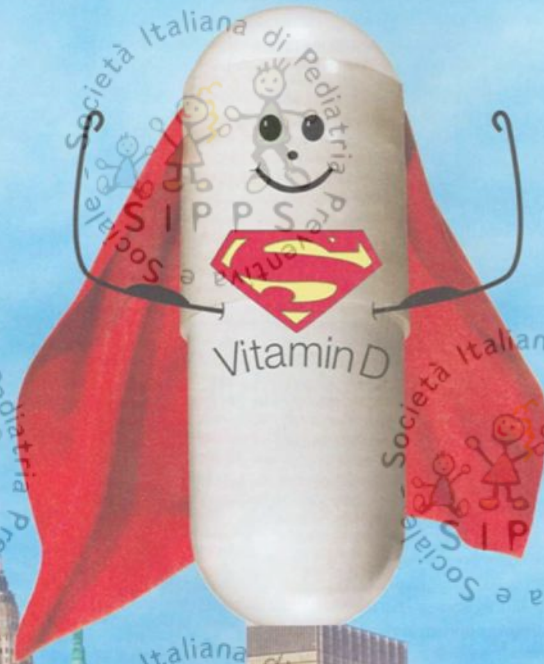


Stile di vita corretto
Dosaggio 25(OH)D
Profilassi
Trattamento --> profilassi

Super Vitamin to the Rescue!

Faster than prescription meds! More powerful than an ordinary supplement! Able to stop all health problems in their tracks! Vitamin D is the new health hero so why aren't you taking it? BY RICHARD LALIBERTE

Billie Jo Coomer, 31, couldn't figure out what the heck was wrong with her. For more than six years she had suffered from headaches and pain in her stomach, back, arms and legs. "I hurt constantly and couldn't sleep at night," says Billie Jo, an administrator in St. Clair Shores, Michigan. She saw more than a dozen doctors, but all they did was prescribe painkillers and antidepressants.



Consensus vitamina D - Salute ossea

Conclusioni

- Il rachitismo carenziale esiste ancora.
 - La **profilassi** con vitamina D è fondamentale per la prevenzione del rachitismo carenziale.
 - Il pediatria deve porre particolare attenzione ai **fattori di rischio** di deficit di vitamina D e all'apporto di **calcio**, in particolare nei bambini adottati e nei figli di immigrati.
 - Il rachitismo carenziale non dovrebbe esistere più.
-
- La **vitamina D** influenza i processi di acquisizione della massa ossea sia direttamente contribuendo alla regolazione del metabolismo fosfo-calcico che indirettamente stimolando lo sviluppo del tessuto muscolare.
 - L'**evidenza** attuale basata sugli studi di associazione e di supplementazione disponibili sembra confermare un **effetto positivo** della supplementazione con vitamina D sui processi di acquisizione della massa ossea in bambini ed adolescenti con **deficit** di vitamina D.

Grazie per l'attenzione



Pediatr Int. 2005 Apr;47(2):142-6.

Vitamin D deficiency rickets caused by improper lifestyle in Japanese children.

Miyako K¹, Kinjo S, Kohno H.

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Pediatr Int. 2009 Aug;51(4):559-62. doi: 10.1111/j.1442-200X.2009.02834.x. Epub 2009 Mar 27.

Prevalence and risk factors of vitamin D deficiency rickets in Hokkaido, Japan.

Matsuo K¹, Mukai T, Suzuki S, Fujieda K.

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International Osteoporosis Foundation map of vitamin D status in children and adolescents

<http://www.iofbonehealth.org/facts-and-statistics/vitamin-d-studies-map>

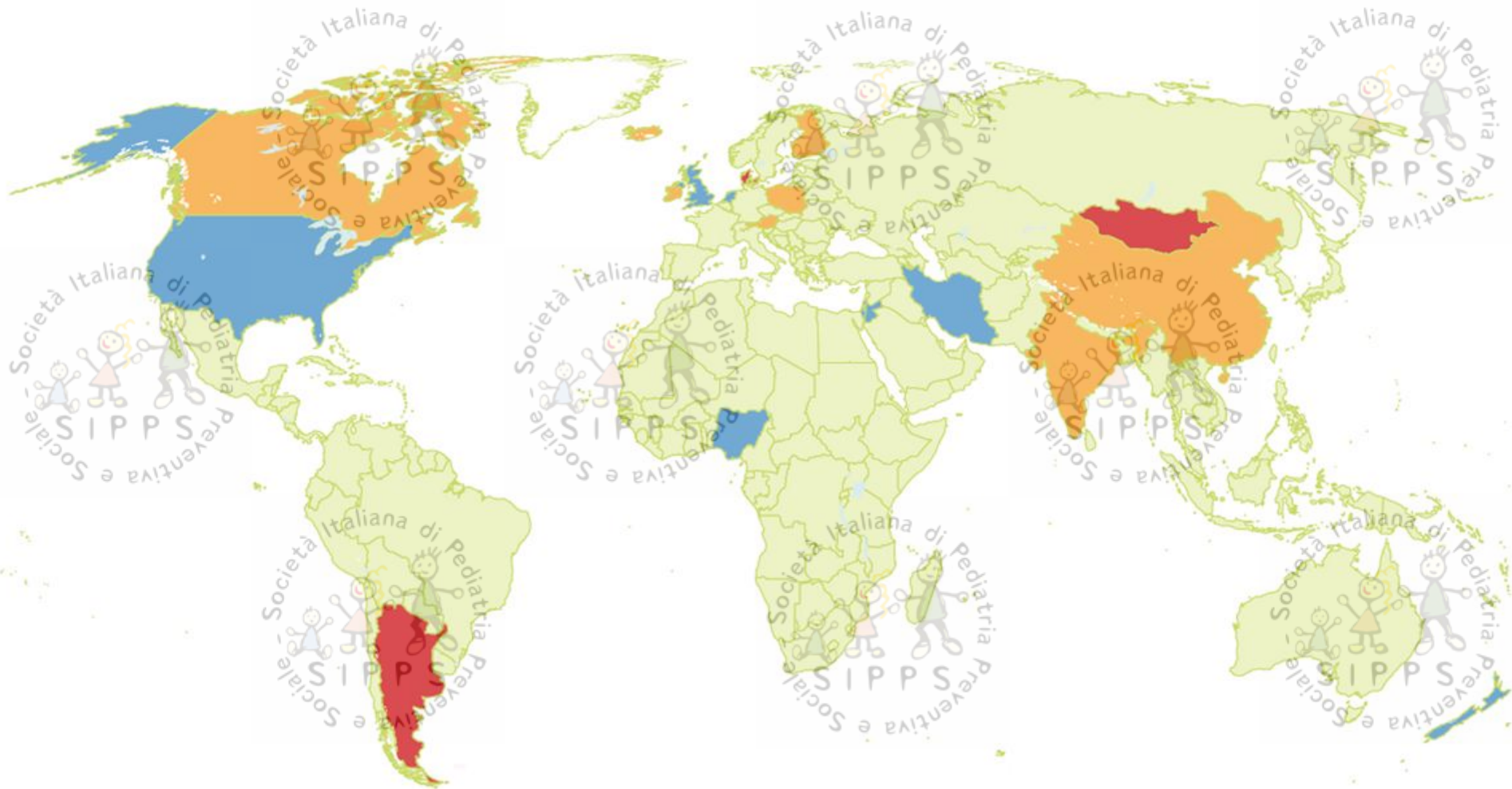
Vitamin D level

■ > 75 nmol/L

■ 50-74 nmol/L

■ 25-49 nmol/L

■ < 25 nmol/L



(Mitchell et al. Osteoporos Int Dec 2015)

Raccomandazioni relative al trattamento del rachitismo carenziale

	Trattamento	Mantenimento	Trattamento con calcio	Monitoraggio
Australia/ Nuova Zelanda (Munns 2006)	1) Dosi giornaliere 1.000 UI/die (età < 1 mese) 3.000 UI/die (età 1-12 mesi) 5.000 UI/die (età > 12 mesi) per 3 mesi	400 UI/die oppure 150.000 UI all'inizio dell'autunno	a) Ipocalcemia con crisi convulsive ^o calcio gluconato al 10% ev: 0,5 ml/Kg (massimo 20 ml) in 30-60 minuti b) Ipocalcemia senza crisi convulsive ^o - calcio elementare per os: 40-80 mg/Kg/ die (1-2 mmol/Kg/die) in 4-6 dosi	1 mese: calcio, ALP 3 mesi: calcio, fosforo, ALP, magnesio, PTH, 25(OH)D, valutazione radiologica del polso Annualmente: 25(OH)D
LWPI (Misr) Svizzera (Federal Commission for Nutrition 2012)	5.000-10.000 UI/die (età > 12 mesi) per 8-12 settimane 2) Terapia con boli di vitamina D* a) con 100.000-600.000 UI (in 1-5 giorni) b) 50.000 UI/settimana per 8 settimane	400-1.000 UI/die	a) Ipocalcemia con crisi convulsive ^o calcio gluconato al 10% ev: 1-2 ml/Kg in 5-10 minuti b) Ipocalcemia asintomatica e per la prevenzione della hungry bone syndrome calcio elementare per os: 30-75 mg/Kg/ die in 3 dosi (iniziare al dosaggio maggiore e ridurre progressivamente la dose in 2-4 settimane)	1 mese: calcio, fosforo, ALP 3 mesi: calcio, fosforo, ALP, magnesio, PTH, 25(OH)D, calcemia/creatininuria, valutazione radiologica delle sedi interessate 12 mesi e poi annualmente: 25(OH)D
British National Formulary for Children (Elder 2014)	1) Dosi giornaliere 3.000 UI/die (età 1-6 mesi) 6.000 UI/die (età 6-12 mesi) 10.000 UI/die (età > 12 mesi) per 8-12 settimane 2) Terapia con boli 300.000 UI in dose a distanza di almeno 12 ore	400 UI/die	La supplementazione con calcio è indicata in caso di basso apporto dietetico e ipocalcemia	All'inizio del trattamento: controllo della calcemia 1 o 2 volte/settimana o in presenza di ipocalcemia 25(OH)D e valutazione del metabolismo osseo (non ulteriormente specificata)

**Vitamina D,
no metaboliti**

Calcio

**Profilassi
di mantenimento**

Monitoraggio

* consigliata negli adolescenti con scarsa compliance alla terapia giornaliera. ** controllo non raccomandato dagli autori della revisione nei soggetti asintomatici (Elder 2014)

^o considerare la somministrazione di calcitriolo (50-100 ng/Kg/die in 2-3 dosi) fino a livelli di calcio > 2.1 mmol/l

^{oo} considerare la somministrazione di calcitriolo (20-100 ng/Kg/die in 2-3 dosi) fino alla normalizzazione dei livelli di calcio

A systematic review of pediatric clinical trials of high dose vitamin D

(<https://vitamind.knackhq.com/pediatrics/>)

Only High Dose Arms (Exclude low dose or placebo) No Yes High dose defined as higher than RDA (400IU for infants, 600IU for older children)

Age Group Age at enrollment, based on the eligibility criteria

Study Design

Population

Baseline 25(OH)D Based on the central value prior to supplementation

Dose Group RDA: 400IU for infants, 600IU for older children

Type of Regimen

Assessed Outcome

Showing 1-22 of 22

Diagnostic category	Arms	Patients
Conventional outcomes		
Healthy/subclinical VDD	97	4,608
Classical diseases	123	4,134
Premature/low birth weight	48	2,127
Rickets	43	1,359
Malabsorption	15	319
Epilepsy/seizure	7	125
Renal disease	4	96
Other	6	108
Non-conventional outcomes		
Non-classical diseases	43	3,205
Obesity	7	213
Asthma	4	101
Pneumonia/URTI	4	2,065
Recurrent acute otitis media	3	251
HIV	3	65
Dental fluorosis	3	55
Other	19	455

Regimen (different arms)	Study Design	Year	Age Groups	Population details	Outcomes	Overall risk of bias	Details
Aggarwal, V. Management of nutritional rickets in Indian children: a randomized controlled trial. Journal of Tropical Pediatrics							
600000 D2/3 IM once	RCT/qRCT	2013	Infants, Toddlers, Primary school age	Rickets	25OHD, Blood calcium, Phosphate, Clinical Rickets, Bone mass marker, ALKP, PTH	Medium/Unclear	view
600000 D2/3 IM once + Calcium	RCT/qRCT	2013	Infants, Toddlers, Primary school age	Rickets	25OHD, Blood calcium, Phosphate, Clinical Rickets, Bone mass marker, ALKP, PTH	Medium/Unclear	view
No drug, control arm	RCT/qRCT	2013	Infants, Toddlers, Primary school age	Rickets	25OHD, Blood calcium, Phosphate, Clinical Rickets, Bone mass marker, ALKP, PTH	Medium/Unclear	view

(Nama et al. PeerJ Feb 2016)



CLINICAL REPORT

Optimizing Bone Health in Children and Adolescents

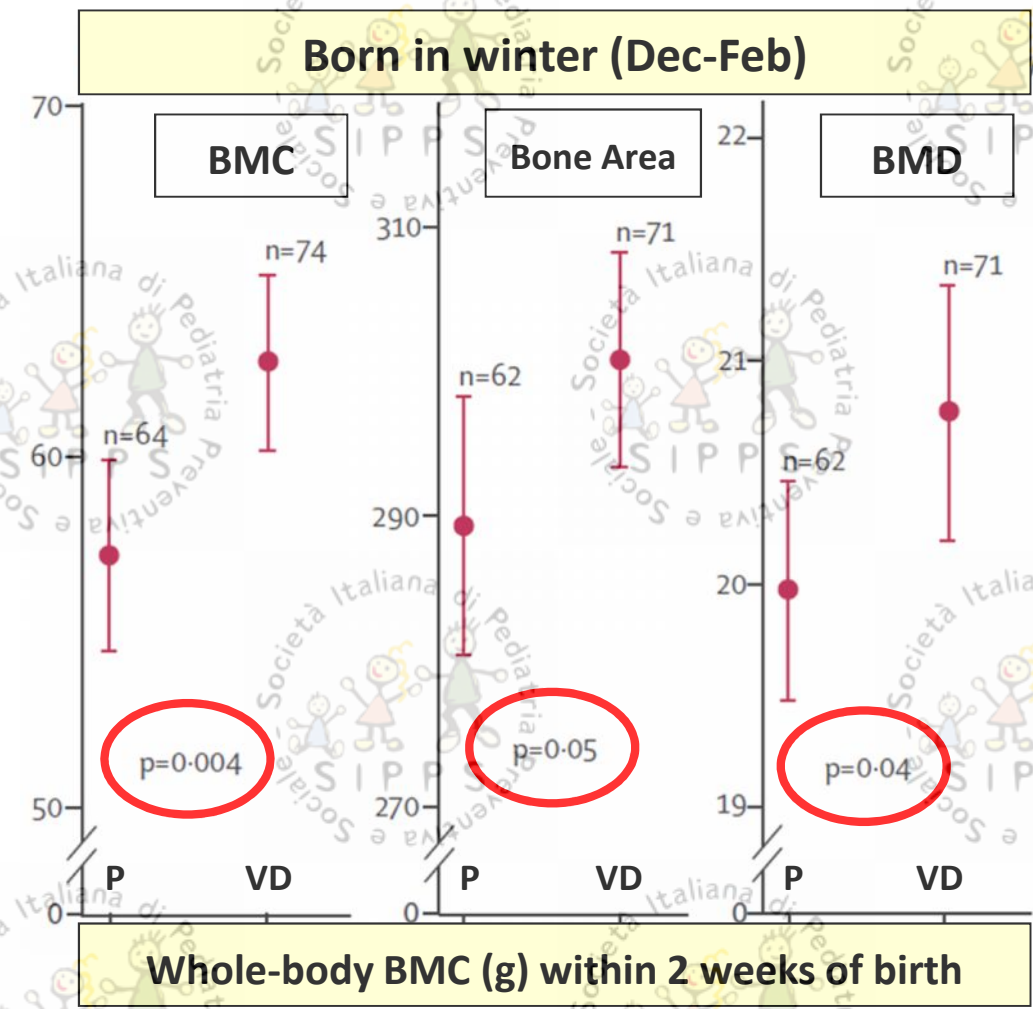
- Ask about **dairy intake**, nondairy sources of calcium and vitamin D, use of calcium and/or vitamin D **supplements**, soda consumption, and type and amount of **exercise** at health maintenance visits.
- Encourage increased dietary intake of **calcium- and vitamin D-containing foods**.
- Current data do **not support routine calcium supplementation** for healthy children and adolescents.
- The RDA of vitamin D for children 1 year and older is **600 IU**.
- Encourage **weight-bearing activities** (walking, jumping, running, dancing).
- Routine **screening of healthy children and adolescents for vitamin D deficiency is not recommended**.

Maternal gestational vitamin D supplementation [1.000 IU/day from 14-17 weeks in women with 25(OH)D 10-100 ng/ml] and neonatal bone health

n = 569 n = 565

	Placebo	Cholecalciferol 1000 IU/day	p value
Neonatal characteristics*			
N	486	479	
Male	251 (51%)	258 (54%)	0.49
Birthweight, g	3518 (3472-3564)	3481 (3432-3530)	0.28
Crown-heel length, cm	50.8 (50.6-51.0)	50.6 (50.4-50.8)	0.31
Head circumference, cm	35.5 (35.3-35.6)	35.4 (35.3-35.5)	0.62
Abdominal circumference, cm	32.7 (32.4-32.9)	32.9 (32.7-33.1)	0.16
Whole-body DXA results			
N	327	338	
Age at DXA, days	7 (6.1-7.4)	8 (6.8-8.4)	0.12
BMC, g	60.5 (59.3-61.7)	61.6 (60.3-62.8)	0.21
Bone area, cm ²	297.8 (293.7-301.9)	301.6 (297.8-305.4)	0.18
BMD, g/cm ²	0.203 (0.200-0.205)	0.203 (0.200-0.205)	0.96
Lean mass, g	3014 (2965-3062)	3055 (3008-3101)	0.23
Median fat mass, g (IQR)	374 (244-517)	355 (235-564)	0.97

Data are N, n (%), or mean (95% CI), unless otherwise stated. DXA=dual-energy x-ray absorptiometry. BMC=bone mineral content. BMD=bone mineral density. *Data obtained within 14 days of delivery.



This study is the first RCT to show a potential benefit of vitamin D supplementation during pregnancy for offspring bone mass, confirming a benefit for neonatal BMC and BMD with treatment for deliveries during winter months.

(Cooper et al. Lancet Mar 2016)