Associazione Culturale
Pediatri Centro-Sicilia

ASP CALTANISSETTA
AZIENDA SANITARIA PROVINCIALE

CEFPAS

Attualità in tema di disturbi respiratori del sonno nel bambino e nell'adolescente:
dal russamento alle OSAS
aspetti clinici, diagnostici e terapeutici

Complicanze cardiovascolari: un cocktail micidiale!

Francesco De Luca

U.O. di Cardiologia Pediatrica
Ospedale Santo Bambino - Catania

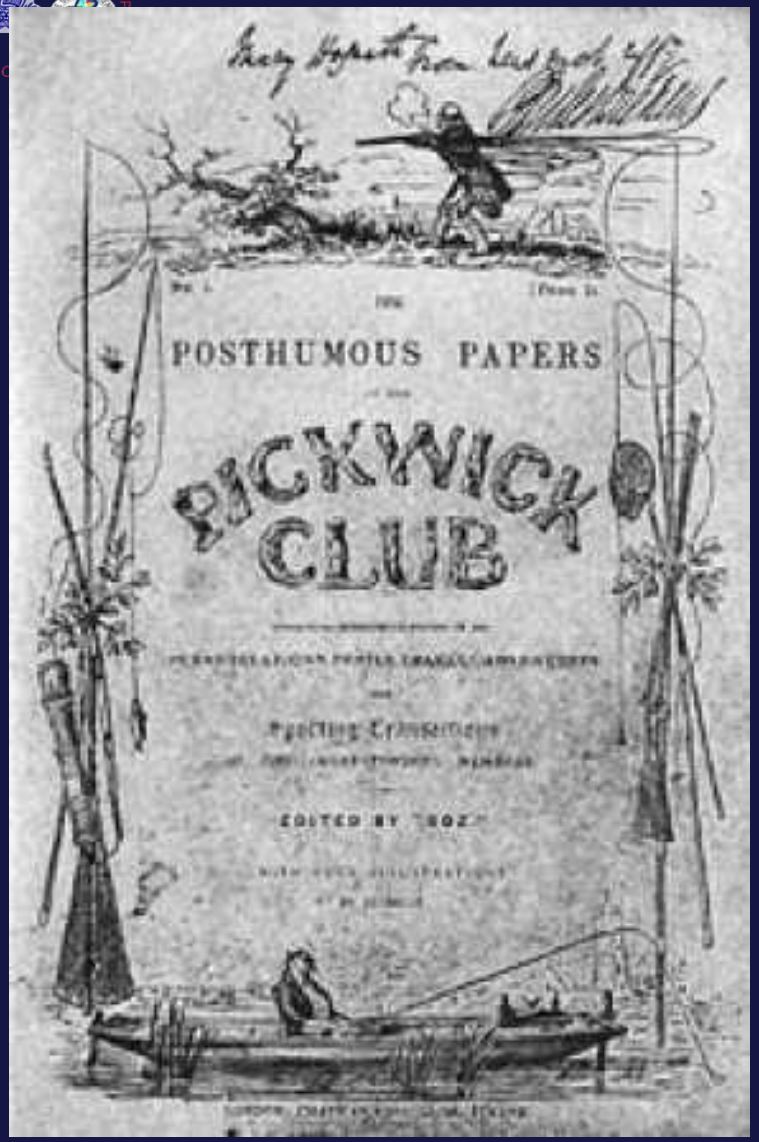
f.deluca@ao-ve.it

Perché Sergio ha così fortemente voluto una giornata sull'OSAS nei bambini???

Obstructive Sleep Apnoea (OSA)

Perchè

- Considerate la sua enorme diffusione, questa patologia deve essere oramai considerata tra i problemi di salute pubblica primari.
- L'OSA, se non trattata, presenta una prognosi povera, a breve (accidenti cerebrovascolari), e a lungo termine (complicanze cardiovascolari).
- Vi è una evidente carenza di infrastrutture e risorse dedicate a questa patologia, il che comporta che la stragrande maggioranza dei pazienti risulti diagnosticata in ritardo o non.
- **Il ruolo del pediatra nel riconoscimento tempestivo, nel trattamento e nel follow-up di questi pazienti è fondamentale, viste le dimensioni epidemiologiche che l'OSA sta assumendo.**



CHARLES DICKENS
(7 FEB.1812 - 9 GIU.1870)

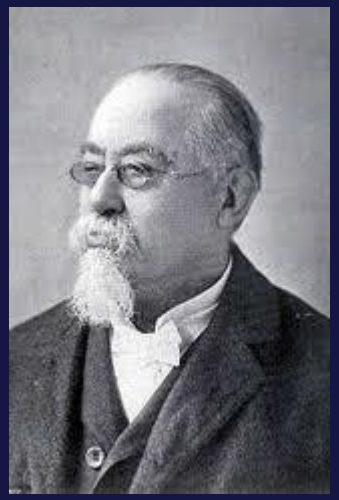
"The Posthoumous Papers of the Pickwick Club" ("I quaderni postumi del Circolo Pickwik"), più noti come "The Pickwick Papers" furono la prima novella che Dickens pubblicò a dispense nel 1837 prima di raccoglierla in un unico volume

Joe, il ragazzo, "meravigliosamente grasso" o "amabile individuo paffuto", che mangiava a qualsiasi ora del giorno, era fattorino e persona di servizio di Mr. Wardle, amico di Samuel Pickwick, protagonista principale dei racconti di Dickens, fondatore del Circolo Pickwick.

Joe, ragazzo grasso che consumava grandi quantità di cibo, cadeva addormentato in qualsiasi situazione ed a qualsiasi ora del giorno, anche durante una cerimonia militare dove veniva simulata una battaglia con numerosi e ripetuti colpi d'arma da fuoco:

"Tutti erano eccitati, meno il ragazzo grasso, il quale se la dormiva saporitamente come se il tuonar del cannone fosse stata la sua ninna-nanna"

1956



Case Reports

AMERICAN JOURNAL OF MEDICINE

NOVEMBER, 1956

Extreme Obesity Associated with Alveolar Hypoventilation— A Pickwickian Syndrome*

C. SIDNEY BURWELL, M.D., EUGENE D. ROBIN, M.D., ROBERT D. WHALEY, M.D. and ALBERT G. BICKELMANN, M.D.†

Boston, Massachusetts

Fig. 4

PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

1976

. . . si comincia a parlare di OSAS nei bambini

Sleep Apnea in Eight Children

Christian Guilleminault, Frederic L. Eldridge, F. Blair Simmons and William C. Dement

Pediatrics 1976;58:23

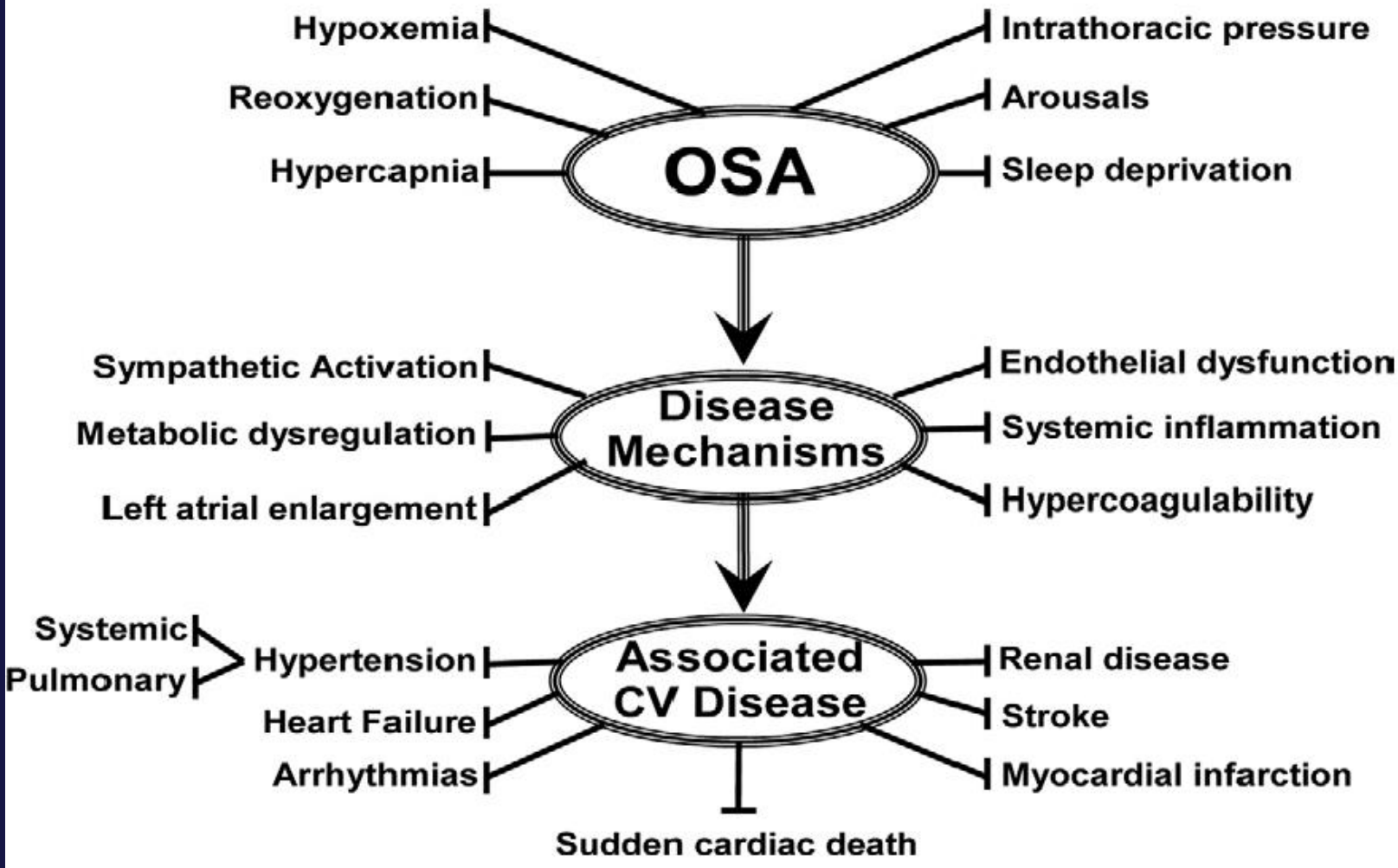
L’OSA è una condizione comune in età pediatrica, con importanti implicazioni cliniche su vari organi ed apparati, avremo infatti, tra gli altri:

- Effetti sulla crescita
- Morbilità neurocognitiva
- Effetti Endocrino/Metabolici
- **Danni Cardiovascolari**

Sleep Apnea and Cardiovascular Disease

Adulto

An American Heart Association/American College of Cardiology Foundation Scientific Statement From the American Heart Association Council for High Blood Pressure Research Professional Education Committee, Council on Clinical Cardiology, Stroke Council,



....Adulto

Journal of the American College of Cardiology
© 2013 by the American College of Cardiology Foundation
Published by Elsevier Inc.

Vol. 62, No. 7, 2013
ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2013.04.080

Obstructive Sleep Apnea and the Risk of Sudden Cardiac Death

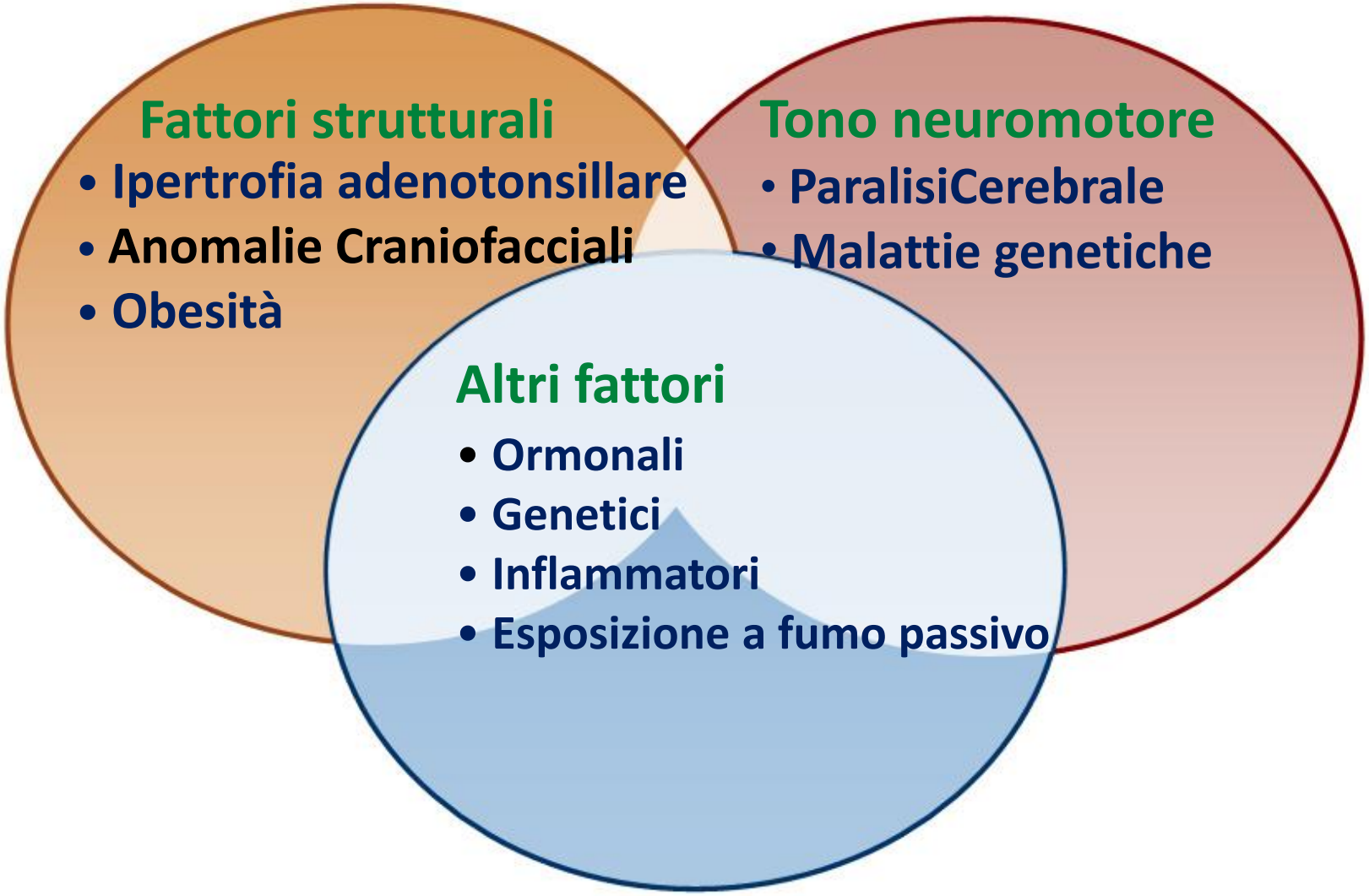
A Longitudinal Study of 10,701 Adults

Conclusioni

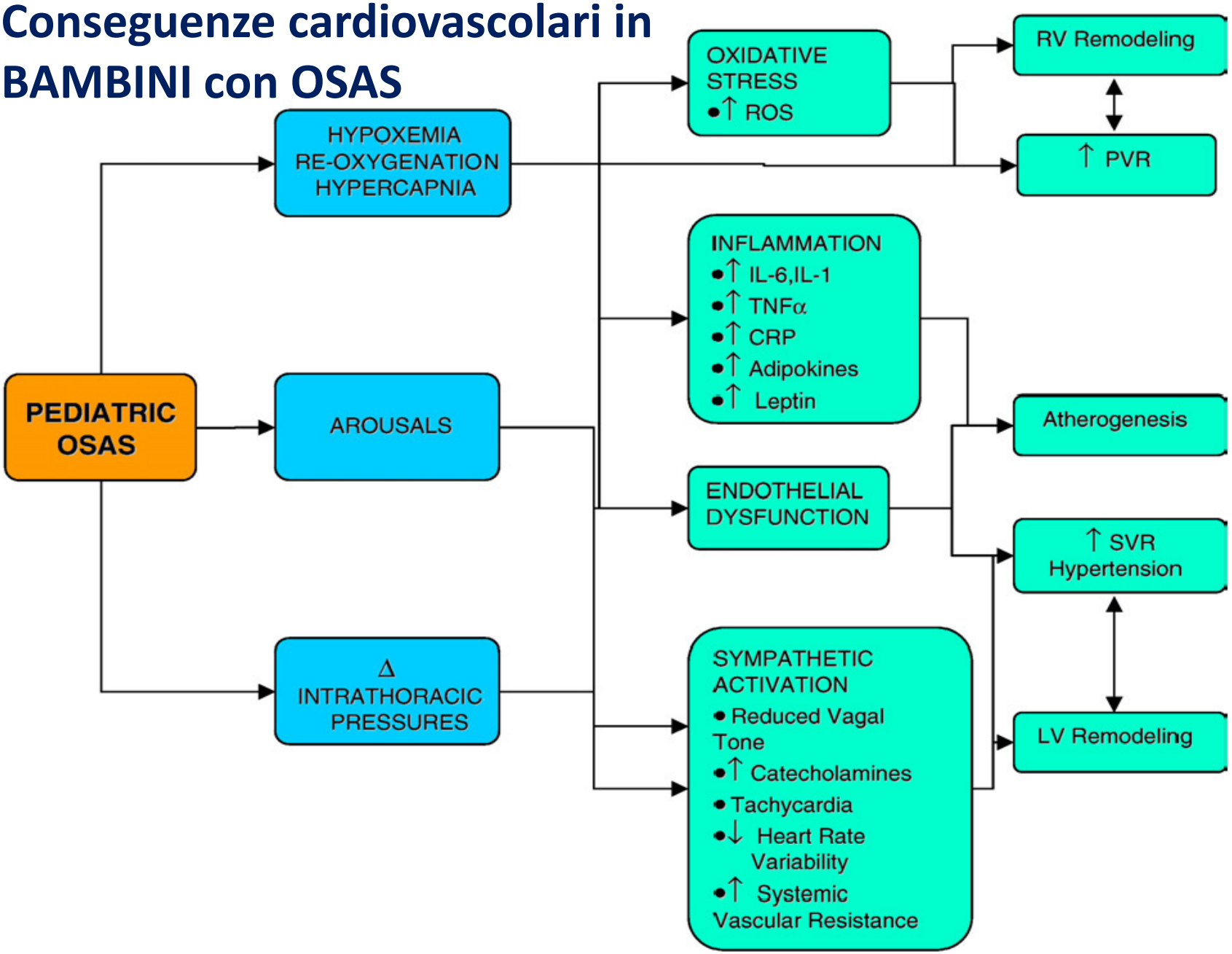
In a population of 10,701 adults referred for polysomnography, OSA predicted incident SCD, and the magnitude of risk was predicted by multiple parameters characterizing OSA severity. Nocturnal hypoxemia, an important pathophysiological feature of OSA, strongly predicted SCD independently of well-established risk factors. These findings implicate OSA, a prevalent condition, as a novel risk factor for SCD. (J Am Coll Cardiol 2013;62:610–6)

Ma come agisce l'OSA sull'apparato cardiovascolare del bambino?

Patofisiologia dell'OSA in età padiatrica



Conseguenze cardiovascolari in BAMBINI con OSAS



Progress in Cardiovascular Diseases, Vol. 51, No. 5 (March/April), 2009

Elevated Blood Pressure During Sleep and Wake in Children With Sleep-Disordered Breathing

CONCLUSIONS: A total of 105 children referred for assessment of SDB and 36 nonsnoring controls were studied..We recorded BP continuously overnight and found that SDB, regardless of the severity, was associated with increased BP during sleep and wake compared with nonsnoring control children. These findings highlight the importance of considering the cardiovascular effects of SDB of any severity in children, and the need to review current clinical management that focuses primarily on more severe SDB.

Pediatrics 2011;128:e85–e92

WHAT THIS STUDY ADDS: The authors recorded blood pressure continuously overnight in children and revealed that all severities of sleep-disordered breathing were associated with elevated blood pressure of 10 to 15 mm Hg. These cardiovascular complications in mild disease need to be considered when planning treatment thresholds.

Obstructive Sleep Apnea and Endothelial Function in School-Aged Nonobese Children Effect of Adenotonsillectomy

Background: *Obstructive sleep apnea (OSA) in children is associated with cardiovascular morbidity such as systemic* hypertension and endothelial dysfunction. However, it remains unclear if they are reversible on effective treatment of OSA.

Conclusions: *Postocclusive hyperemia is consistently blunted in children with OSA, and such altered endothelial function* is reversible 4 to 6 months after treatment, particularly if a family history of cardiovascular disease is not present.

(*Circulation. 2007;116:2307-2314*)

Storia ed esame clinico di base nei soggetti con sospetta OSA presso l'ambulatorio del PDF

- Segni clinici di base: russamento, apnee, addormentamenti frequenti durante il giorno, difficoltà di attenzione, facile stancabilità, irritabilità, depressione, riduzione della memoria (Epworth Scale)
- Anamnesi cardiovascolare e respiratoria
- Modi di dormire (siesta, durata, risvegli, enuresi, frequenti arousals)
- Valutazione antropometrica: peso, altezza, BMI, circonferenza toracica
- Fenotipo del volto: tipo di morso, micrognazia, collo corto.
- Orofaringoscopia: ipertrofia del palato molle e/o delle tonsille
- Rinoscopia: rinorrea, deviazione del setto, ipertrofia adenoidea
- **Esame obiettivo cardiaco e misurazione della pressione arteriosa**

Mid-Michigan Sleep Center

Modified Pediatric Epworth Sleepiness Scale (Ages 6-16)

The Epworth Sleepiness Scale is used to determine the level of daytime sleepiness. A score of 10 or more is considered sleepy. A score of 18 or more is very sleepy. If you score 10 or more on this test, you should consider whether you are obtaining adequate sleep, need to improve your sleep hygiene and/or need to see a sleep specialist. These issues should be discussed with your personal physician.

Use the following scale to choose the most appropriate number for each situation. Circle your answers and see where you stand.

Situation	**Chance of Dozing or Sleeping**			
	None	**Slight**	**Moderate**	**High**
Sitting and reading	0	1	2	3
Watching TV	0	1	2	3
Sitting inactive in a public place	0	1	2	3
Being a passenger in a motor vehicle for an hour or more	0	1	2	3
Lying down in the afternoon	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after lunch	0	1	2	3
Playing video games	0	1	2	3

Total score (add the scores up)
This is your Epworth score _____

F. De Luca

ATS Journals

Redline e coll. (Am. J. Respir. Crit. Care Med. Vol. 159. pp 1527- 1532, 1999)

Hanno esaminato i fattori di rischio per disturbi respiratori nel sonno in bambini tra 2 e 18 anni e hanno trovato che negli obesi il rischio di sviluppare disturbi nel sonno aumentava di 4-5 volte

In particolare, per ogni incremento di 1 Kg/m² del *body mass index (BMI) rispetto al valore medio di BMI per età* e sesso, il rischio di OSAS aumentava del 12%.

Obstuctive Sleep Apnea Syndrome

OSAS

Numerosi studi negli Stati Uniti suggeriscono che circa il 25-35% dei bambini obesi soffre di OSAS

Clinical Study

Inflammatory Markers and Obstructive Sleep Apnea in Obese Children: The NANOS Study

Mediators of Inflammation 2014

204 obese children were enrolled in the study; 75 had OSA, defined by an obstructive respiratory disturbance index (RDI) of 3 events/hour total sleep time (TST). BMI, gender, and age were similar in OSA and no-OSA children. Monocyte chemoattractant protein-1 (MCP-1) and plasminogen activator inhibitor-1 (PAI-1) levels were significantly higher in OSA children, with interleukin-6 concentrations being higher in **moderate-severe OSA**

In summary, **systemic inflammation is more pronounced in obese children with OSA**, further buttressing the contributions of perturbed sleep and gas exchange abnormalities to the inflammatory cascade.

Fernando Botero (b. 1932) - After Velasquez, 2005 - Oil on canvas - 79 x 67 in. - Private Collection

L'obesità è una malattia cardiovascolare, che si può diagnosticare precocemente

POSITION STATEMENT

Healthy active living: Physical activity guidelines for children and adolescents

Healthy Active Living and Sports Medicine Committ
Canadian Paediatric Society

Paediatr Child Health 2012;17(2)

Physical activity guidelines

For healthy growth and development:

Infants (<1 yr of age) should be physically active several times daily – particularly through interactive floor-based play.

Toddlers (1-2 yrs) and preschoolers (3-4 yrs) should accumulate at least 180 min of physical activity at any intensity spread throughout the day, including:

- A variety of activities in different environments.
- Activities that develop movement skills.
- Progression toward at least 60 min of energetic play by 5 yrs of age.

More daily physical activity provides greater benefits.

For health benefits:

Children (5-11 yrs) and youth (12-17 yrs) should accumulate at least 60 min of moderate-to-vigorous-intensity physical activity daily, including:

- Vigorous-intensity activities at least 3 days/week.
- Activities that strengthen muscle and bone at least 3 days/week.
- More daily PA provides greater health benefits

Physical activity and sedentary behavior: a review of longitudinal studies of weight and adiposity in youth.

Must A Int J Obes 2005; 29 Suppl 2

Rischio di incremento dell' eccesso ponderale nell' infanzia e nell' adolescenza

maggiori livelli di sedentarietà

(soprattutto nei più piccoli)

minori livelli di attività fisica

(soprattutto nei più grandi)

Endothelial Dysfunction in Children Without Hypertension Potential Contributions of Obesity and Obstructive Sleep Apnea

Background: *Endothelial dysfunction can develop in the context of both obesity and obstructive* sleep apnea (OSA) in children. However, the potential interactions between OSA and obesity have not been defined.

Conclusions: *Both, obesity and OSA,* ***<u>can independently increase the risk for endothelial dysfunction</u>****,* and the concurrent presence of both markedly increases such risk. Although the mechanisms underlying endothelial dysfunction remain unclear, a potential role for MRP8/14 as an inflammatory biomarker of endothelial dysfunction is suggested..

CHEST 2012; 141(3):682–691

Research Article

Response to Statin Therapy in Obstructive Sleep Apnea Syndrome: A Multicenter Randomized Controlled Trial

***This multicenter,* randomized, double-blind study** compared the effects of atorvastatin 40mg/day versus placebo over 12 weeks on endothelial function (the primary endpoint) measured by peripheral arterial tone (PAT). Secondary endpoints included office blood pressure (BP), early carotid atherosclerosis, arterial stiffness measured by pulse wave velocity (PWV), and metabolic parameters. Systolic BP significantly decreased with atorvastatin (mean difference: −6.34mmHg (−12.68; −0.01), P = 0.050) whereas carotid atherosclerosis and PWV were unchanged compared to the placebo group.

Mediators of Inflammation, **2014**

Journal of the American College of Cardiology
© 2013 by the American College of Cardiology Foundation
Published by Elsevier Inc.

Vol. 62, No. 7, 2013
ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2013.05.045

STATE-OF-THE-ART PAPER

Obstructive Sleep Apnea

A Cardiometabolic Risk in Obesity and the Metabolic Syndrome

Obstructive sleep apnea (OSA) is an underdiagnosed condition characterized by recurrent episodes of obstruction of the upper airway leading to sleep fragmentation and intermittent hypoxia during sleep. Obesity predisposes to OSA, and the prevalence of OSA is increasing worldwide because of the ongoing epidemic of obesity. Recent evidence has shown that surrogate markers of cardiovascular risk, including sympathetic activation, systemic inflammation, and endothelial dysfunction, are significantly increased in obese patients with OSA versus those without OSA, suggesting that OSA is not simply an epiphenomenon of obesity. Moreover, findings from animal models and patients with OSA show that intermittent hypoxia exacerbates the metabolic dysfunction of obesity, augmenting insulin resistance and nonalcoholic fatty liver disease. In patients with the metabolic syndrome, the prevalence of moderate to severe OSA is very high (~60%). In this population, OSA is independently associated with increased glucose and triglyceride levels as well as markers of inflammation, arterial stiffness, and atherosclerosis. A recent randomized, controlled, crossover study showed that effective treatment of OSA with continuous positive airway pressure for 3 months significantly reduced several components of the metabolic syndrome, including blood pressure, triglyceride levels, and visceral fat. Finally, several cohort studies have consistently shown that OSA is associated with increased cardiovascular mortality, independent of obesity. Taken together, these results support the concept that OSA exacerbates the cardiometabolic risk attributed to obesity and the metabolic syndrome. Recognition and treatment of OSA may decrease the cardiovascular risk in obese patients. (J Am Coll Cardiol 2013;62:569–76)

OSAS

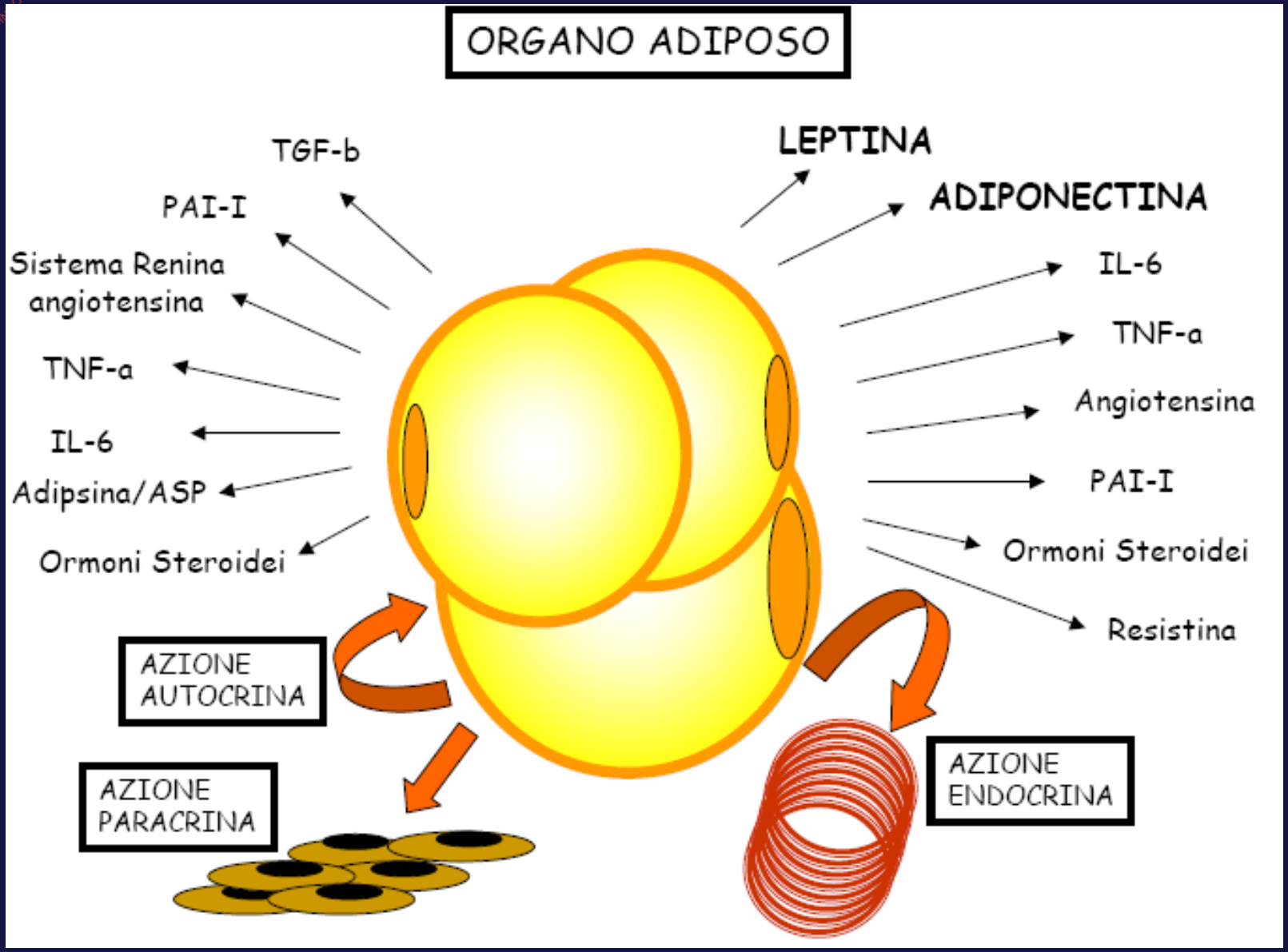
Recentemente è stato ipotizzato che alcuni fattori umorali, tra cui le *adipochine* prodotte dal tessuto adiposo (che si comporta come un *tessuto endocrino infiammato*), abbiano pure un ruolo rilevante.

……L'Adipocita

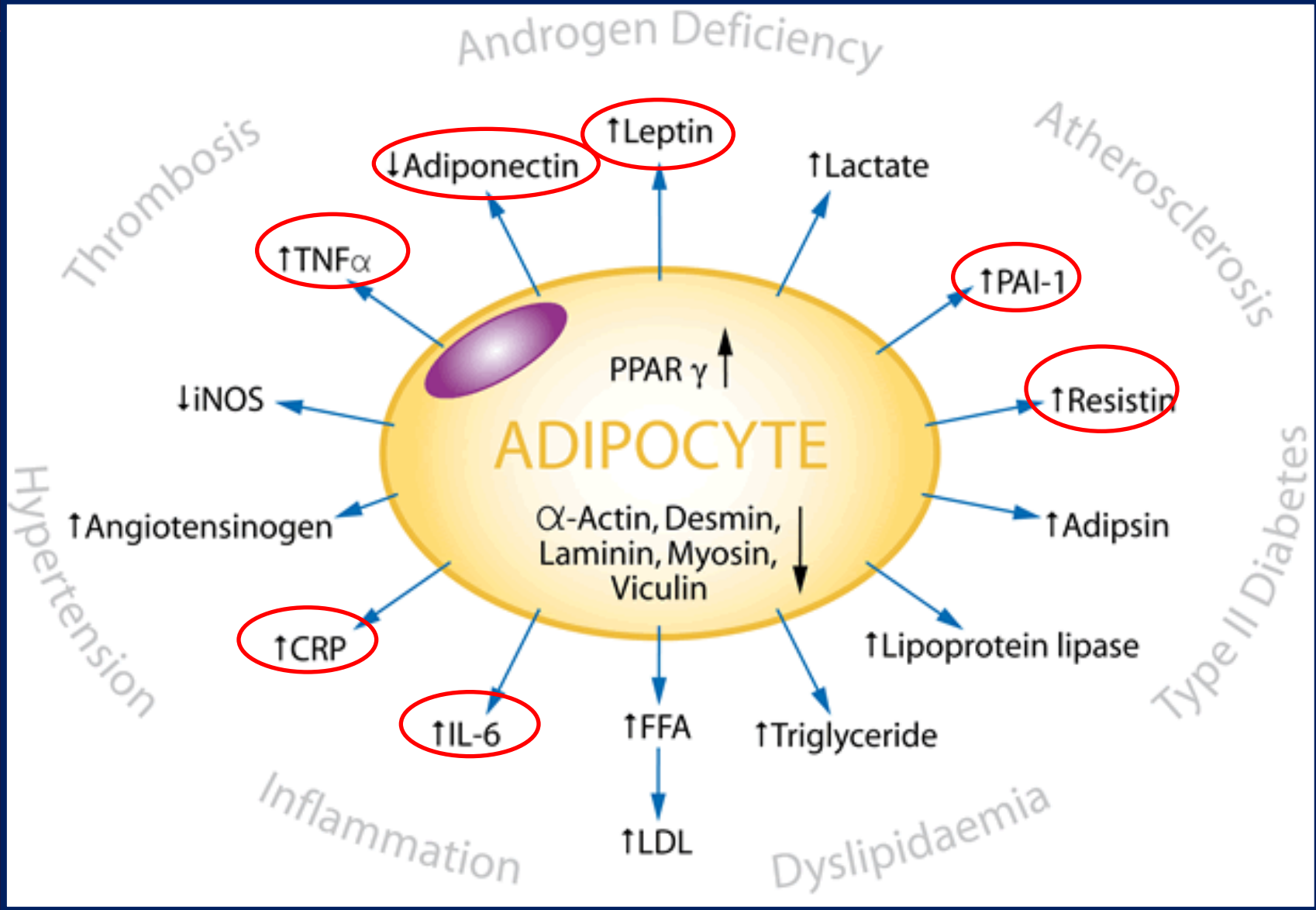
Il tessuto adiposo si comporta come un organo endocrino. Produce molte sostanze biologicamente attive, indicate come adipochine. Queste, insieme alle citochine classiche (interleuchina 1 (IL-1), interleuchina 6 (IL-6), *tumor necrosis factor α),* includono molecole molto attive come la **leptina** e **l'adiponectina**. In particolare, l'**adiponectina**, per le sue proprietà **anti-infiammatorie e anti-aterogene**, avrebbe rilevanti effetti protettivi a livello cardiovascolare.

(J Clin Endocrinol Metab 92: 3025–3032, 2007)

ORGANO ADIPOSO

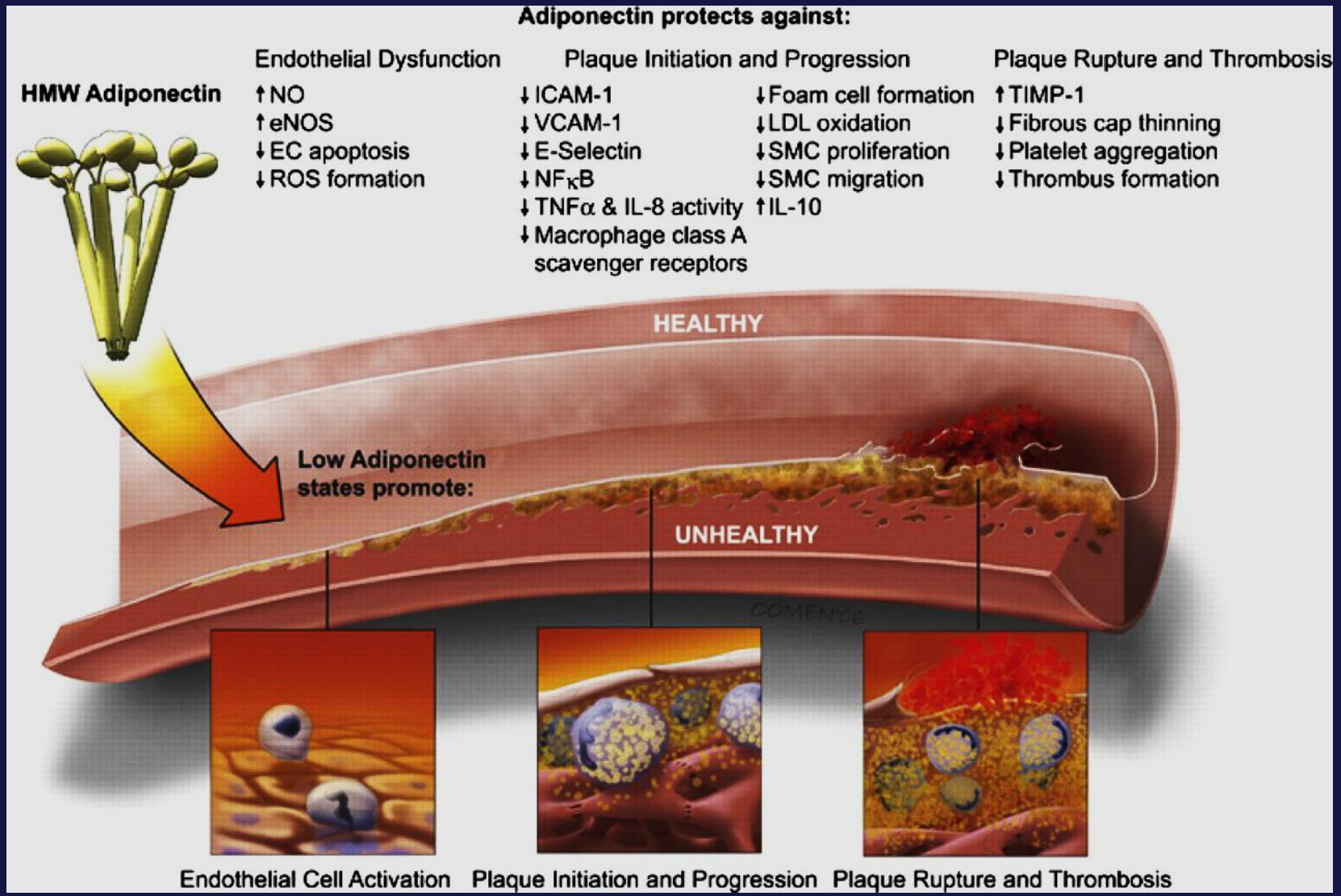


ADIPOCHINE

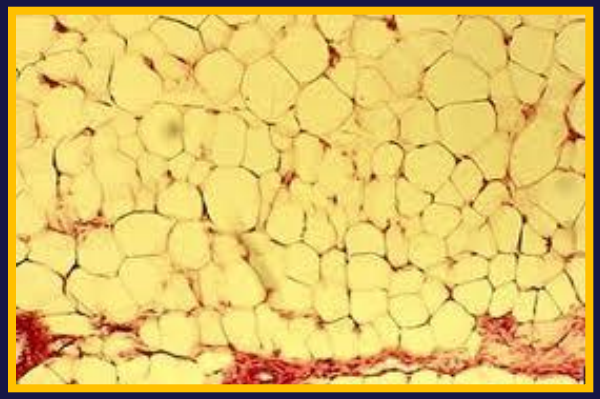


F. De Luca

Adiponectin, via its anti-inflammatory actions on the vascular endothelium, is a molecular regulator of atherosclerosis



Szmitko, P. E. et al. Am J Physiol Heart Circ Physiol 292: 1655-1663, 2007



Leptina
TNF - α
Resistina
IL – 6
PAI – 1

Adiponectina
(aumenta la sensibilità all'insulina)

Insulino-resistenza
⬆ rischio cardiovascolare

⬇ sensibilità all'insulina

LEPTINA

Importante potenziale ruolo come collegamento endocrino-mediato tra:

obesità, sindrome metabolica e disturbi respiratori del sonno

LEPTINA

I pazienti affetti da OSA hanno **livelli plasmatici di leptina più alti del 50% rispetto ai controlli senza OSA** similmente obesi, quindi è stato ipotizzato che nell'OSA sia presente uno stato di ***leptino resistenza***

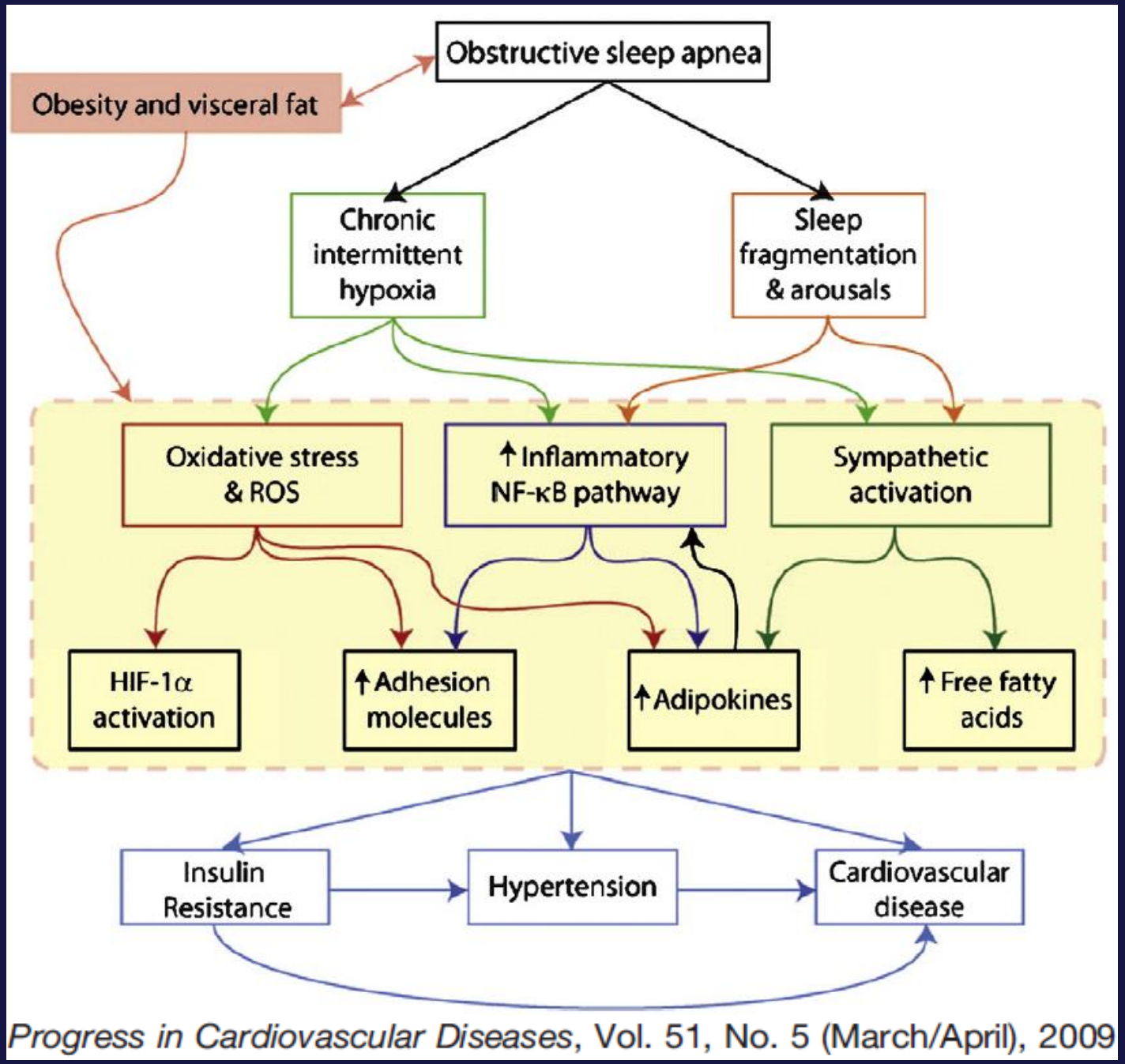
LEPTINA

Questa potenziata *resistenza alla leptina* predispone ad un incremento del peso e ad un peggioramento ulteriore dell'OSAS.

La reciproca interazione tra obesità e OSAS innesca un circolo vizioso in cui, entrambe, rafforzano vicendevolmente la loro progressione e la loro severità.

L'ipossia intermittente porta ad uno stato infiammatorio per produzione di citochine pro-infiammatorie che contribuiscono alla disfunzione endoteliale responsabile delle complicanze cardiovascolari

Luca



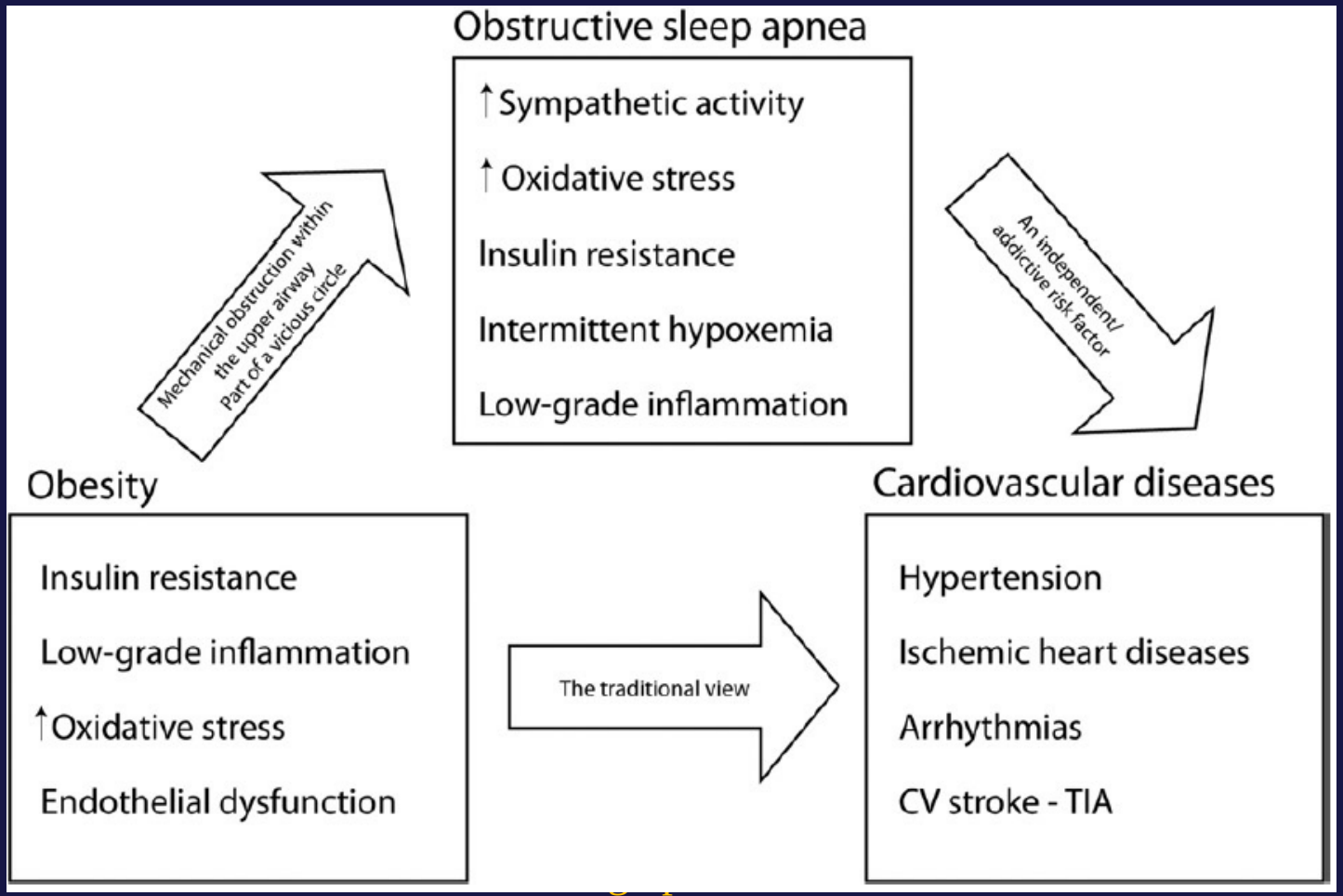
Progress in Cardiovascular Diseases, Vol. 51, No. 5 (March/April), 2009

Circulation
Cardiovascular Quality and Outcomes

American Heart Association®

Association of Obstructive Sleep Apnea With Risk of Serious Cardiovascular Events: A Systematic Review and Meta-Analysis

2012;5:720-728.



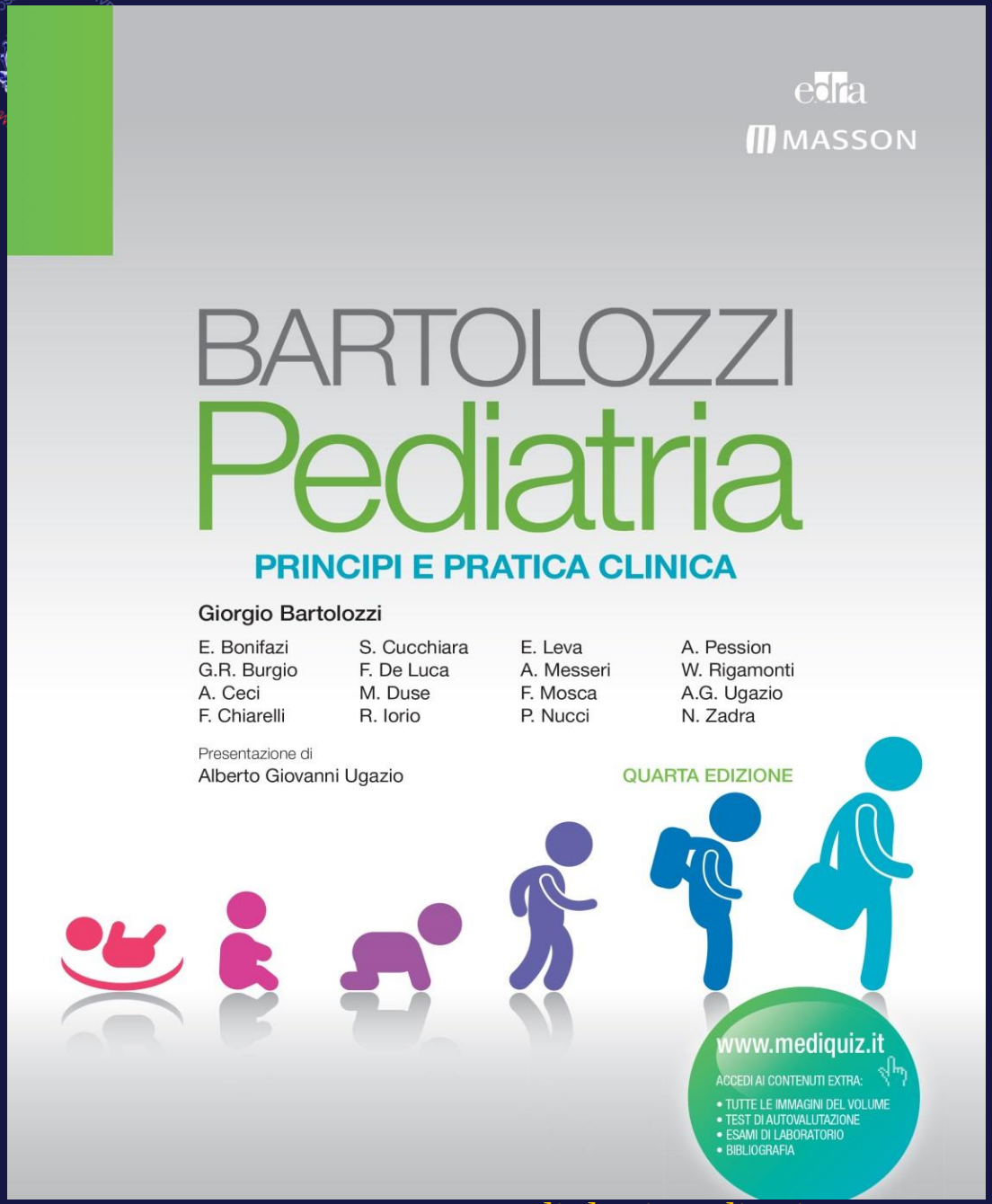
OSAS

Le OSAS nel bambino rappresentano un fattore di rischio indipendente di Sindrome Metabolica nell'adulto


www.SuperEdo.it
S.S. FAT GUY

TAKE HOME MESSAGE

- Screenare tutti I bambini che russano, in particolar modo quelli con fattori di rischio
- Eseguire, in questi, una valutazione cardiovascolare completa
- Monitorare i pazienti ad alto rischio
- Ricordare che l'obesità è un fattore predisponente per OSAS
- Obesità, OSAS e Malattia Metabolica hanno legami sostanziali
- L' adenotonsillectomia resta il trattamento di prima scelta
- Rivalutare la situazione post intervento per determinare se sono necessarie terapie addizionali



- Pagine: 1672 + **contenuti on-line**
- Immagini: oltre **450** + **flowcharts e tabelle**

…e, disponibili online

Immagini a colori scaricabili

Test a risposta multipla

Valori di riferimento per esami più frequenti

E grazie a voi tutti per l'attenzione!!!