



XX Congresso Nazionale Società Italiana di Pediatria Preventiva e Sociale

Prendersi cura del bambino:
prevenzione, comunicazione, ascolto della famiglia

30 Maggio - 2 Giugno 2008 - Reggia di Caserta



SORVEGLIANZA E PREVENZIONE DELLA PATOLOGIA TIROIDEA IN ETA' PEDIATRICA

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Giovanna

EC 12 anni
Ritardo puberale



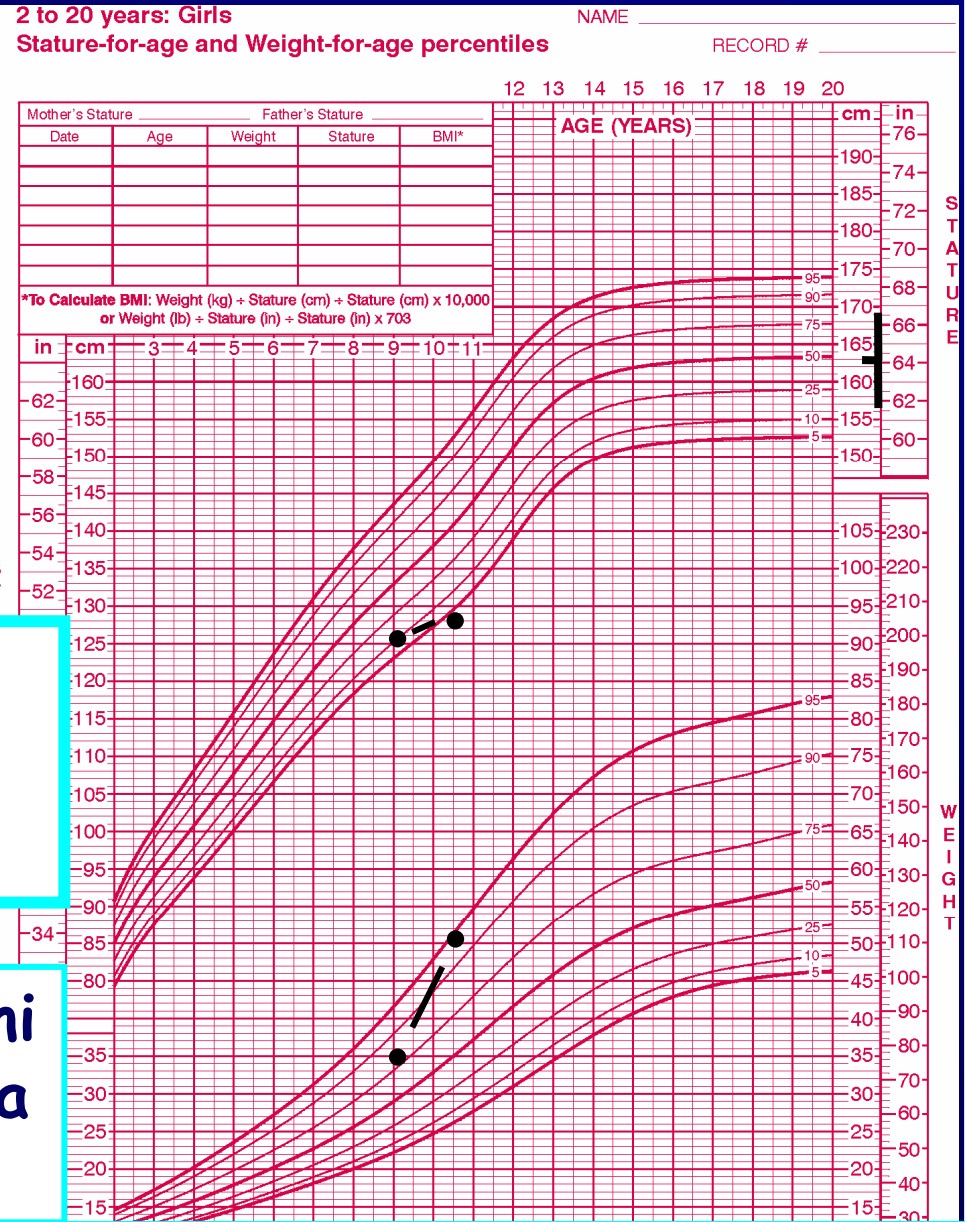
Giovanna

EC 12 anni
Ritardo puberale

- ❖ B1-P2
- ❖ Rallentamento staturale
- ❖ Incremento ponderale

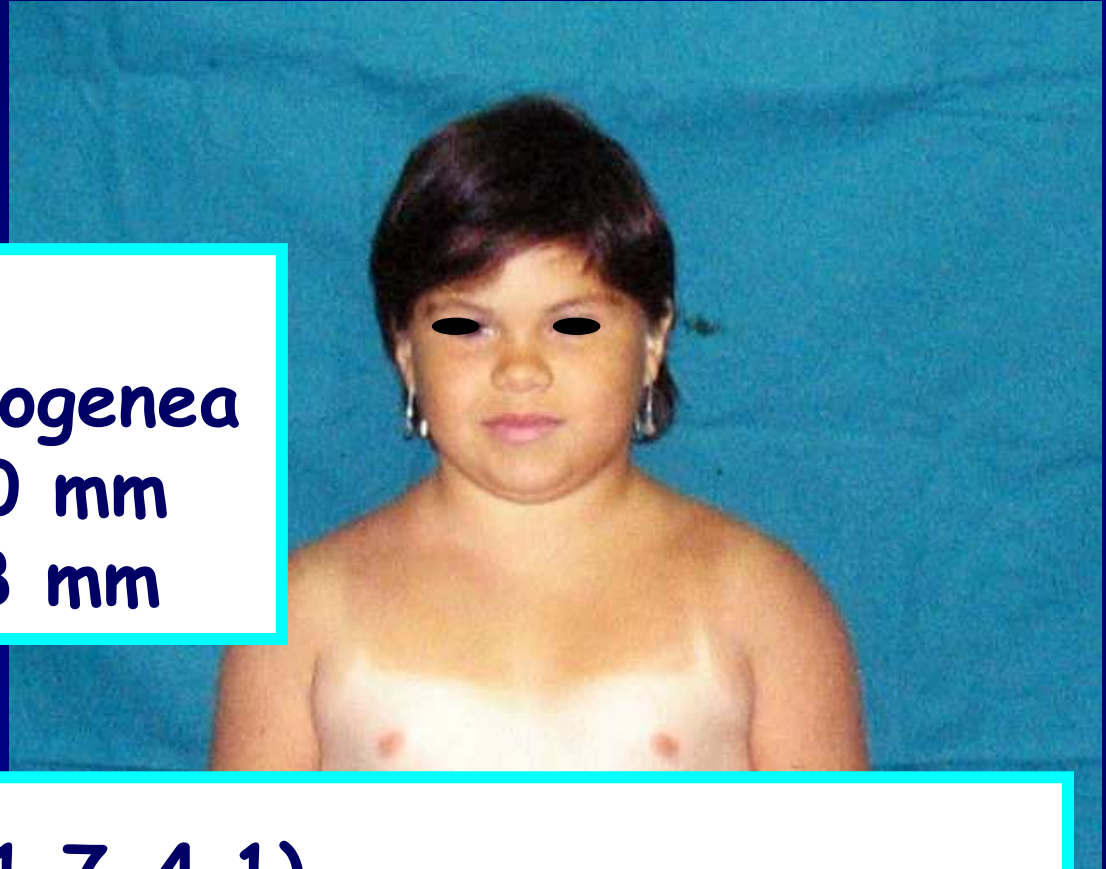
Tiroide palpabile di dimensioni aumentate e consistenza dura visibile con la deglutizione

Riduzione del rendimento scolastico



Giovanna

Eco tiroide:
Ecostruttura disomogenea
Lobo dx: 42x17x20 mm
Lobo sx: 40x15x18 mm



FT3 1.8 pg/ml (vn 1.7-4.1)

FT4 0.6 ng/dl (vn 0.7-1.6)

TSH 113 mcU/ml (vn 0.5-4.5)

Anti TG 780 - Anti TPO 1400 IU/ml (vn <40)

Francesco

EC 7 a - Vitiligine estesa al volto ,
arti superiori ed inferiori ed al dorso

FT3 4.5 pg/ml (vn 1.7-4.1)

FT4 1.3 ng/dl (vn 0.7-1.6)

TSH 1.3 mcU/ml (vn 0.5-4.5)

Anti TG 80 - Anti TPO 400 IU/ml (vn <40)

TIROIDITE DI HASHIMOTO

- Prevalenza 1-4% popolazione generale
- Più frequente nel sesso femminile (F/M = 5:1)
- Età di insorgenza 3-17 anni
- Eziologia autoimmune
- Familiarità (fino a 50% familiari e 33% fratelli)
- Frequente associazione con altre patologie autoimmuni: diabete tipo 1, celiachia, collagenopatie, Addison, alopecia, vitiligine
- Frequente associazione con cromosomopatie: S. Down, S. Turner

MANIFESTAZIONI CLINICHE

Ingrandimento della tiroide con lobi di volume superiore a quello delle falangi distali del soggetto esaminato

GOZZO

- Simmetrico (talora prev. lobo dx)
- Consistenza dura
- Granulosità alla palpazione o noduli

SEGNI E SINTOMI

- Ipotiroidismo
- Ipertiroidismo
- Eutiroidismo

Classificazione del gozzo



- Grado 0** Tiroide non palpabile e non visibile anche a collo esteso
- Grado 1A** Tiroide palpabile ma non visibile anche a collo esteso
- Grado 1B** Tiroide palpabile e visibile solo a collo esteso
- Grado 2** Tiroide palpabile e visibile anche a collo in posizione normale
- Grado 3** Tiroide visibile anche a distanza

Principali segni e sintomi dell'ipotiroidismo

- Gozzo
- Bassa statura
- ↓ velocità di crescita
- Cute secca e fredda
- Bradicardia
- Ritardo puberale
- Amenorrea, irregolarità mestruali
- Galattorrea
- Letargia
- Sonnolenza
- Stipsi
- ↓ rendim.scolastico

Principali segni e sintomi dell'ipertiroidismo

- Gozzo
- Tachicardia
- Nervosismo
- Ipertensione
- Tremori
- ↑ Appetito
- Perdita di peso
- Iperattività
- Sudorazione
- Labilità emotiva
- Riduzione attenzione
- ↓ rend.scolastico
- Disturbi del sonno
- Alvo irregolare
- Debolezza muscolare

DIAGNOSI

- FT3, FT4, TSH
- anticorpi anti-Tg (nel 30-60%)
- anticorpi anti-TPO (nel 80-95%)
- anticorpi anti TSHr (in caso di ipertiroidismo)
- Ecografia tiroidea

QUADRO ECOGRAFICO

Grado

Pattern Ecografico

- 1 Tiroide diffusamente ingrandita con pattern ecografico **normoecogeno**
- 2 Tiroide diffusamente ingrandita con pattern ecografico caratterizzato da multiple **aree ipoecogene** nell'ambito di una ghiandola normoecogena
- 3 Tiroide diffusamente ingrandita con pattern ecografico caratterizzato da **diffusa e lieve ipoecogenicità**
- 4 Tiroide diffusamente ingrandita con pattern ecografico caratterizzato da **diffusa e marcata ipoecogenicità**

Volume tiroideo (media±ds) in età pediatrica

Età (anni)	Volume tiroideo Maschi	Volume tiroideo Femmine
6	2.8 ± 0.6	2.7 ± 0.6
7	3.1 ± 0.8	3.2 ± 0.9
8	3.2 ± 0.8	3.4 ± 1.0
9	3.5 ± 1.4	3.7 ± 1.1
10	3.8 ± 1.4	4.1 ± 1.3
11	3.9 ± 1.2	4.2 ± 1.2
12	4.3 ± 1.4	4.7 ± 1.5
13	5.1 ± 2.0	4.8 ± 1.4
14	5.0 ± 1.6	5.3 ± 1.7

Vol Lobo=(DLxDAPxDTx0.5)

Rossi et al, J Clin Ultrasound 2002

TERAPIA

TIROIDITE DI HASHIMOTO

- Eutiroidismo
- Ipotiroidismo L- Tiroxina
- Ipertiroidismo discussa

TERAPIA DELL'IPOTIROIDISMO

ETA'

L-T4 ($\mu\text{g}/\text{kg}/\text{die}$)

1 - 5 anni

4 - 6

5 - 12 anni

3 - 5

12-18 anni

2 - 3

Adulti

1 - 2

Giovanna



Giovanna dopo 3 anni di terapia



TERAPIA

TIROIDITE DI HASHIMOTO

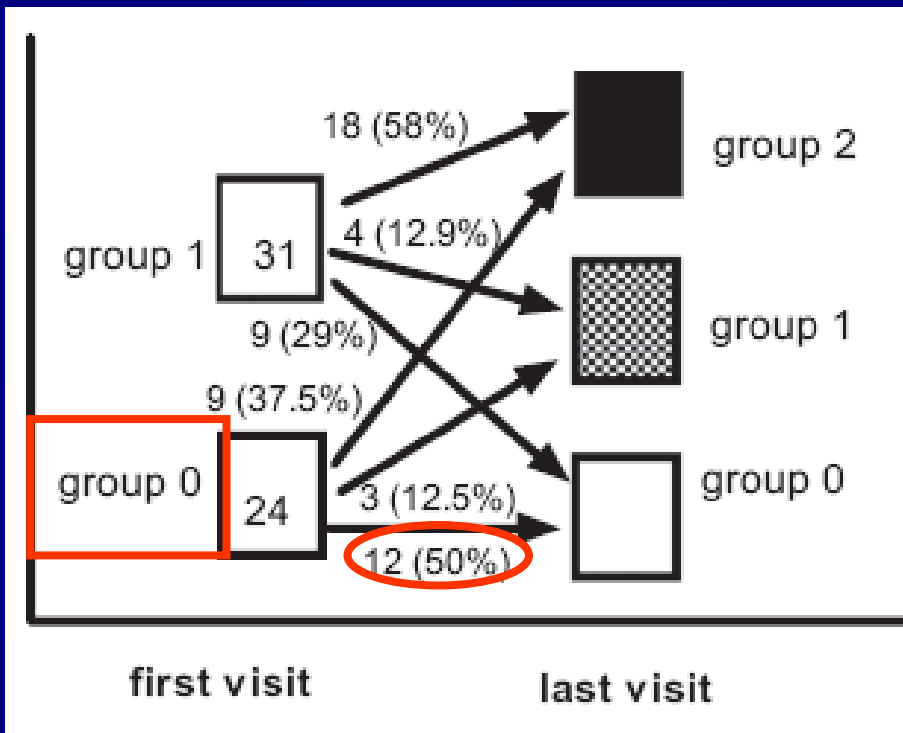
- Eutiroidismo
- Ipotiroidismo L- Tiroxina
- Ipertiroidismo discussa

Evoluzione spontanea della tiroidite di Hashimoto

Follow-up 5 anni

età 9.1 ± 3.6 anni
FT4 normale in tutti

Gruppo 0
pazienti TSH normale



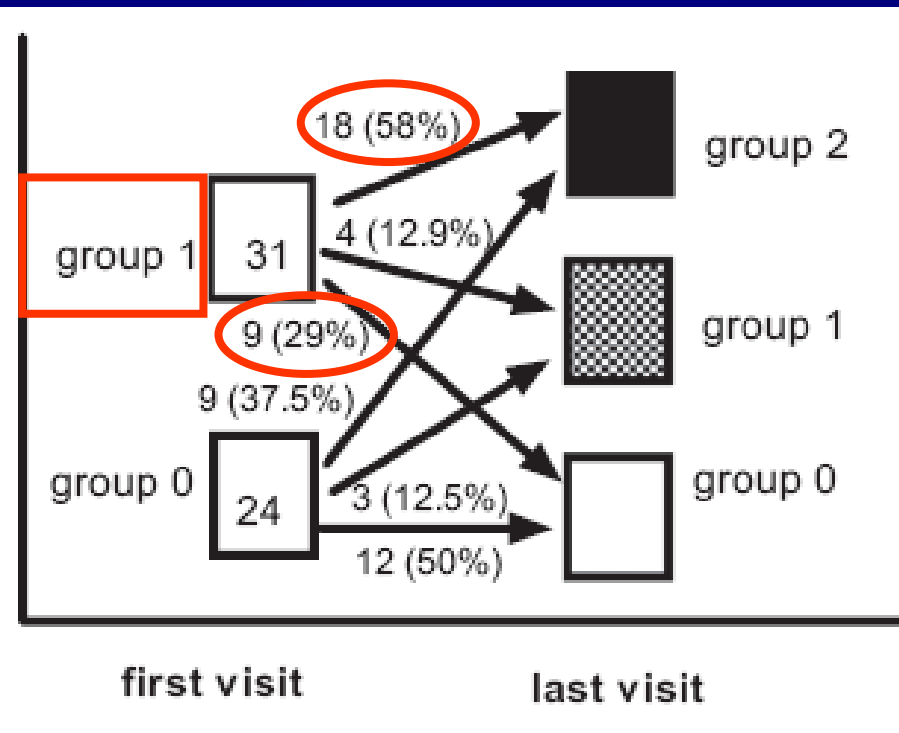
Evoluzione spontanea della tiroidite di Hashimoto

Follow-up 5 anni

età 9.1 ± 3.6 anni
FT4 normale in tutti

Gruppo 0
pazienti TSH normale

Gruppo 1
pazienti TSH lievemente
aumentato (4.5-10)



FOLLOW-UP

- Controllo clinico
(P, A, sviluppo puberale, dimensioni gozzo)
- TSH, FT3 ed FT4 ogni 4-6 mesi
- Anticorpi anti-TG e anti-TPO ogni anno
- Eco tiroide ogni anno

EVOLUZIONE

- Non influenzata dalla terapia con I-T4
- Remissione in 1/3 circa dei casi
- Ricaduta nei 2/3 dei casi
- Assenza di fattori predittivi di possibile risoluzione

Francesco

Controlli
Ormoni ogni 6 mesi
Anticorpi ed eco ogni anno

EC 18 a

❖ H cm 180

❖ P kg 75.400

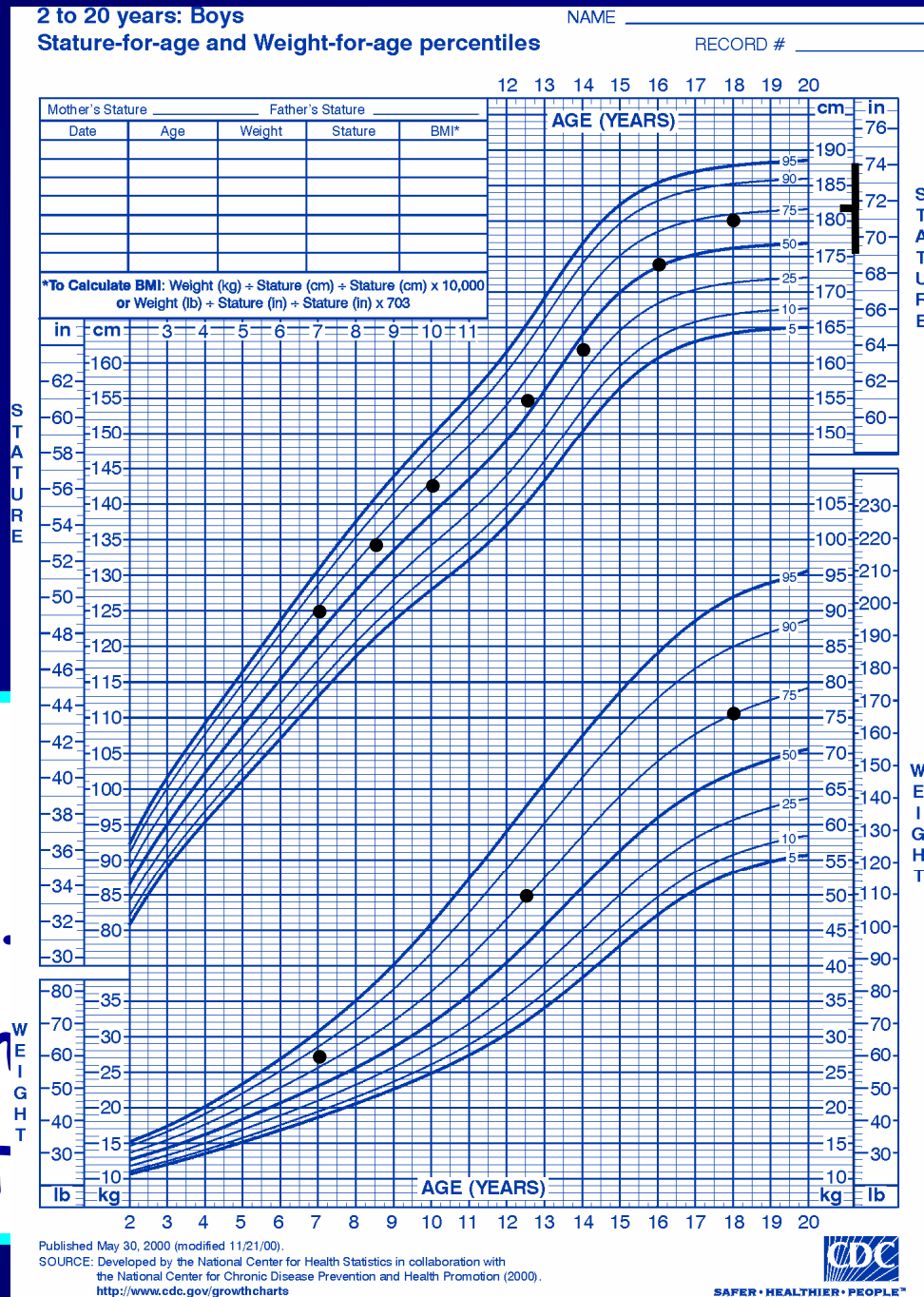
❖ Sviluppo puberale

FT3 3.9 pg/ml (vn 1

FT4 1.6 ng/dl (vn 0.

TSH 1.7 mcU/ml (vn

Anti TG 20 - Anti T



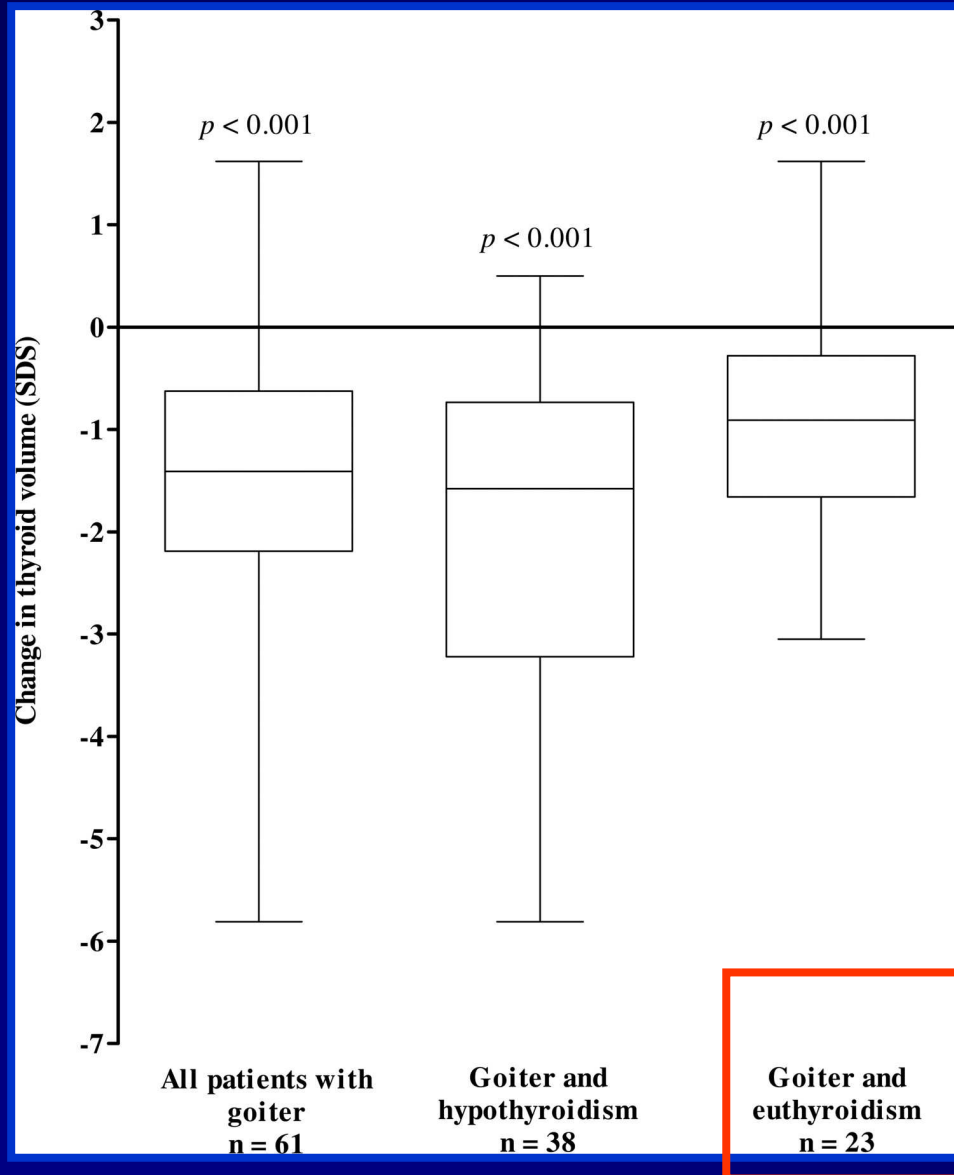
TERAPIA

TIROIDITE DI HASHIMOTO

- Eutiroidismo nessuna
- Ipotiroidismo L- Tiroxina
- Ipertiroidismo discussa

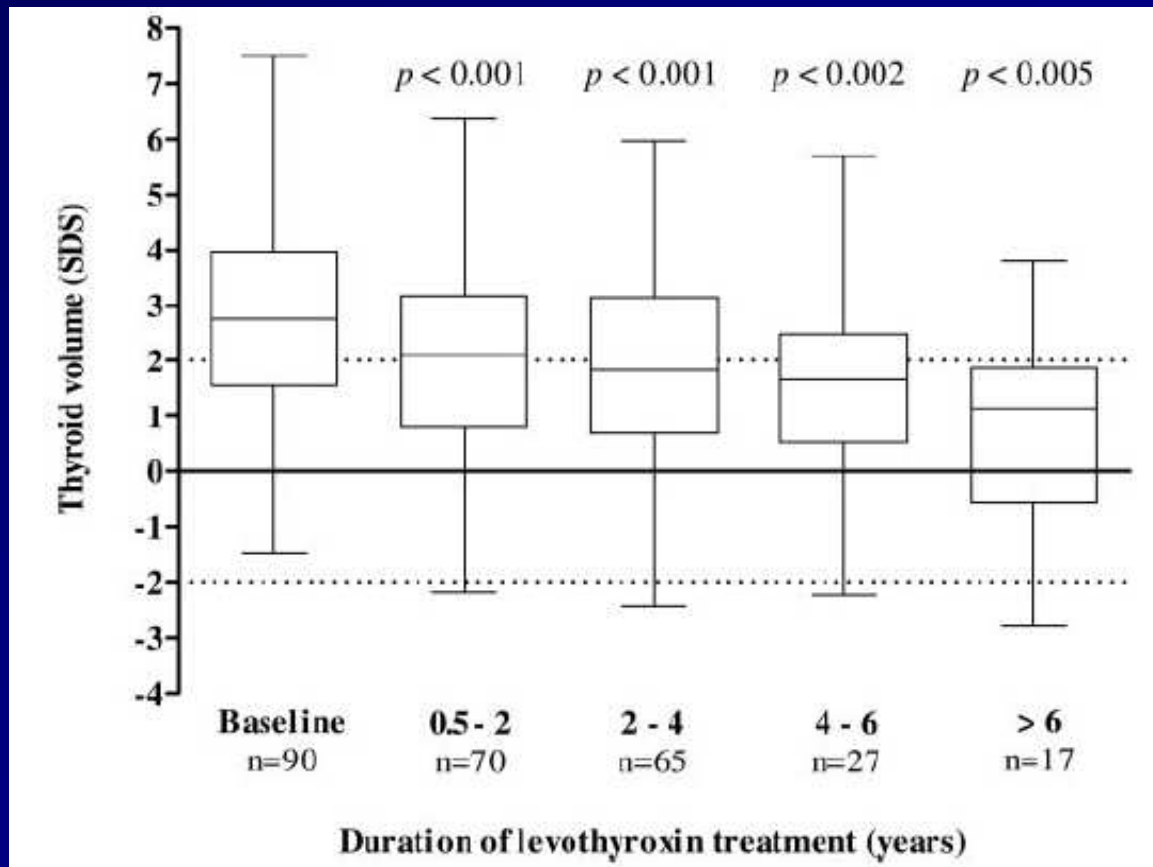


Evoluzione del GOZZO durante la terapia con L-Tiroxina (L-T4) nella tiroidite di Hashimoto



- 61 pazienti con gozzo
- età 6-17.5anni
- L-T4 0.5-10 anni

Modifiche del volume tiroideo durante la terapia con L-Tiroxina (L-T4) nella tiroidite di Hashimoto



- 90 pazienti
- età 6-17.5anni
- L-T4 0.5-10 anni

TERAPIA

TIROIDITE DI HASHIMOTO

- Eutiroidismo

L-Tiroxina se GOZZO

- Ipotiroidismo

L- Tiroxina

- Ipertiroidismo

discussa

MARIA

ECO TIROIDE

Struttura disomogenea con **2 noduli** ipoecogeni di cui 1 al terzo medio del lobo dx di dimensioni 1.1 cm ed 1 al terzo inferiore del lobo dx di dimensioni 0.5 cm

L'approccio diagnostico ad un bambino con patologia nodulare del collo, qualunque ne sia la causa, deve essere mirato innanzitutto ad escludere una lesione maligna della tiroide.

Prevalenza nodulo tiroideo

- 1.5% in età pediatrica
- 4-7% in età adulta

Rischio di nodulo maligno

- 26% in età pediatrica
- 5-10% in età adulta

INQUADRAMENTO DIAGNOSTICO

- Anamnesi
- Esame clinico
- Indagini ormonali
- Ecografia tiroidea
- Esame citologiche mediante ago aspirato (FNAC)

ANAMESI

- Familiarità per neoplasie o patologie tiroidee
- Pregressa irradiazione testa e/o collo
- Concomitanza di patologie tiroidee
- Concomitanti patologie a rischio di tumori tiroidei

ESAME CLINICO

- Valutazione della tiroide
dimensione, consistenza, simmetria, mobilità
- Caratteristiche del nodulo
isolato, multiplo, duro, fisso, centrale, laterale
- Presenza di linfonodi palpabili
laterocervicali o sovraclaveari
- Sintomi da compressione di strutture circostanti
disfonia, disfagia

Table 1. Clinical Findings Suggesting the Diagnosis of Thyroid Carcinoma in a Euthyroid Patient with a Solitary Nodule, According to the Degree of Suspicion.

High suspicion

Family history of medullary thyroid carcinoma or multiple endocrine neoplasia

Rapid tumor growth, especially during levothyroxine therapy

A nodule that is very firm or hard

Fixation of the nodule to adjacent structures

Paralysis of vocal cords

Regional lymphadenopathy

Distant metastases

Moderate suspicion

Age of either <20 years or >70 years

Male sex

History of head and neck irradiation

A nodule >4 cm in diameter or partially cystic

Symptoms of compression, including dysphagia, dysphonia, hoarseness, dyspnea, and cough

INDAGINI

- TSH, FT4, FT3
- Anticorpi anti-tiroide (anti-Tg, TPO, TSHr)
- TG e Calcitonina ??
- Ecografia tiroidea / Color - Doppler

CRITERI DI RISCHIO ALL'ECOGRAFIA / COLOR - DOPPLER

- Nodulo solido ipoecogeno
- Assenza di alone periferico
- Margini irregolari del nodulo
- Microcalcificazioni
- Pattern di vascolarizzazione intranodale
- Linfadenopatia satellite
- Aumento dimensioni nodulo

INDICAZIONI ALL'ESECUZIONI DI FNAC

- Nodulo isolato solido o cistico >1 cm
- Nodulo dominante in caso di gozzo multinodulare
- Nodulo di qualunque dimensione in caso di linfadenopatia satellite
- Nodulo di qualunque dimensione in caso di rapida crescita
- Criteri ecografici di rischio

DIAGNOSI ISTOLOGICA

Lesioni Benigne (77-84%)

Adenoma follicolare	(18-82%)
Nodulo colloidale/gozzo	(4-74%)
Tiroidite Linfocitaria	(0-14%)
Cisti dotto tireoglosso	(0-5%)

Lesioni Maligne (16-22%)

CA papillare	(50-95%)
CA follicolare	(0-25%)
CA misto	(0-20%)
CA anaplastico	(0-13%)
CA midollare	(0-7%)

Table 2. Treatment of the Single Nonmalignant Thyroid Nodule.

Treatment Type	Advantages	Disadvantages
Surgery	Nodule ablation, complete relief of symptoms, definite histologic diagnosis	Need for hospitalization, high cost, risks associated with surgery, vocal-cord paralysis (approximately 1% of patients), hypoparathyroidism (<1%), hypothyroidism (approximately 1%*)
Levothyroxine	No need for hospitalization, low cost, may slow nodule growth, may prevent new nodule formation	Low efficacy, need for lifelong treatment, regrowth of nodule after cessation of treatment, cardiac tachyarrhythmias, reduced bone density, not feasible when thyrotropin level is suppressed
Radioiodine†	No need for hospitalization, low cost, few subjective side effects, nodule reduced by 40% in 1 yr	Use of contraceptives needed in fertile women, only gradual reduction of the nodule, hypothyroidism within 5 yr (10% of patients), risk of radiation thyroiditis and thyrotoxicosis
Ethanol injection	No need for hospitalization, relatively low cost, no hypothyroidism, nodule reduced by 45% in 6 mo	Limited experience with treatment, decreasing efficacy with increasing nodule size, success dependent on operator's skill, painful (reducing compliance), risk of thyrotoxicosis and vocal-cord paralysis (approximately 1–2%), seepage of ethanol,‡ interpretation of cytologic and histologic findings impeded in treated nodules

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TERAPIA

TIROIDITE DI HASHIMOTO

- Eutiroidismo L-Tiroxina se GOZZO/NODULI
- Ipotiroidismo L- Tiroxina
- Ipertiroidismo discussa

MARIA

FNAC: negativo per cellule maligne,
compatibile con tiroidite linfocitaria
cronica

Terapia: L-tiroxina

MARIA

Dopo 1 anno
di terapia

ECO TIROIDE

Struttura disomogenea con 1 nodulo
ipoecogeno al terzo medio del lobo
dx di dimensioni 6mm

Dimensioni: 38x14x17 a dx

35x12x15 a sin

FT3 3.9 pg/ml (vn 1.7-4.1)

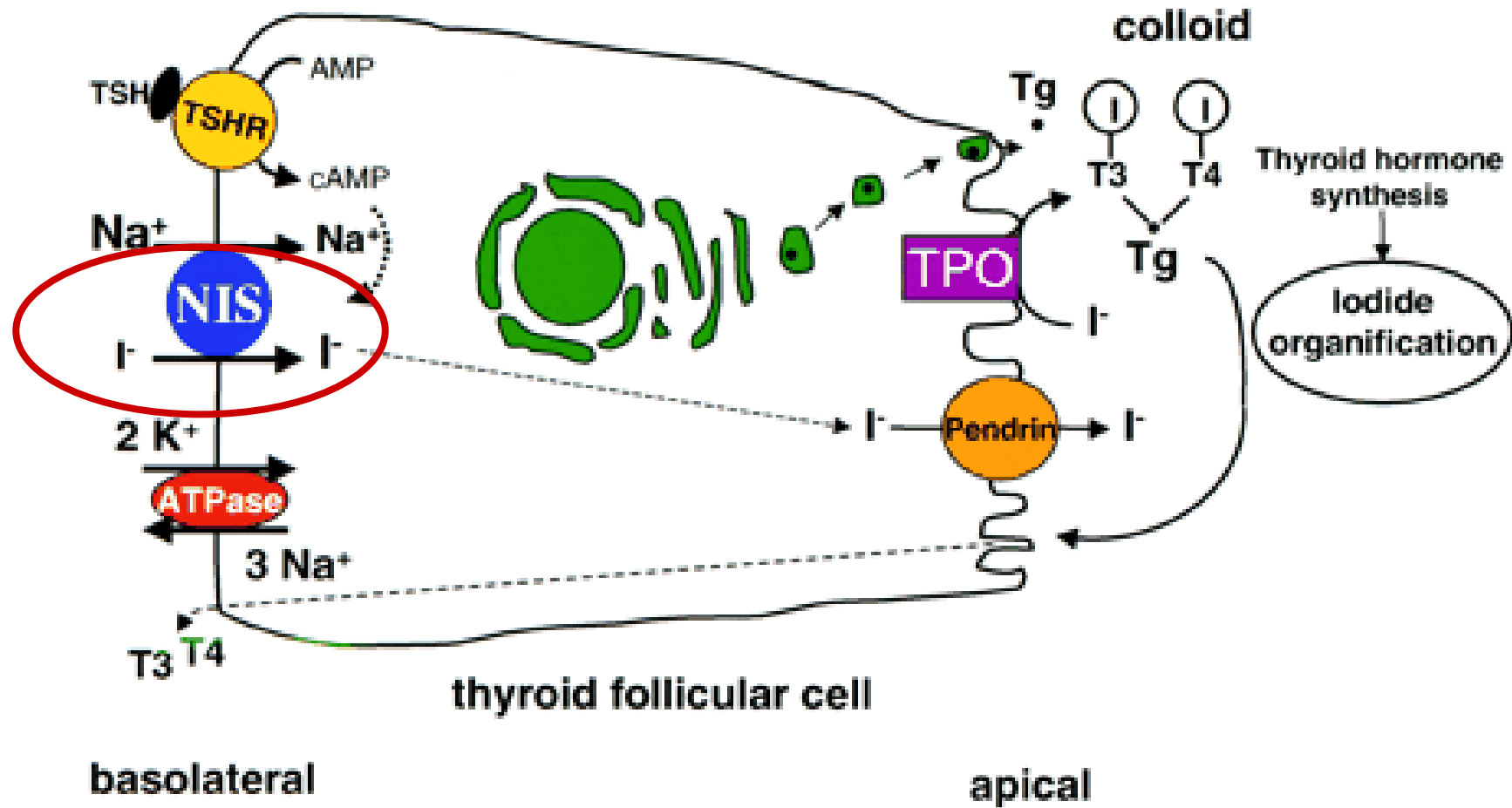
FT4 1.6 ng/dl (vn 0.7-1.6)

TSH **0.3** mcU/ml (vn 0.5-4.5)

Anti TG 1660 - Anti TPO 980 IU/ml (vn <40)



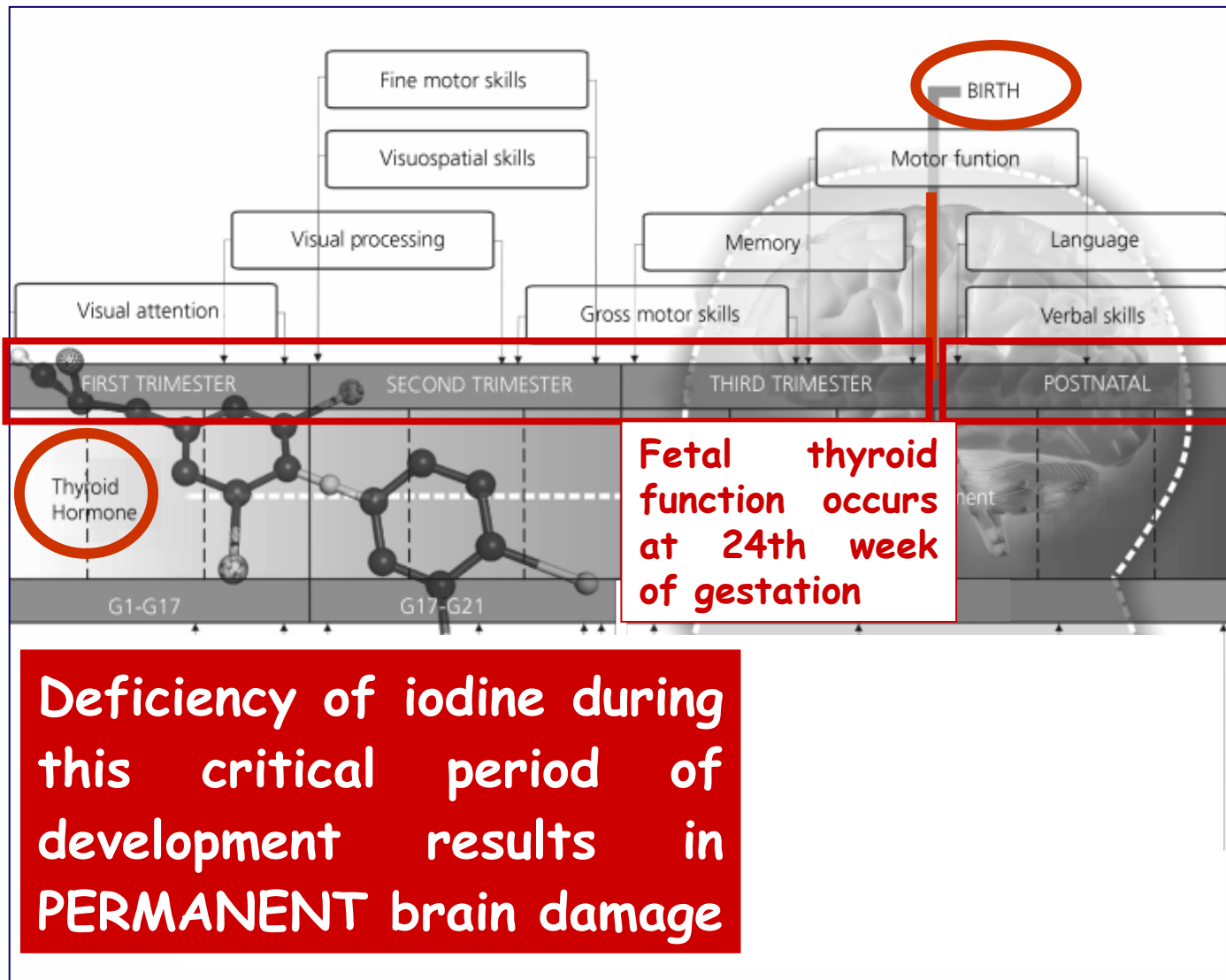
Thyroid hormones synthesis



The spectrum of Iodine Deficiency Disorders

FETUS	Abortions Stillbirths Congenital anomalies Goiter Increased perinatal mortality Endemic cretinism Psychomotor defects
NEONATE	Neonatal goiter Neonatal hypothyroidism Mental retardation
CHILD & ADOLESCENT	Goiter Retarded physical development Impaired mental function
ADULTS	Goiter Thyroid nodule Hypothyroidism/hyperthyroidism

Timing of thyroid hormone action in developing brain



The spectrum of Iodine Deficiency Disorders

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<p>NEONATE</p>	<p>Neonatal goiter Neonatal hypothyroidism Mental retardation</p>
<p>CHILD & ADOLESCENT</p>	
<p style="text-align: center;">NEONATAL SCREENING</p> <ul style="list-style-type: none"> • Early diagnosis and treatment • Improvement of neurological outcome and IQ 	
	<p>Hypothyroidism/hyperthyroidism</p>

The spectrum of Iodine Deficiency Disorders

FETUS	Abortions Stillbirths Congenital anomalies Goiter Increased perinatal mortality Endemic cretinism Psychomotor defects
NEONATE	Neonatal goiter Neonatal hypothyroidism Mental retardation
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ADULTS	Goiter Thyroid nodule Hypothyroidism/hyperthyroidism

CLASSIFICATION OF GOITER



GRADE 0 No palpable or visible goiter

GRADE 1 Goiter palpable but not visible

GRADE 2 Goiter palpable and visible when the neck is in a normal position

Indicators for diagnosis of iodine deficiency

- **Most usefull:**
concentration of iodine in urine
- **Also usefull:**
thyroid size (palpation and /or ultrasound)
serum thyroglobulin
- **Less usefull:**
Serum TSH (except in newborns)
serum FT4 and FT3

Criteria for assessing iodine nutrition based on urinary iodine concentrations in school-aged children

Median urinary iodine (μg /L)	Iodine nutrition
<20	Severe deficiency
20-49	Moderate deficiency
50-99	Mild deficiency

Criteria for assessing iodine nutrition based on urinary iodine concentrations in school-aged children

Median urinary iodine ($\mu\text{g} / \text{L}$)	Iodine nutrition
<20	Severe deficiency
20-49	Moderate deficiency
50-99	Mild deficiency
100-199	Optimal
200-299	More than adequate
>300	Excessive*

* Risk of hypothyroidism, autoimmune thyroid disease

WORLD PREVALENCE OF IODINE DEFICIENCY*

	General population	School-age children
Africa	42.6%	42.3%
Americas	9.8%	10.1%
Eastern Mediterr	54.1%	55.4%
Europe	56.9%	59.9%
Southeast Asia	39.8%	39.9%
Western Pacific	24.0%	25.7%
TOTAL	35.2%	36.4%

*Urinary iodine <100 µg/L

De Benoist, Lancet 2003

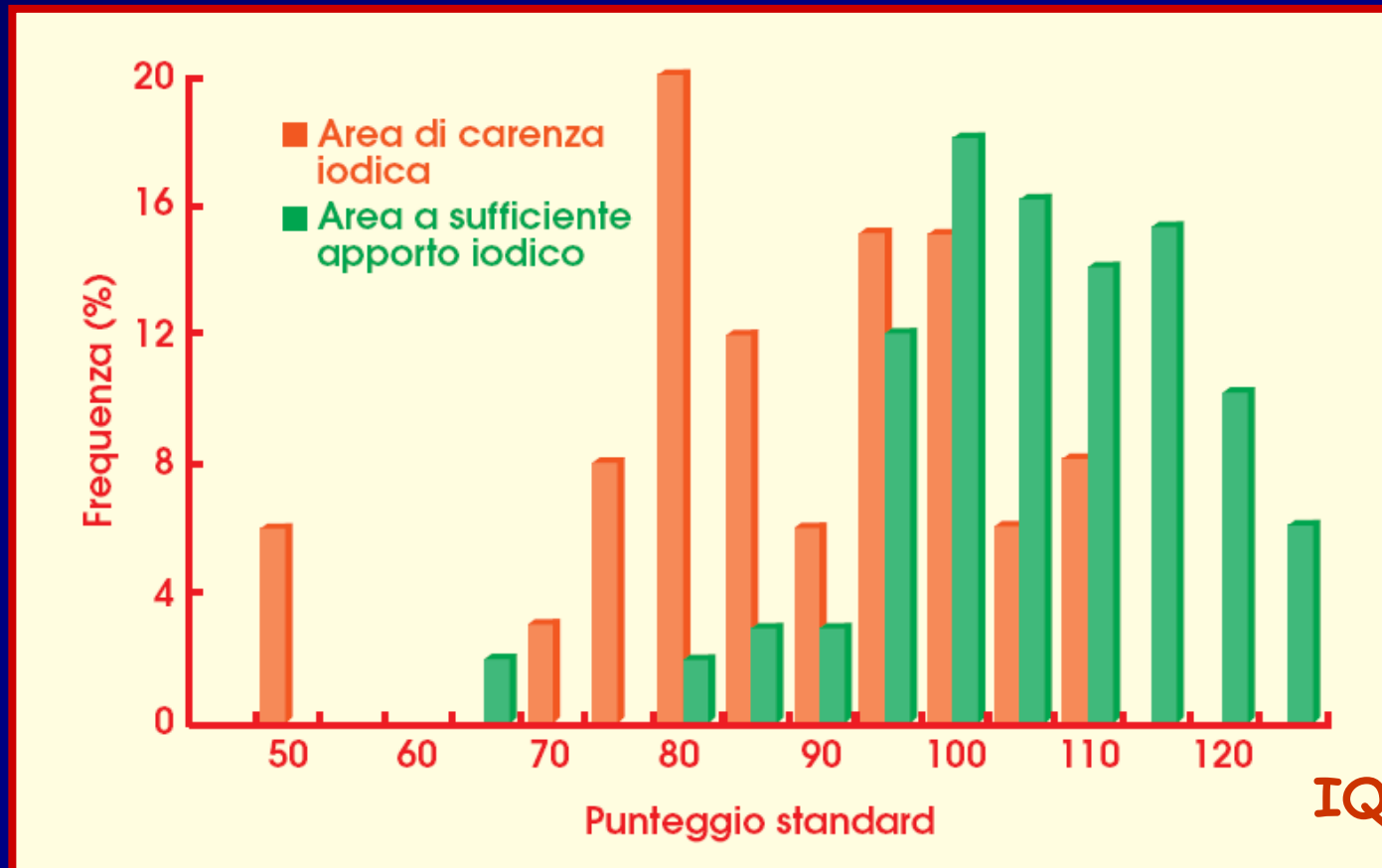
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TOTAL	35.2%	36.4%

*Urinary iodine <100 µg/L

De Benoist, Lancet 2003

IQs in children (2.5-6 years) from iodine deficient (orange) and iodine sufficient area (green)



Prevalence and age distribution of thyroid disorders in the iodine deficient community of Pescopagano (Basilicata-Italy)

Age (yr)	Subjects (n)	Goiter (%)	Nodular goiter (%)
1-5	135	---	---
6-8	79	10.1	---
9-11	88	17.0	---
12-14	117	37.6	1.7

MAIN DIETARY SOURCE OF IODINE



Golter is easily prevented by including a small amount of iodine in the diet

Food	Fresh ($\mu\text{g}/100\text{ g}$)		Dried ($\mu\text{g}/100\text{ g}$)	
	Average	Variation	Average	Variation
Fresh water fish	30	17-40	116	68-194
Sea fish	832	163-3180	3715	471-4591
Shellfish	798	308-1300	3866	1292-4987
Meat	50	27-97	-	-
Milk	47	35-56	-	-
Eggs	93	-	-	-
Cereal	47	22-72	65	34-92
Fruit	18	10-29	154	62-277
Pulses	30	23-36	234	223-245
Vegetables	29	12-201	385	204-1636
Iodized salt	30 mg/kg			

Recommended daily intake of iodine



Goiter is easily prevented by including a small amount of iodine in the diet

GROUP

DAILY INTAKE (μg)

•CHILDREN

Preschool children (0-59 months) 90

School children (6-12 years) 120

•ADULTS 150

•PREGNANT AND LACTATING WOMEN 200

IODINE SUPPLEMENTATION

1 teaspoon full: 5 gms of salt = 150 μ g iodine

Infant formulas: Term 10 μ g/100 ml iodine

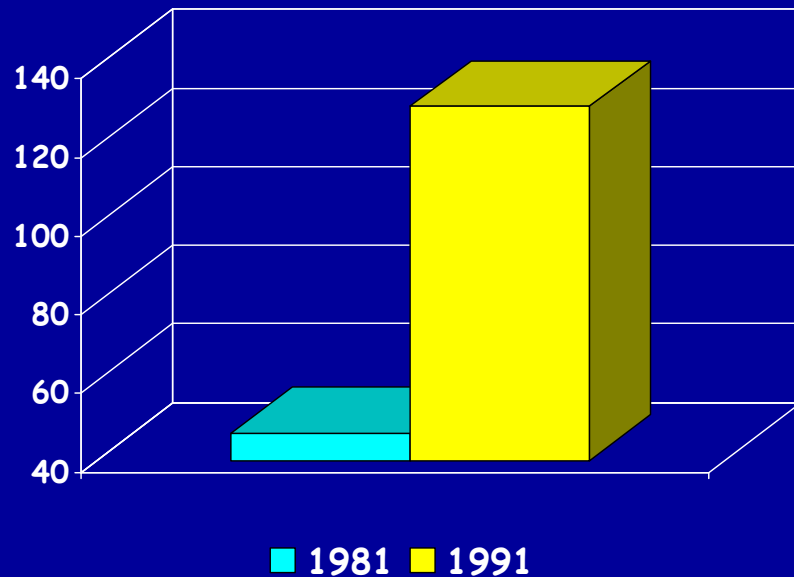
Preterm 15-20 μ g/100 ml iodine

Dietary supplements: Multicentrum baby 90 μ g iodine

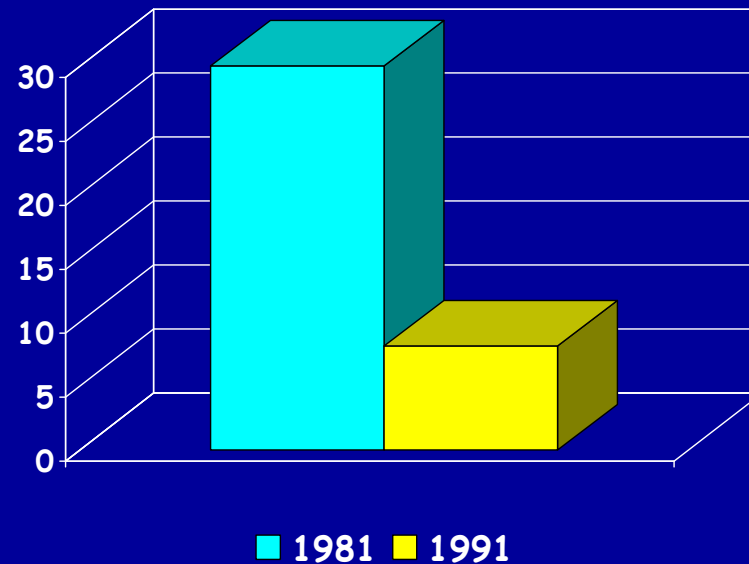
Multicentrum 150 μ g iodine

Effects of iodized salt supplementation in schoolchildren (10-14 yr): Toscana (Italy)

Urinary iodine levels ($\mu\text{g/L}$)

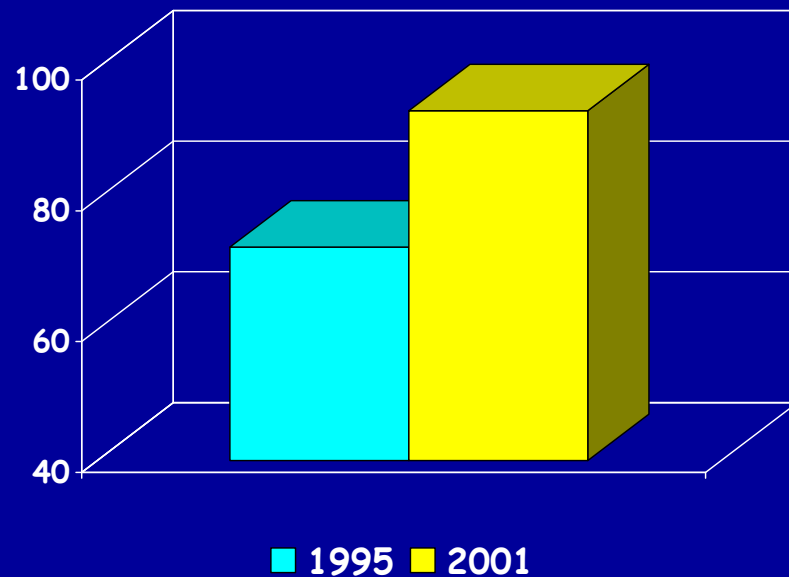


Prevalence of goiter(%)



Effects of iodized salt supplementation in schoolchildren (11-14 yr): Umbria (Italy)

Urinary iodine levels ($\mu\text{g}/\text{L}$)



Prevalence of goiter(%)

