obesità materna, neonato e….dintorni

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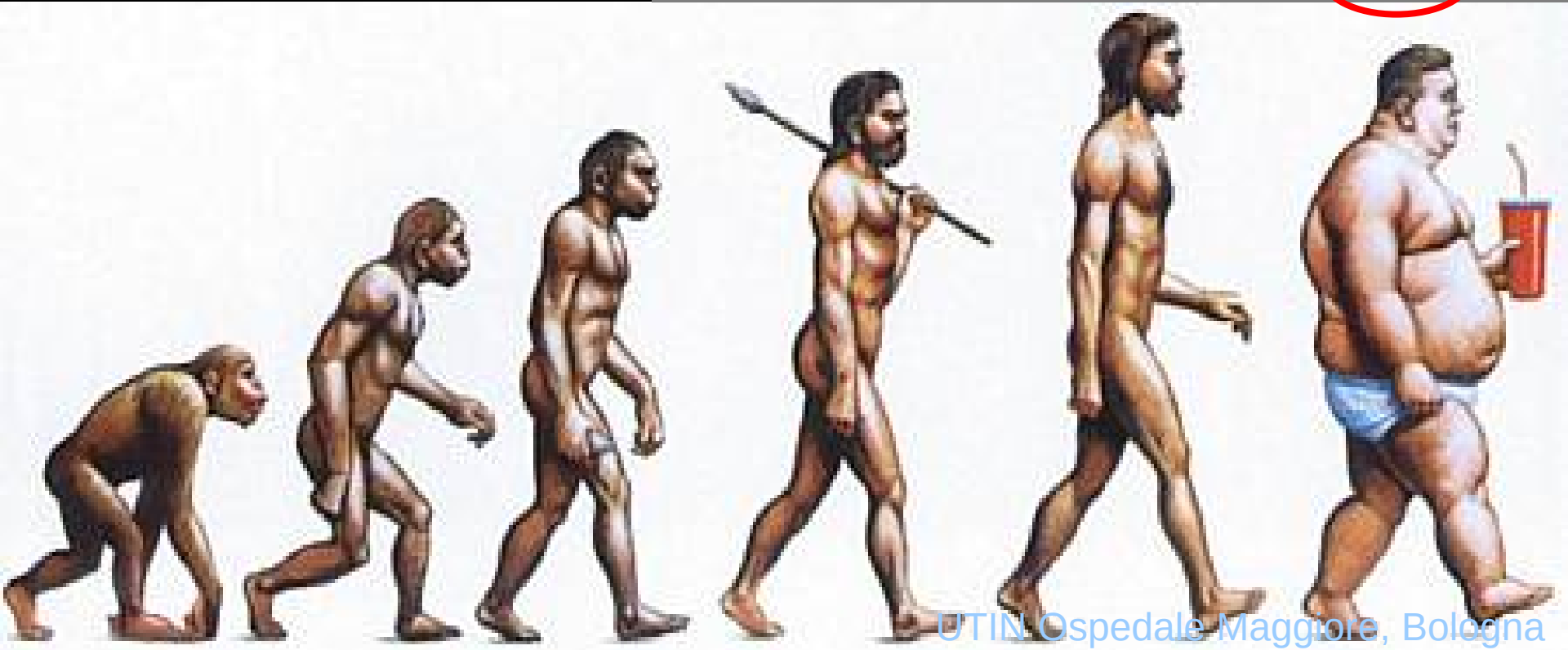
L'evoluzione

Frequenza di sovrappeso e obesità materna		
	sovrappeso	obesità
Scozia	27.7%	20.7%
Svezia	24.9%	12.6%
Germania	22.6%	13.7%
Norvegia	22.4%	12.3%
Francia	17.3%	9.9%
Emilia Romagna	17.8%	7.7%



Impact of Maternal Obesity on Fetal Health

Fetal Diagn Ther 2013;34:1–7
DOI: 10.1159/000350170

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Cominciamo bene.....

The exact mechanism in which obesity mediates poor health outcomes for both mother and fetus, are far from clear.

Thus, the malevolent effect of obesity on embryonic/fetal growth and development is profound and apparent throughout pregnancy.

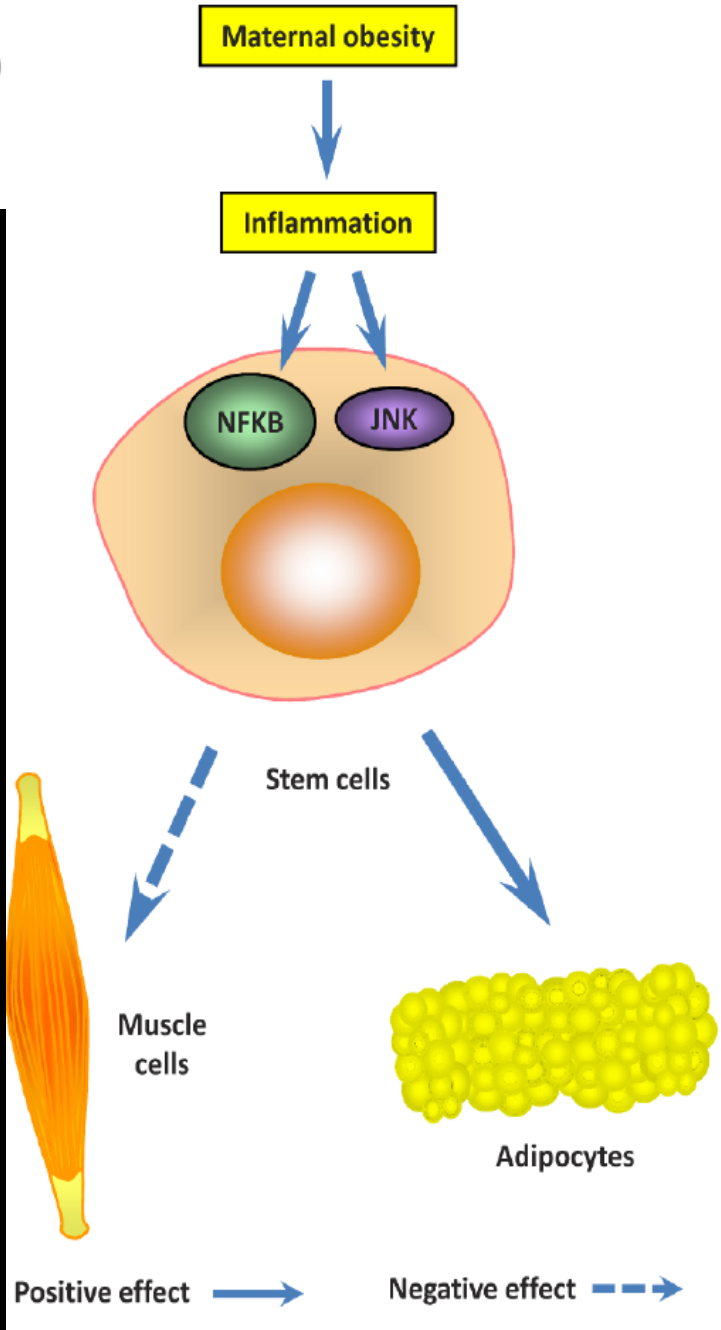
Maternal Obesity, Inflammation, and Fetal Skeletal Muscle Development

BIOLOGY OF REPRODUCTION **82,** 4–12 (2010)
Published online before print 10 June 2009.
DOI 10.1095/biolreprod.109.077099

- Infiammazione sistemica di grado lieve è associata all'obesità materna

- Inibizione della differenziazione delle cellule progenitrici - miociti ++ adipociti

- nati da madre obesa : scarso sviluppo muscolare alla nascita, poi incremento diabete di tipo 2 ed obesità



Nascita pretermine in relazione alla condizione di sovrappeso/obesità

		Odds ratio (IC 95%)
Sovrappeso	Nascita <37 sett. e.g. vs. nascita 37-41 sett.	**0.90**(0.80-1.01)
Obesità	Nascita <37 sett. e.g. vs. nascita 37-41 sett.	**1.34**(1.16-1.55)
Obesitàclasse 2 e 3	Nascita <37 sett. e.g. vs. nascita 37-41 sett.	**1.67**(1.32-2.11)

Nascita grave pretermine in relazione alla condizione di sovrappeso/obesità

		Odds ratio (IC 95%)
Sovrappeso	Nascita <32 sett. e.g. vs. nascita 37-41 sett.	**1.14**(0.85-1.52)
Obesità	Nascita <32 sett. e.g. vs. nascita 37-41 sett.	**1.71**(1.21-2.41)
Obesitàclasse 2 e 3	Nascita <32 sett. e.g. vs. nascita 37-41 sett.	**2.25**(1.33-3.83)

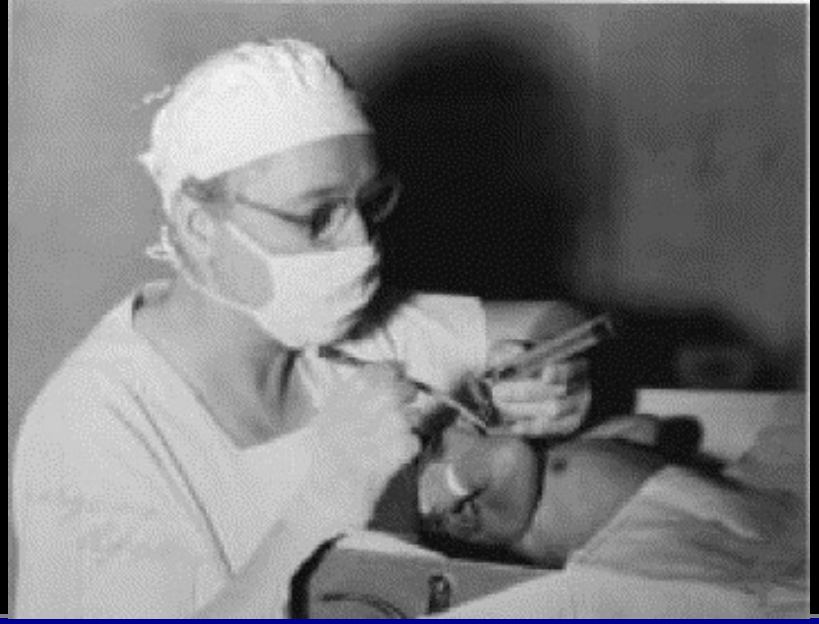
Nascita "late preterm" in relazione alla condizione di sovrappeso/obesità

		Odds ratio (IC 95%)
Sovrappeso	Nascita 34-36 sett.. vs. nascita 37-41 sett.	**0.92**(0.80-1.05)
Obesità	Nascita 34-36 sett.. vs. nascita 37-41 sett.	**1.25**(1.05-1.48)
Obesitàclasse 2 e 3	Nascita 34-36 sett.. vs. nascita 37-41 sett.	**1.54**(1.17-2.04)

Frequenza di LGA (>90° e >97° centile)secondo la condizione di sovrappeso/obesità

		Odds ratio (IC 95%)
Sovrappeso	Frequenza LGA (>90°) vs. AGA	**1.35**(1.24-1.48)
	Frequenza LGA (>97°) vs. AGA	**1.39**(1.21-1.59)
Obesità	Frequenza LGA (>90°) vs. AGA	**1.83**(1.64-2.05)
	Frequenza LGA (>97°) vs. AGA	**2.41**(2.05-2.83)
Obesitàclasse 2 e 3	Frequenza LGA (>90°) vs. AGA	**1.99**(1.64-2.40)
	Frequenza LGA (>97°) vs. AGA	**2.77**(2.14-3.59)

Asfissia fetale
Distocia di spalla
Ipoglicemia neonatale



Frequenza intubazione endotracheale in relazione alla condizione di obesità

		Odds ratio (IC 95%)
Sovrappeso	Intubazione vs. no rianimazione	**1.37**(0.99-1.89)
Obesità	Intubazione vs. no rianimazione	**2.11**(1.45-3.07)
Obesità classe 2 e 3	Intubazione vs. no rianimazione	**3.19** (1.87-5.47)

Punteggio di Apgar in relazione alla condizione di obesità

		Odds ratio (IC 95%)
Sovrappeso	Frequenza punteggio Apgar<7 vs. 7-10	**1.55**(1.13-2.11)
Obesità	Frequenza punteggio Apgar<7 vs. 7-10	**2.10**(1.43-3.07)
Obesità classe 2 e 3	Frequenza punteggio Apgar<7 vs. 7-10	**1.28**(0.56-2.91)

Maternal Obesity and Stillbirth

Semin Perinatol 35:340-344 © 2011 Elsevier Inc.

	Number of Cases of Stillbirth	Crude Hazard Ratio (95% CI)*	Adjusted Hazard Ratio (95% CI)*
Normal weight (BMI = 18.5-24.9)	7091	1.0	1.0
Overall obesity	1149	1.5 (1.4-1.6)	1.4 (1.3-1.5)
Class I obesity (BMI = 30-34.9)	649	1.4 (1.3-1.5)	1.3 (1.2-1.4)
Class II obesity (BMI = 35-39.9)	290	1.5 (1.3-1.7)	1.4 (1.3-1.6)
Extreme obesity	210	2.0 (1.8-2.4)	1.9 (1.6-2.1)

Rischio di natimortalità in relazione alla condizione di obesità

		Odds ratio (IC 95%)
Sovrappeso	Frequenza nati morti vs. nati vivi	1.43 (0.89-2.28)
Obesità	Frequenza nati morti vs. nati vivi	2.04 (1.16-3.59)
Obesità classe 2 e 3	Frequenza nati morti vs. nati vivi	2.75 (1.89-6.30)

Maternal Overweight and Obesity and the Risk of Congenital Anomalies

A Systematic Review and Meta-analysis

JAMA, February 11, 2009—Vol 301, No. 6

OBESITA' MATERNA

- RISCHIO 2 VOLTE > SPINA BIFIDA
- IDROCEFALIA
- ANOMALIE CARDIOVASCOLARI (TFO, DIFETTI SETTALI)
- LABIOPALATOSCHISI
- ATRESIA ANO-RETTALE
- DIFETTI IN RIDUZIONE DEGLI ARTI

Maternal Pre-Pregnancy Body Mass Index and Risk of Selected Birth Defects: Evidence of a Dose–Response Relationship

Paediatric and Perinatal Epidemiology, 2013, **27**, 521–531

Suzanne R. Block,[a] Sharon M. Watkins,[a] Jason L. Salemi,[b] Rachel Rutkowski,[a] Jean Paul Tanner,[c] Jane A. Correia,[a] Russell S. Kirby[c]

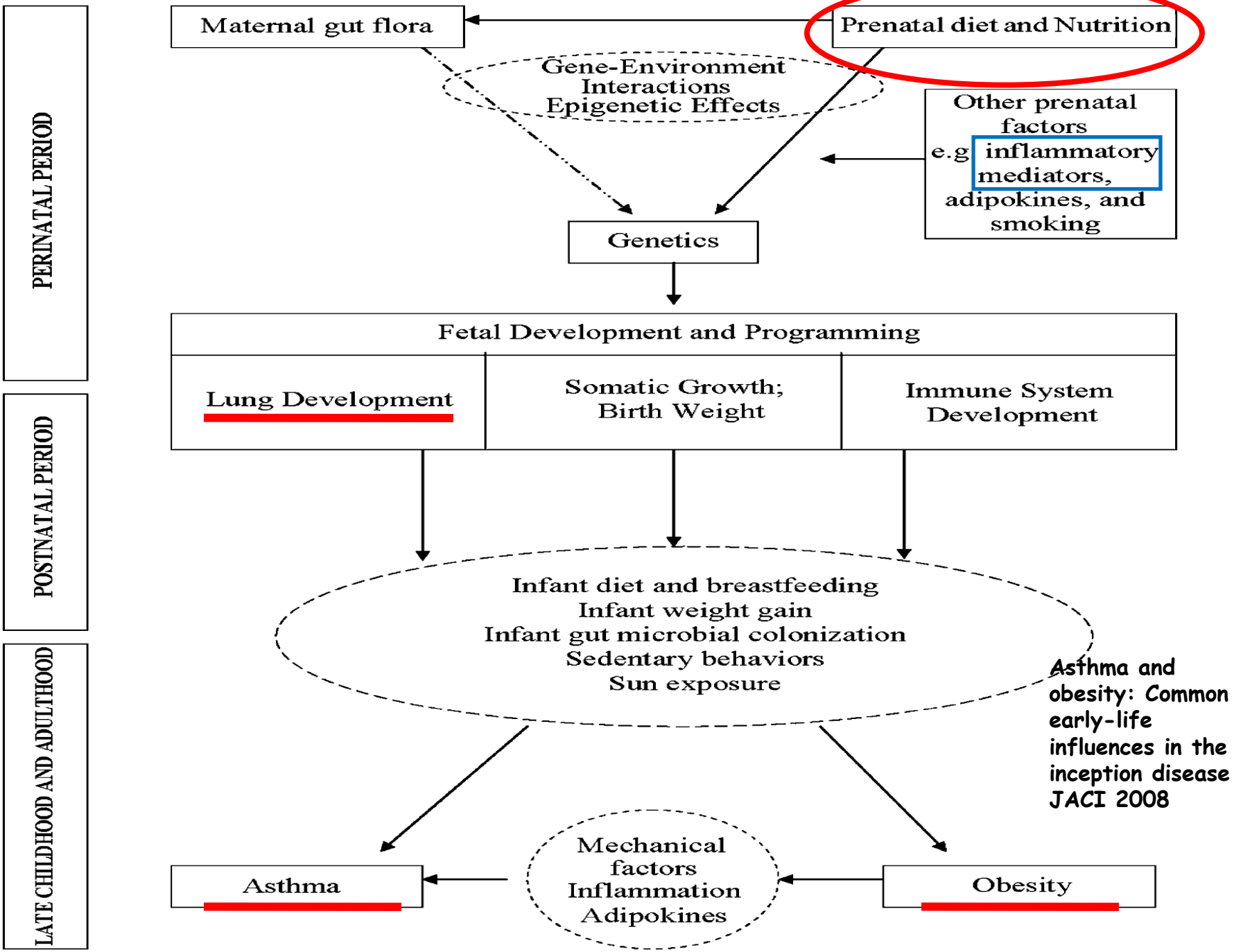
Birth defect condition (*P trend*)	Cases	Obese I BMI (30.0–34.9) Adjusted OR [95% CI]	Obese II BMI (35.0–39.9) Adjusted OR [95% CI]	Obese III BMI (≥40) Adjusted OR [95% CI]
Any birth defect[d****f]	31 123	1.12 [1.09, 1.16][f]	1.26 [1.21, 1.31][f]	1.37 [1.31, 1.47][f]
Aortic valve stenosis[f]	122	1.14 [0.69, 1.89]	1.93 [1.09, 3.43][f]	1.32 [0.57, 3.04]
Choanal atresia	117	1.06 [0.63, 1.77]	1.50 [0.79, 2.83]	1.31 [0.57, 3.03]
Cleft lip with and without cleft palate	633	1.21 [0.98, 1.49]	1.29 [0.96, 1.74]	1.30 [0.90, 1.89]
Cleft palate without cleft lip*[f]	428	1.27 [0.98, 1.63]	1.67 [1.21, 2.30][f]	0.97 [0.59, 1.62]
Coarctation of aorta	501	1.09 [0.85, 1.39]	1.28 [0.92, 1.77]	1.33 [0.90, 1.98]
Congenital hip dislocation	672	0.83 [0.66, 1.05]	0.82 [0.58, 1.16]	0.87 [0.57, 1.34]
Diaphragmatic hernia**[f]	253	1.01 [0.70, 1.45]	1.85 [1.24, 2.76][f]	1.91 [1.18, 3.09][f]
Endocardial cushion defect	137	1.44 [0.94, 2.22]	1.71 [0.97, 3.03]	1.35 [0.62, 2.97]
Esophageal atresia/tracheoesophageal fistula	150	0.63 [0.37, 1.06]	0.82 [0.42, 1.63]	1.44 [0.75, 2.79]
Gastroschisis**[f]	359	0.32 [0.20, 0.50][f]	0.19 [0.08, 0.46][f]	0.19 [0.06, 0.58][f]
Hirschsprung's disease (congenital megacolon)	197	1.17 [0.80, 1.72]	1.59 [0.99, 2.57]	0.99 [0.48, 2.03]
Hydrocephalus without spina bifida**[f]	519	0.93 [0.73, 1.20]	1.15 [0.83, 1.59]	1.61 [1.15, 2.25][f]
Hypoplastic left heart syndrome*[f]	244	0.99 [0.69, 1.42]	1.38 [0.89, 2.15]	1.55 [0.94, 2.58]
Hypospadias[e,f]	2847	1.07 [0.91, 1.26]	1.15 [0.91, 1.45]	1.37 [1.05, 1.78][f]
Microcephalus	464	1.17 [0.92, 1.49]	1.32 [0.95, 1.83]	1.05 [0.68, 1.63]
Obstructive genito-urinary defect[f]	2856	1.10 [0.99, 1.22]	1.26 [1.10, 1.45][f]	1.08 [0.89, 1.30]
Pulmonary valve atresia and stenosis****[f]	771	1.19 [0.98, 1.44]	1.45 [1.13, 1.87][f]	1.83 [1.39, 2.40][f]
Pyloric stenosis**[f]	2407	1.13 [1.01, 1.26][f]	1.17 [1.00, 1.37]	1.30 [1.09, 1.57][f]
Rectal and large intestinal atresia/stenosis*[f]	348	1.24 [0.94, 1.65]	1.26 [0.84, 1.88]	1.77 [1.15, 2.71][f]
Reduction deformity: lower limbs	118	0.61 [0.33, 1.11]	0.84 [0.39, 1.82]	0.95 [0.38, 2.36]
Reduction deformity: upper limbs	159	1.19 [0.78, 1.80]	1.28 [0.71, 2.28]	1.09 [0.50, 2.35]
Renal agenesis/hypoplasia	309	1.24 [0.92, 1.66]	1.02 [0.64, 1.62]	0.98 [0.55, 1.76]
Spina bifida without anencephalus[f]	214	1.43 [1.02, 2.01][f]	1.11 [0.65, 1.90]	1.51 [0.85, 2.68]
Tetralogy of Fallot****[f]	357	1.35 [1.02, 1.79][f]	1.93 [1.38, 2.71][f]	2.11 [1.42, 3.12][f]
Transposition of great arteries**[f]	374	1.32 [1.01, 1.73][f]	1.54 [1.08, 2.20][f]	1.80 [1.19, 2.72][f]
Ventricular septal defect****[f]	4059	1.10 [1.01, 1.20][f]	1.17 [1.04, 1.32][f]	1.32 [1.15, 1.52][f]

Maternal Obesity and Risk for Birth Defects

Margaret L. Watkins, Sonja A. Rasmussen, Margaret A. Honein, Lorenzo D. Botto and Cynthia A. Moore

Pediatrics 2003;111;1152

	Total	Average (BMI 18.5–24.9)	Underweight (BMI <18.5)		Overweight (BMI 25–29.9)		Obese (BMI ≥30)	
		n	*n*	OR (95% CI)	*n*	OR (95% CI)	*n*	OR (95% CI)
Controls	330	212	27		55		36	
Hydrocephaly	14	8	1	1.0 (0.1–8.2)	3	1.5 (0.4–5.6)	2	1.5 (0.3–7.2)
NTDs	43	22	3	1.1 (0.3–3.8)	8	1.4 (0.6–3.3)	10	2.7 (1.2–6.1)
Anencephaly	12	6	1	1.3 (0.2–11.3)	2	1.3 (0.3–6.5)	3	2.9 (0.7–12.3)
Spina bifida	22	10	2	1.6 (0.3–7.6)	4	1.5 (0.5–5.1)	6	3.5 (1.2–10.3)
Encephalocele	9	6	0	-	2	1.3 (0.3–6.5)	1	1.0 (0.1–8.4)
Anencephaly and spina bifida	34	16	3	1.5 (0.4–5.4)	6	1.5 (0.5–3.9)	9	3.3 (1.4–8.1)
Oral clefts	90	59	5	0.7 (0.3–1.8)	18	1.2 (0.6–2.2)	8	0.8 (0.4–1.8)
Cleft palate	30	22	1	0.4 (0.1–2.8)	5	0.9 (0.3–2.4)	2	0.5 (0.1–2.4)
Cleft lip	26	16	3	1.5 (0.4–5.4)	5	1.2 (0.4–3.4)	2	0.7 (0.2–3.3)
Cleft lip + palate	34	21	1	0.4 (0.1–2.9)	8	1.5 (0.6–3.5)	4	1.1 (0.4–3.5)
Heart defects	195	95	20	1.7 (0.9–3.1)	48	2.0 (1.2–3.1)	32	2.0 (1.2–3.4)
LVOTO	42	19	3	1.2 (0.3–4.5)	16	3.3 (1.6–6.7)	4	1.2 (0.4–3.9)
HLH	22	13	1	0.6 (0.1–4.8)	7	2.1 (0.8–5.5)	1	0.5 (0.1–3.6)
Coarctation of aorta	12	5	0	-	5	3.9 (1.1–13.8)	2	2.4 (0.4–12.6)
RVOTO	25	13	4	2.4 (0.7–7.9)	5	1.5 (0.5–4.3)	3	1.4 (0.4–5.0)
Severe RVOTO†	14	6	3	3.9 (0.9–16.6)	3	1.9 (0.5–8.0)	2	2.0 (0.4–10.1)
ASD	12	4	3	5.9 (1.3–27.7)	3	2.9 (0.6–13.3)	2	2.9 (0.5–16.7)
VSD	43	23	3	1.0 (0.3–3.6)	9	1.5 (0.7–3.4)	8	2.1 (0.9–4.9)
ASD or VSD	55	27	6	1.8 (0.7–4.6)	12	1.7 (0.8–3.6)	10	2.2 (1.0–4.9)
Outflow tract defects	50	25	6	1.9 (0.7–5.0)	11	1.7 (0.8–3.7)	8	1.9 (0.8–4.5)
TOF	19	10	2	1.6 (0.3–7.6)	4	1.5 (0.5–5.1)	3	1.8 (0.5–6.7)
D-TGA	25	13	4	2.4 (0.7–7.9)	5	1.5 (0.5–4.3)	3	1.4 (0.4–5.0)
Esophageal atresia	20	13	1	0.6 (0.1–4.8)	1	0.3 (0.0–2.3)	5	2.3 (0.8–6.7)
Omphalocele	18	9	1	0.9 (0.1–7.2)	3	1.3 (0.3–4.9)	5	3.3 (1.0–10.3)
Gastroschisis	23	16	1	0.5 (0.1–3.9)	6	1.5 (0.5–3.9)	0	-
Small intestinal atresia	9	5	0	-	3	2.3 (0.5–10.0)	1	1.2 (0.1–10.4)
Large intestinal atresia	32	19	0	-	9	1.8 (0.8–4.3)	4	1.2 (0.4–3.9)
Limb deficiencies	45	29	4	1.1 (0.4–3.3)	8	1.1 (0.5–2.5)	4	0.8 (0.3–2.5)
Transverse	33	22	2	0.7 (0.2–3.2)	5	0.9 (0.3–2.4)	4	1.1 (0.4–3.3)
Longitudinal	13	7	2	2.2 (0.4–11.4)	3	1.7 (0.4–6.6)	1	0.8 (0.1–7.0)
Amniotic band sequence	12	10	0	-	1	0.4 (0.1–3.1)	1	0.6 (0.1–4.7)
Renal anomalies	106	74	8	0.9 (0.4–2.0)	16	0.8 (0.5–1.5)	8	0.6 (0.3–1.4)
Renal agenesis	20	14	3	1.5 (0.4–5.4)	1	0.3 (0.0–2.1)	2	0.8 (0.2–3.9)
Renal multicystic dysplasia	30	19	1	0.4 (0.1–3.2)	7	1.4 (0.6–3.6)	3	0.9 (0.3–3.3)
Urinary obstruction	67	47	5	0.8 (0.3–2.3)	11	0.9 (0.4–1.9)	4	0.5 (0.2–1.5)
Hypospadias	21	13	2	1.2 (0.3–5.6)	5	1.5 (0.5–4.3)	1	0.5 (0.1–3.6)
Craniosynostosis	28	15	4	2.1 (0.7–6.8)	7	1.8 (0.7–4.6)	2	0.8 (0.2–3.6)
Diaphragmatic hernia	17	11	2	1.4 (0.3–6.8)	3	1.1 (0.3–3.9)	1	0.5 (0.1–4.3)
Multiple congenital anomalies	96	48	8	1.3 (0.6–3.1)	24	1.9 (1.1–3.4)	16	2.0 (1.0–3.8)


PERINATAL PERIOD
POSTNATAL PERIOD
LATE CHILDHOOD AND ADULTHOOD
Maternal gut flora
Prenatal diet and Nutrition
Gene-Environment Interactions Epigenetic Effects
Other prenatal factors e.g inflammatory mediators, adipokines, and smoking
Genetics
Fetal Development and Programming
Lung Development
Somatic Growth; Birth Weight
Immune System Development
Infant diet and breastfeeding
Infant weight gain
Infant gut microbial colonization
Sedentary behaviors
Sun exposure
Asthma and obesity: Common early-life influences in the inception disease JACI 2008
Asthma
Mechanical factors Inflammation Adipokines
Obesity

Pediatr Allergy Immunol 2005: 16: 380–385

PEDIATRIC ALLERGY AND IMMUNOLOGY

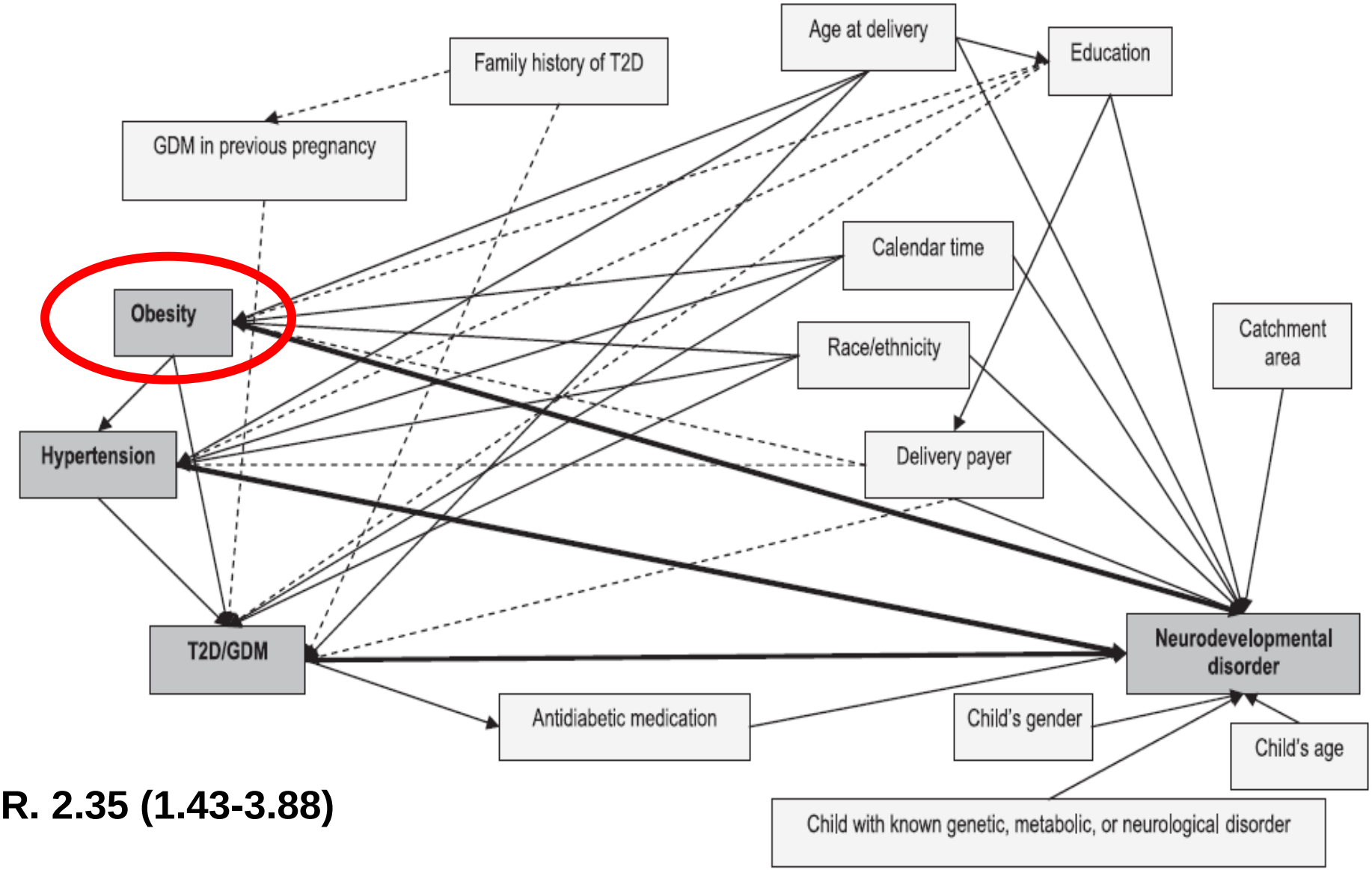
DOI: 10.1111/j.1399-3038.2005.00290.x

Early rapid weight gain and current overweight in relation to asthma in adolescents born with very low birth weight

Associazione positiva tra sovrappeso ed asma a 12 anni di età nei VLBW <1500: il rapido incremento di peso aumenta la iperresponsività bronchiale

Maternal Metabolic Conditions and Risk for Autism and Other Neurodevelopmental Disorders

PEDIATRICS Volume 129, Number 5, May 2012



O.R. 2.35 (1.43-3.88)

Impact of Maternal Obesity on Fetal Health

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Dietary restriction and weight loss prior to pregnancy are proven strategies to improve infant health outcome.

controlled or minimal weight gain during pregnancy may also mitigate the impact of obesity and produce a dramatic positive impact on pregnancy outcome.

L'importanza del counselling

L'obesità e una malattia della FAMIGLIA

Ostetriche

Neonatologo

Psicologo

Nutrizionista

Ginecologo

Medico e Pediatra di famiglia

Genetista