Centro Salute Donna
Azienda USL Ferrara

OSTETRICIA e GINECOLOGIA 2017

"RICONOSCERE I RISCHI ASSOCIATI ALL'OBESITA"

UNIMORE
UNIVERSITÀ DEGL STUDI DI MODENA E REGGIO EMILIA

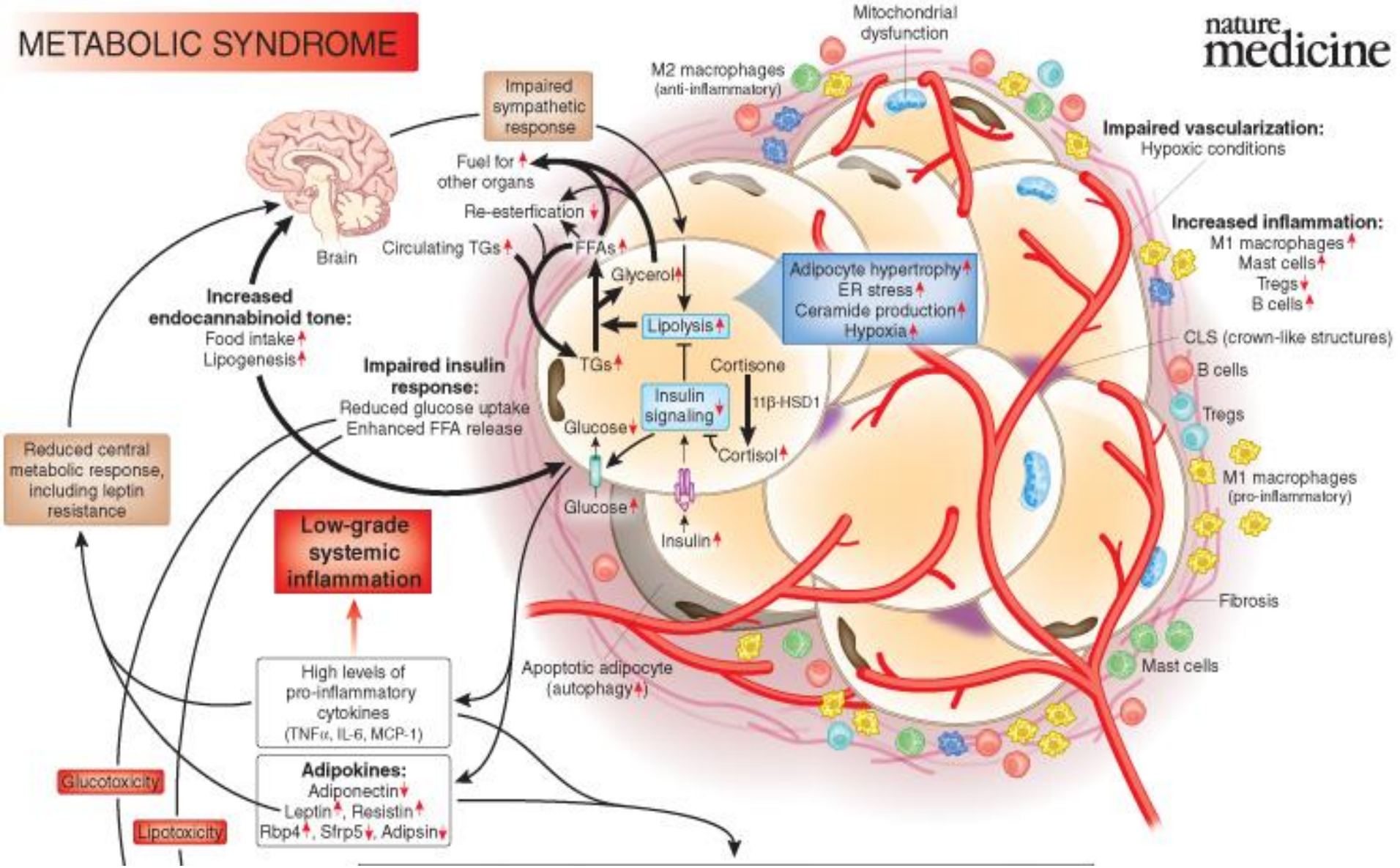
Prevenire i rischi perinatali associati all'obesità

Dott.ssa Elisabetta Petrella

Prof. F. Facchinetti

Policlinico hospital of Modena
Mother-Infant Department.
Obstetric Unit

OBESITY IS A STATE OF LOW-GRADE INFLAMMATION



MetS Definitions

The MetS is a cluster of metabolic abnormalities that appear to directly promote the development of atherosclerotic cardiovascular diseases and type 2DM

&

It is characterized by a chronic low-grade systemic inflammation

	WHO (1999) [6]	EGIR (1999) [7]	NCEP ATP III (2001) [8]
	Glucose intolerance, IGT or diabetes and/or insulin resistance* together with two or more of the following:	Insulin resistance (defined as hyperinsulinaemia—top 25% of fasting insulin values among the non-diabetic population). Plus two of the following:	Three or more of the following five risk factors:
Fasting plasma glucose		≥ 6.1 mmol/l (110 mg/dl) but non-diabetic	≥ 5.6 mmol/l (100 mg/dl)[a]
Blood pressure	≥ 140/90 mmHg	≥ 140/90 mmHg or treatment	≥ 130/≥ 85 mmHg
Triglycerides	Raised plasma triglycerides: ≥ 1.7 mmol/l (150 mg/dl) *and/or*	> 2.0 mmol/l (178 mg/dl) or treatment *and/or*	≥ 1.7 mmol/l (150 mg/dl)
HDL-cholesterol	Men: < 0.9 mmol/l (35 mg/dl) Women: < 1.0 mmol/l (39 mg/dl)	< 1.0 mmol/l (39 mg/dl) or treatment	Men: < 1.03 mmol/l (40 mg/dl) Women: < 1.29 mmol/l (50 mg/dl)
Obesity	Men: waist–hip ratio > 0.90 Women: waist–hip ratio > 0.85 and/or BMI > 30 kg/m^2	Men: waist circumference ≥ 94 cm Women: waist circumference ≥ 80 cm	Men: waist circumference > 102 cm[b] Women: waist circumference > 88 cm
Microalbuminuria	Urinary albumin excretion rate ≥ 20 µg/min or albumin:creatinine ratio ≥ 30 mg/g		

DM

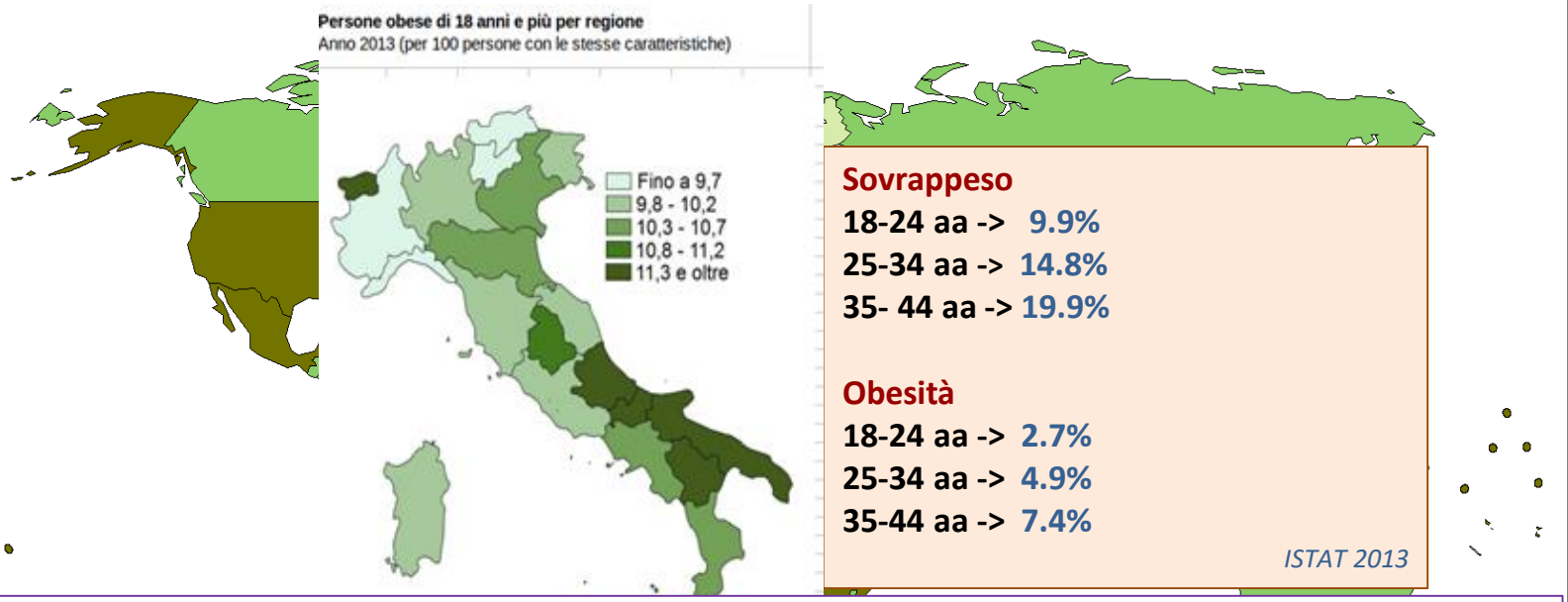
Diabet Med. 2006 May;23(5):469-80.

Metabolic syndrome—a new world-wide definition. A Consensus Statement from the International Diabetes Federation

K. G. M. M. Alberti, P. Zimmet* and J. Shaw*

Central obesity	Waist circumference*†—ethnicity specific (see Table 7 plus any two of the following:
Raised triglycerides	≥ 1.7 mmol/l (150 mg/dl) or specific treatment for this lipid abnormality
Reduced HDL-cholesterol	< 1.03 mmol/l (40 mg/dl) in males < 1.29 mmol/l (50 mg/dl) in females or specific treatment for this lipid abnormality
Raised blood pressure	Systolic: ≥ 130 mmHg or Diastolic: ≥ 85 mmHg or treatment of previously diagnosed hypertension
Raised fasting plasma glucose‡	Fasting plasma glucose ≥ 5.6 mmol/l (100 mg/dl) or previously diagnosed Type 2 diabetes If > 5.6 mmol/l or 100 mg/dl, oral glucose tolerance test is strongly recommended but is not necessary to define presence of the syndrome

Prevalence of obesity*, ages 18+, 2014 (age standardized estimate)
Female



Sovrappeso
18-24 aa -> 9.9%
25-34 aa -> 14.8%
35- 44 aa -> 19.9%

Obesità
18-24 aa -> 2.7%
25-34 aa -> 4.9%
35-44 aa -> 7.4%

ISTAT 2013

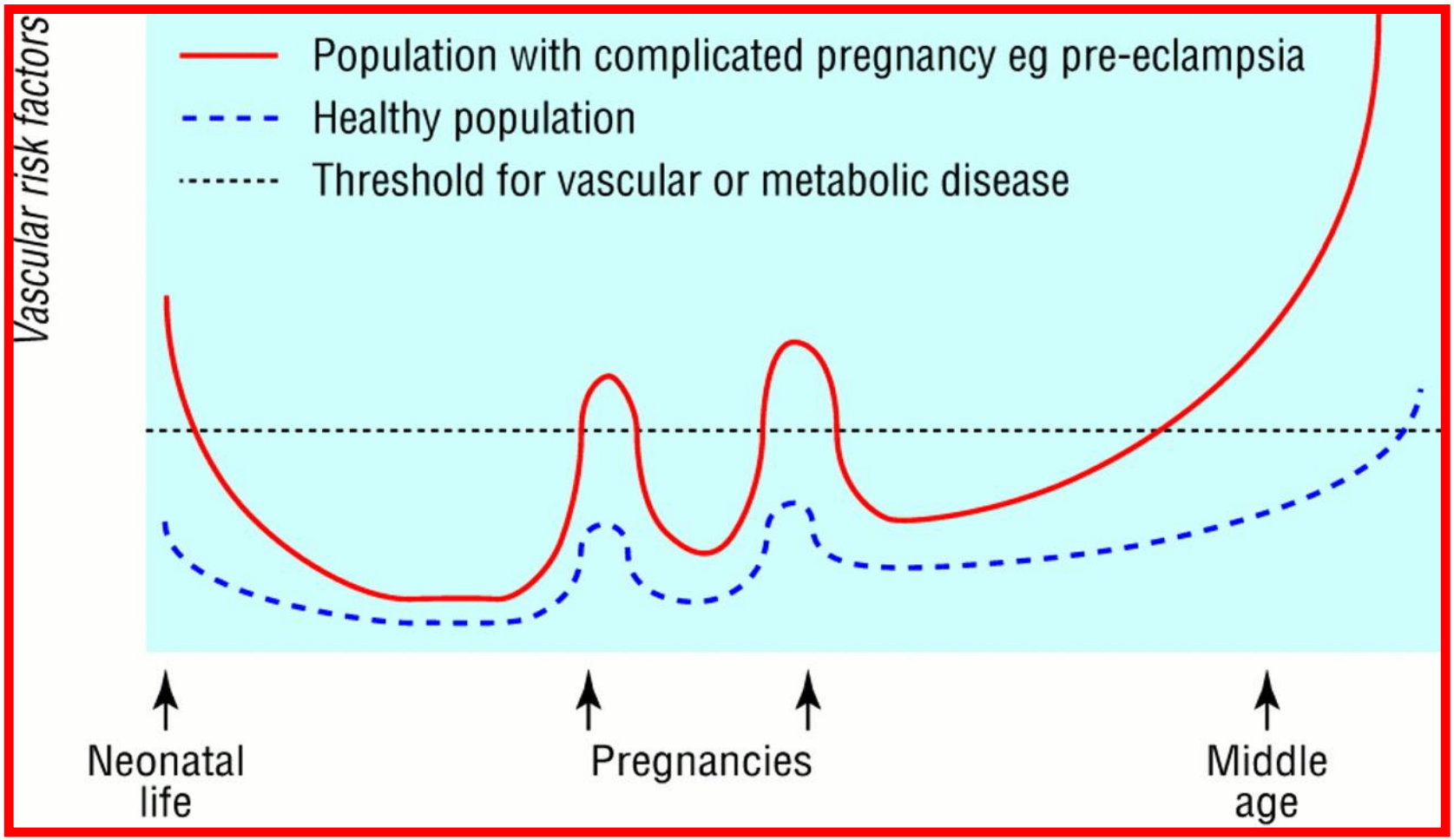
Cedap su 34.466 donne che hanno partorito nell'anno **2013** in **Emilia Romagna**:

- 67% normopeso
- 7.3% sottopeso
- **17.8% sovrappeso**
- **7.9% obese** → **2015: Obese 9.8%**

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

World Health Organization

LA GRAVIDANZA RAPPRESENTA UN TEST METABOLICO PER L'ORGANISMO.



Pregnancy complications and maternal cardiovascular risk: opportunities for intervention and screening?
Naveed Sattar, Ian A Greer
BMJ. 2002 Jul 20; 325(7356): 157–160.

OBSTETRICS

The multidisciplinary approach to the care of the obese parturient

Neda Ghaffari, MD; Sindhu K. Srinivas, MD, MSCE; Celeste P. Durnwald, MD

PRENATAL CARE

- Document height, weight, and BMI at every visit
- Discuss weight gain goals per IOM guidelines (Table 1) and address throughout prenatal care
- Refer to nutritionist
- Recommend at least 30 minutes of daily exercise
- Counsel on risks of obesity in pregnancy
- Recommend first-trimester ultrasound for dating and diagnosis of multiple gestation
- Early 1 hour GCT
- Consider baseline EKG (if not done preconceptionally), especially with comorbidities
- Screen for obstructive sleep apnea (Table 3); refer to sleep specialist if indicated
- Offer aneuploidy screening and discuss limitations in obesity
- Schedule anatomical survey at 20 weeks and discuss limitations in obesity
- Discuss delivery planning
- Discuss neuraxial anesthesia and set expectations for difficult placement
- Growth ultrasound at 32 weeks
- If BMI >40 kg/m^2 or per regional guidelines: consider antepartum testing, starting at 32 weeks

Ghaffari N et al, *Am J Obstet Gynecol*, 2015

The Impact of Maternal Obesity on Maternal and Fetal Health

Meaghan A. Leddy,*† Michael L. Power, PhD,* Jay Schulkin, PhD*

VOL. 1 NO. 4 2008 REVIEWS IN OBSTETRICS & GYNECOLOGY

Complication	OR (95% CI) or % vs Normal Weight	*P*
Late pregnancy		
Hypertensive disorder of pregnancy		
Gestational nonproteinuric hypertension	2.5 (2.1-3.0)	< .0001
Preeclampsia	3.2 (1.8-5.8)	.007
Gestational diabetes mellitus	2.6 (2.1-3.4)	< .001
Preterm birth	1.5 (1.1-2.1)	< .05
Intrauterine fetal demise (stillbirth)	2.8 (1.9-4.7)	< .001
Fetal/neonatal complications		
Fetal macrosomia (EFW ≥ 4500 g)	2.2 (1.6-3.1)	< .001
Shoulder dystocia	3.6 (2.1-6.3)	< .001
Birth weight > 4000 g	1.7 (1.4-2.0)	.0006
Birth weight > 4500 g	2.0 (1.4-3.0)	< .0001
Childhood obesity	2.3 (2.0-2.6)	< .05

GESTATIONAL DIABETES MELLITUS

70 observational studies (1977-2007), including 671,945 women (old criteria)

Overweight	⇨ OR **1.97**	(95% CI=1.77-2.19)
Obesity Ist	⇨ OR **3.01**	(95% CI=2.34-3.87)
Obesity 2nd-3rd	⇨ OR **5.55**	(95% CI=4.27-7.21)

1 Kg/m² ⇨ **prevalence of GDM increased by 0.92%**

Before HAPO study

Prepregnancy BMI and the risk of gestational diabetes: a systematic review of the literature with meta-analysis

M. R. Torloni[1,2], A. P. Betrán[3], B. L. Horta[4], M. U. Nakamura[2], A. N. Atallah[1], A. F. Moron[2] and O. Valente[1]

Obesity Reviews
2009

Pregnancy Hypertens. 2011 January 1; 1(1): 6–16. doi:10.1016/j.preghy.2010.10.013.

The Role of Obesity in Preeclampsia

James M. Roberts[1,2,3], **Lisa M. Bodnar**[1,2,3], **Thelma E. Patrick**[1,4], and **Robert W Powers**[1,2]

[1] Magee-Womens Research Institute, University of Pittsburgh

[2] Department of Obstetrics Gynecology and Reproductive Sciences, University of Pittsburgh

[3] Department of Epidemiology University of Pittsburgh

[4] School of Nursing, The Ohio State University

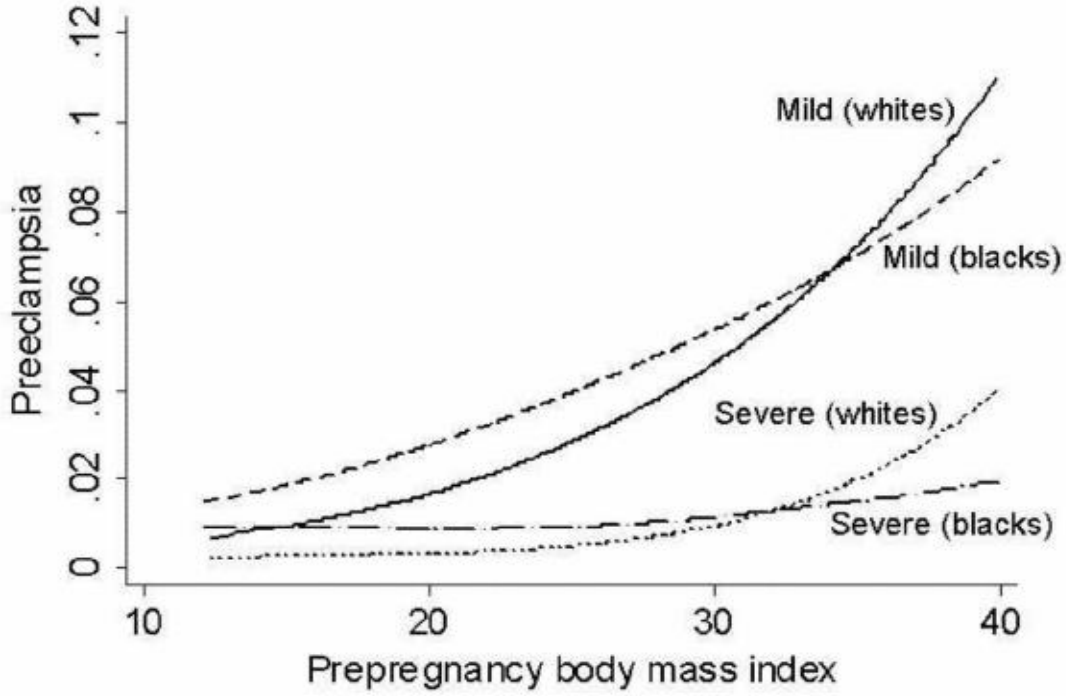


Figure 1. Prepregnancy BMI is associated with an increased risk of preeclampsia

Data from the Perinatal Collaborative Study including more than 19,000 Black and 19,000 white women was analyzed and the unadjusted prevalence of preeclampsia as related to prepregnancy BMI presented[7]. The prevalence of preeclampsia increased with increasing prepregnancy BMI for mild and severe preeclampsia and in blacks and whites.

SLEEP DISORDERS BREATHING
(OBSTRUCTIVE SLEEP APNEA)

Group of disorders characterized by abnormal respiratory patterns (apneas, hypopneas) or abnormal gas exchange (hypoxia) during sleep

The most common type
especially among ***young obese women***
Is
obstructive sleep apnea (OSA)
result of repetitive episodes of upper airway obstruction during sleep

Maternal- Neonatal outcomes and SDB in Pregnancy

SDB is prevalent in early pregnancy
Pregnancy itself has been linked to an increased risk for SDB.

→ in the non pregnant population SDB have be linked to hypertension and type 2 diabetes
→ In pregnancy it correlates in pregnancy (**PIH, PE, GDM**).

enhanced inflammatory and oxidative stress responses

→ endothelial damage, and metabolic derangements

These same biological pathways have been associated with adverse pregnancy outcomes (**PE, GDM, spontaneous PTB, and IUGR**) *Louis j, Obstet & Gyn 2012*

- Frequent snoring in pregnant women is associated with
  - impaired glucose tolerance and **GDM**

    Facco FL, Am J Obstet Gynecol 2010
  - pregnancy induced hypertension (**gestational hypertension and pre-eclampsia)**

    Bourjeily G, Eur Respir J, 2010
    Ursavas A, Respiration 2008
    Franklin KA, Chest 2000
    Pérez-Chada D, Acta Obstet GynecolScand 2007

Preterm birth

Maternal Obesity and Risk of Preterm Delivery

Sven Cnattingius, MD, PhD

2015

Population-based cohort study of women with live singleton births in Sweden from 1992 through 2010.

Maternal and pregnancy characteristics were obtained from the nationwide Swedish Medical Birth Register.

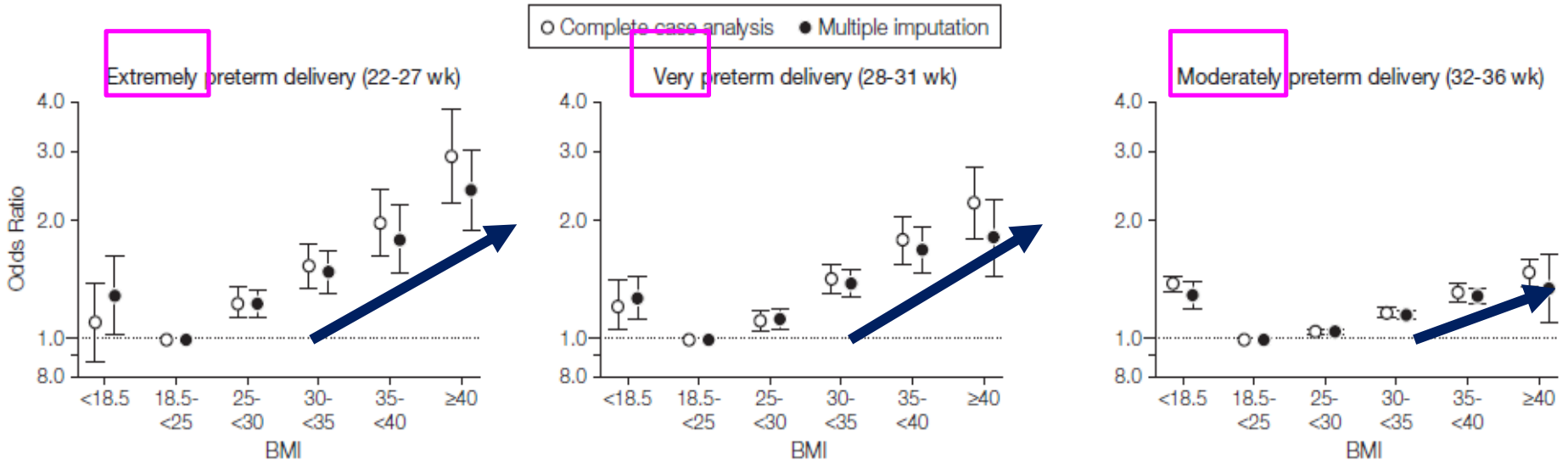
1,559,551 deliveries

Risk of preterm birth:

- **Spontaneous**
- **Medically indicated** → ***Pregnancy induced hypertension***
  Diabetes mellitus

…increases with BMI!

Risk of spontaneous PTB



Risk of medically indicated PTB

	BMI Categories					
	<18.5	18.5-<25	25-<30	30-<35	35-<40	≥40
	All Women					
Extremely preterm delivery[a]						
No. (%)	17 (0.07)	395 (0.04)	226 (0.06)	108 (0.09)	35 (0.11)	17 (0.16)
Adjusted OR (95% CI)[b]	1.05 (0.63-1.74)	1 [Reference]	1.51 (1.27-1.79)	2.48 (1.99-3.1)	2.74 (1.92-3.92)	3.84 (2.32-6.38)
Very preterm delivery[a]						
No. (%)	60 (0.15)	1517 (0.15)	745 (0.19)	324 (0.28)	121 (0.37)	71 (0.66)
Adjusted OR (95% CI)[b]	0.97 (0.74-1.28)	1 [Reference]	1.29 (1.18-1.41)	1.91 (1.68-2.17)	2.52 (2.08-3.06)	4.16 (3.23-5.36)
Moderately preterm delivery[a]						
No. (%)	448 (1.09)	9006 (0.89)	4310 (1.13)	1725 (1.52)	618 (1.91)	256 (2.40)
Adjusted OR (95% CI)[b]	1.24 (1.12-1.37)	1 [Reference]	1.22 (1.18-1.27)	1.62 (1.54-1.71)	2.00 (1.84-2.18)	2.45 (2.15-2.79)

Stillbirth

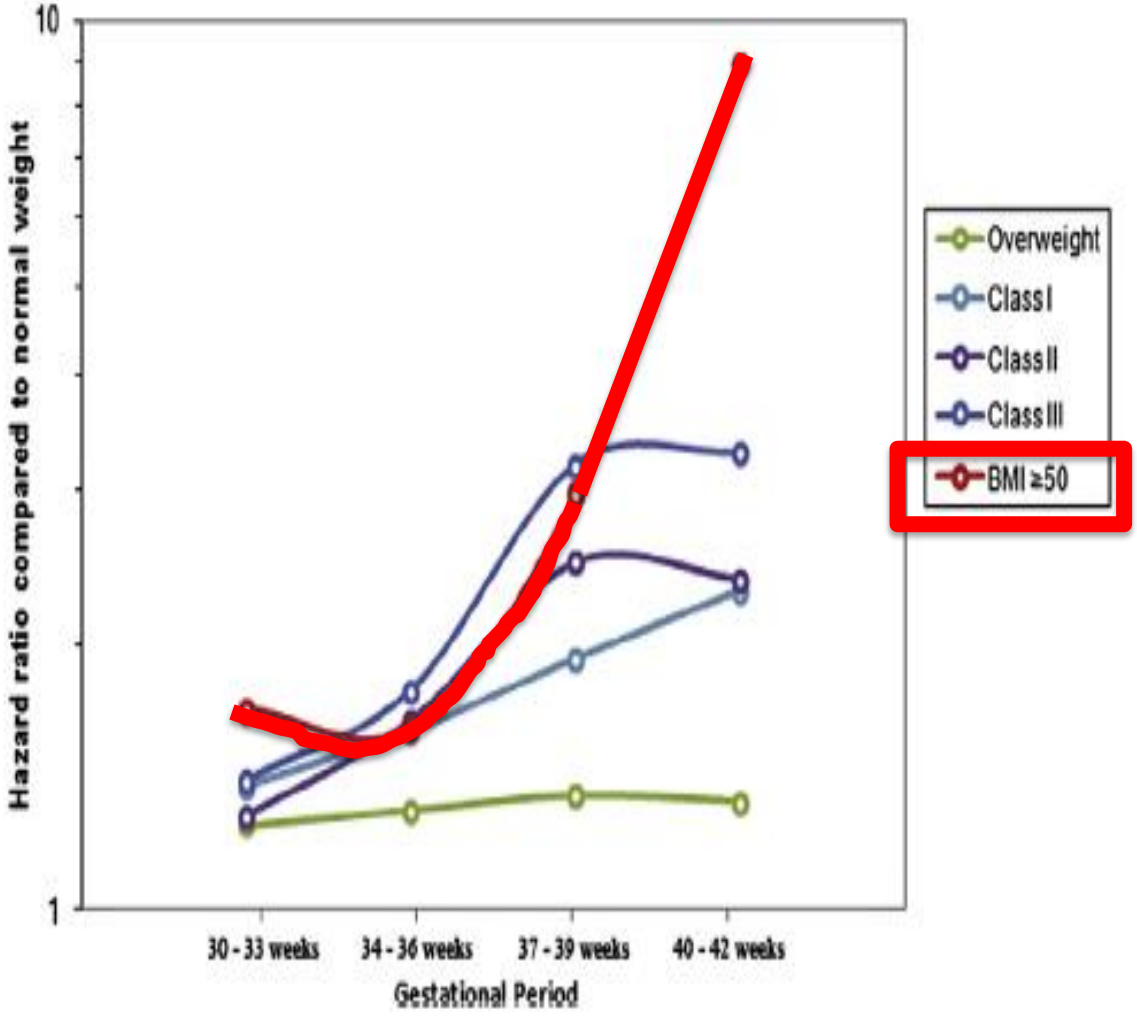


Fig. 1. Risk of stillbirth according to gestational age. (Reprinted from American Journal of Obstetrics and Gynecology 2014; 210; Yao R, Ananth CV, Park BY, Pereira L, Plante LA; Obesity and the risk of stillbirth: a population-based cohort study; 457.e1–9, Copyright (2014), with permission from Elsevier.) [9].

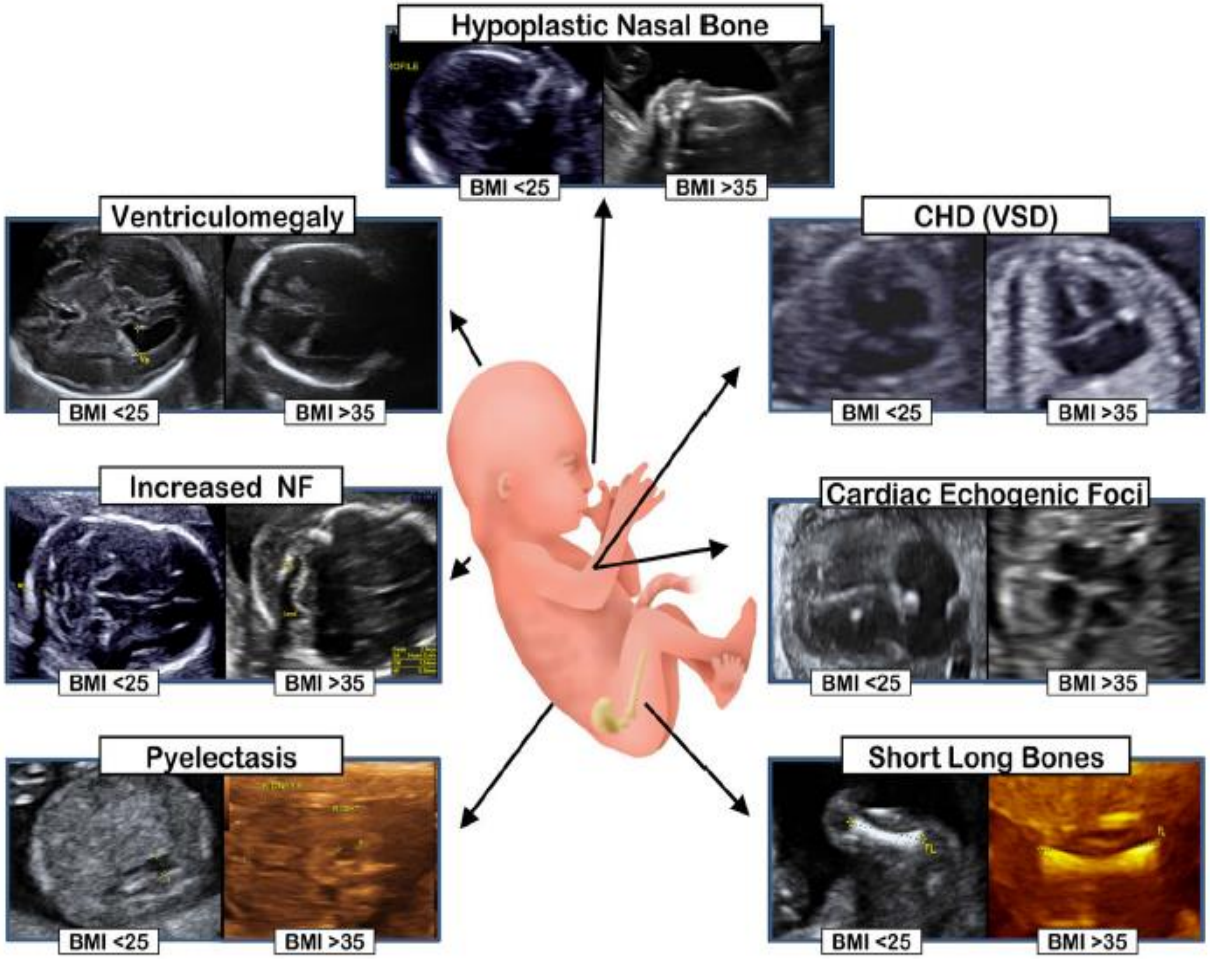


Figure 3. Differential capacity for visualization of fetal structures and markers of aneuploidy in normal weight (BMI <25 kg/m2) and obese women (BMI >35 kg/m2)

As demonstrated in multiple studies (15–19, 54) and visualized herein, maternal obesity decreases the practitioner's ability to confidently recognize such markers, or accurately assess their dimensions. For example, from the representative images in obese women, please note the poor delineation of the boarders of the lateral ventricles and renal pelvis (which may lead to inaccurate assessment), alongside the decreased echogenicity of the intracardiac echogenic focus (which may lead to missed diagnosis).

The role of gestational diabetes, pre-pregnancy body mass index and gestational weight gain on the risk of newborn macrosomia: results from a prospective multicentre study

Salvatore Alberico[1], Marcella Montico[2], Valentina Barresi[1], Lorenzo Monasta[2], Caterina Businelli[1], Valentina Soini[1], Anna Erenbourg[1], Luca Ronfani[2*], Gianpaolo Maso[1] and for the Multicentre Study Group on Mode of Delivery in Friuli Venezia Giulia

14.109 women

- ❑ **Maternal obesity**
- ❑ **Excessive GWG**
- ❑ **GDM & pregestational Diabetes**

→ **Independent predictors of MACROSOMIA (>4000g)**

Pre-Pregnancy Body Mass Index in Relation to Infant Birth Weight and Offspring Overweight/Obesity: A Systematic Review and Meta-Analysis

Zhangbin Yu, Shuping Han, Jingai Zhu, Xiaofan Sun, Chenbo Ji, Xirong Guo*

State Key Laboratory of Reproductive Medicine, Department of Pediatrics, Nanjing Maternity and Child Health Care Hospital, Nanjing Medical University, Nanjing, China

37 observational studies included in the meta-analysis
More than 700.000 women

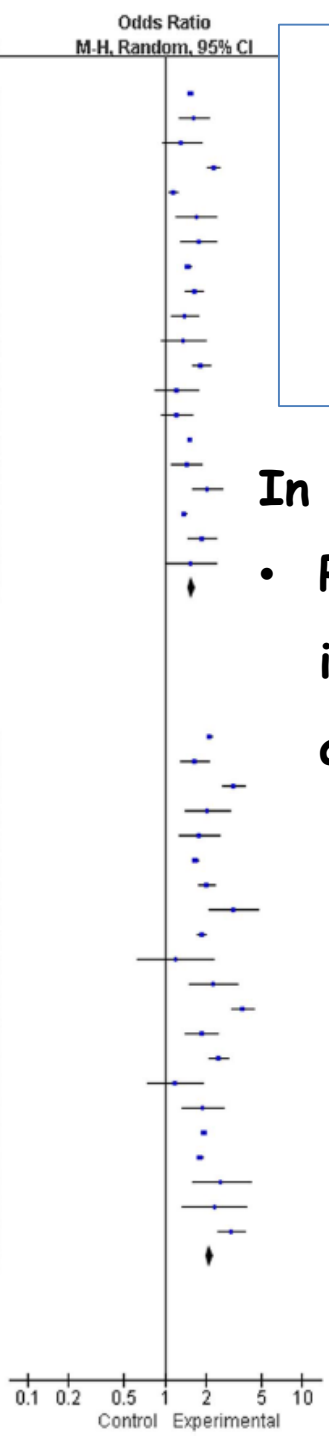
Investigating the effect of maternal BMI categories on

- Birth-weight
- Overweight/obesity in the offsprings

- 16 studies assessed the association between BMI and SGA
- 21 studies assessed the association between BMI and LGA

PRE-PREGNANCY BMI & RISK OF LGA

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Random, 95% CI
1 Overweight vs. Normal						
Sebire 2001	10596	79014	15976	176923	9.3%	1.56 [1.52, 1.60]
Jensen 2003	504	642	425	614	3.6%	1.62 [1.26, 2.10]
Gilboa 2008	51	451	195	2218	2.6%	1.32 [0.95, 1.83]
Leung 2008	631	3956	1694	22041	7.6%	2.28 [2.07, 2.52]
Khashan 2009	1064	24219	1648	43095	8.1%	1.16 [1.07, 1.25]
Kalk 2009	53	309	156	1446	2.4%	1.71 [1.22, 2.40]
Oken 2009	82	456	135	1227	2.9%	1.77 [1.32, 2.39]
Dietz 2009	1589	12918	4934	56718	8.6%	1.47 [1.39, 1.56]
Aydin 2010	315	2214	521	5685	6.0%	1.64 [1.42, 1.91]
Margerison Zilko 2010	107	706	350	3108	4.0%	1.41 [1.11, 1.78]
Athukorala 2010	48	446	76	943	2.0%	1.38 [0.94, 2.01]
Narchi 2010	345	1537	450	3322	5.8%	1.85 [1.58, 2.16]
Chen 2010	41	341	176	1744	2.2%	1.22 [0.85, 1.75]
Tabatabaei 2011	82	682	352	3488	3.6%	1.22 [0.94, 1.57]
Park 2011	15597	135668	23808	305295	9.3%	1.54 [1.50, 1.57]
Liu 2011	94	926	231	3200	3.6%	1.45 [1.13, 1.87]
Jeric 2012	95	550	342	3688	3.7%	2.04 [1.59, 2.62]
Hunt 2012	4128	51594	5260	89146	9.0%	1.39 [1.33, 1.45]
Ferraro 2012	143	1025	194	2428	4.0%	1.87 [1.48, 2.35]
Heude 2012	33	311	83	1172	1.7%	1.56 [1.02, 2.38]
Subtotal (95% CI)		**317965**		**727501**	**100.0%**	**1.56 [1.46, 1.65]**
Total events	35598		57006			
Heterogeneity: Tau² = 0.01; Chi² = 158.60, df = 19 (P < 0.00001); I² = 88%						
Test for overall effect: Z = 14.17 (P < 0.00001)						
2 Obesity vs. Normal						
Sebire 2001	5461	31276	15976	176923	9.0%	2.13 [2.06, 2.20]
Jensen 2003	593	753	425	614	4.3%	1.65 [1.29, 2.11]
Leung 2008	142	677	1694	22041	5.5%	3.19 [2.63, 3.86]
Gilboa 2008	39	236	195	2218	2.5%	2.05 [1.41, 2.98]
Oken 2009	59	328	135	1227	3.0%	1.77 [1.27, 2.48]
Dietz 2009	2654	19235	4934	56718	8.8%	1.68 [1.60, 1.77]
Joy 2009	461	3744	596	9171	7.1%	2.02 [1.78, 2.30]
Kalk 2009	35	126	156	1446	2.1%	3.18 [2.08, 4.86]
Khashan 2009	1052	15271	1648	43095	8.2%	1.86 [1.72, 2.02]
Chen 2010	11	93	176	1744	1.0%	1.20 [0.62, 2.29]
Athukorala 2010	45	272	76	943	2.3%	2.26 [1.52, 3.36]
Aydin 2010	214	1213	310	5685	5.6%	3.71 [3.08, 4.48]
Margerison Zilko 2010	72	376	350	3108	3.7%	1.87 [1.41, 2.47]
Narchi 2010	353	1266	450	3322	6.3%	2.47 [2.11, 2.89]
Tabatabaei 2011	22	186	352	3488	1.9%	1.20 [0.76, 1.89]
Liu 2011	44	342	231	3200	2.9%	1.90 [1.35, 2.68]
Park 2011	14357	101590	23808	305295	9.1%	1.95 [1.90, 1.99]
Hunt 2012	5953	58367	5260	89146	9.0%	1.81 [1.74, 1.88]
Heude 2012	25	152	83	1172	1.7%	2.58 [1.59, 4.19]
Jeric 2012	17	89	342	3688	1.4%	2.31 [1.35, 3.96]
Ferraro 2012	147	699	194	2428	4.5%	3.07 [2.43, 3.87]
Subtotal (95% CI)		**236291**		**736672**	**100.0%**	**2.11 [1.97, 2.27]**
Total events	31756		57391			
Heterogeneity: Tau² = 0.01; Chi² = 186.88, df = 20 (P < 0.00001); I² = 89%						
Test for overall effect: Z = 20.97 (P < 0.00001)						



In comparison with normalweight:

- **Pre-pregnancy overweight/obesity increases the risk of LGA, HBW and macrosomia**

DOI: 10.1111/j.1471-0528.2008.02065.x
www.blackwellpublishing.com/bjog

Systematic review

Indications for induction of labour: a best-evidence review

E Mozurkewich,[a] J Chilimigras,[a] E Koepke,[a] K Keeton,[a] VJ King[b]

Table 2. Summary: quality of evidence and grades of recommendation[8]

Indication	Quality of evidence	Benefits/harm	Grade of recommendation
Post-term pregnancy	High	Net benefits	Strong
PROM	High	Net benefits	Strong
PPROM	Moderate	Uncertain trade-offs	Weak
Macrosomia	Moderate	Net harm	Weak (against induction)
Twin gestation	Low	Uncertain trade-offs	Weak
Oligohydramnios	Low	Uncertain trade-offs	Weak
Diabetes	Moderate	Uncertain trade-offs	Weak
Cholestasis	Very low	Uncertain trade-offs	Weak
Cardiac disease	Very low	Uncertain trade-offs	Weak
Mild pre-eclampsia	No evidence	—	No recommendation
Severe pre-eclampsia (preterm) induction versus expectant	Moderate	Uncertain trade-offs	Weak (against induction)
Severe pre-eclampsia (preterm) induction versus caesarean section	Very low	Uncertain trade-offs	Weak
Eclampsia (induction versus caesarean section)	Low	Uncertain trade-offs	Weak
IUGR/SGA (preterm)	High	Trade-offs	Weak
IUGR/SGA (term)	Low	Uncertain trade-offs	Weak
Gastroschisis	Low	Uncertain trade-offs	Weak

SGA, small for gestational age.

The American College of Obstetricians and Gynecologists
WOMEN'S HEALTH CARE PHYSICIANS

PRACTICE BULLETIN

CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN–GYNECOLOGISTS

NUMBER 173, NOVEMBER 2016

(Replaces Practice Bulletin Number 22, November 2000)

Fetal Macrosomia

Suspected fetal macrosomia is encountered commonly in obstetric practice. As birth weight increases, the likelihood of labor abnormalities, shoulder dystocia, birth trauma, and permanent injury to the neonate increases. The purpose of this document is to quantify those risks, address the accuracy and limitations of methods for estimating fetal weight, and suggest clinical management for a pregnancy with suspected fetal macrosomia.

- The prenatal diagnosis is imprecise
- Suspicion is not an indication for IOL because it does not improve maternal-fetal outcomes

How should a diagnosis of suspected fetal macrosomia affect the management of labor and vaginal delivery?

A clinician's suspicion of a LGA fetus on prenatal examination and communication of fetal size concerns to the patient has been associated with ***increased labor and delivery interventions***

Fetal origins of coronary heart disease

D J P Barker

BMJ VOLUME 311 15 JULY 1995

Contents lists available at ScienceDirect

Best Practice & Research Clinical Obstetrics and Gynaecology

journal homepage: www.elsevier.com/locate/bpobgyn

8

2014

Obesity in obstetrics

Salzer Liat, MD [a], Luis Cabero, MD [b], Moshe Hod, MD [a], Yariv Yogev, MD [a, *]

childhood obesity

- There is accumulating abundant evidence linking **macrosomia to increased overweight and obesity** in adolescents as well as adults.
- The prevalence of **childhood obesity** is between 2.4 and 2.7 times **higher** in the offspring of **obese women**.
- **This risk is further increased** with additive risk factors such as **maternal diabetes** during pregnancy.
- Maternal obesity is also associated with **cardiovascular disease in the adult offspring**.

www.jpnim.com Open Access eISSN: 2281-0692
Journal of Pediatric and Neonatal Individualized Medicine 2015;4(2):e040227
doi: 10.7363/040227
Received: 2015 Aug 26; accepted: 2015 Oct 02; published online: 2015 Oct 26

Original article

Lifestyle-induced maternal body composition changes and birthweight in overweight/obese pregnant women

Raffaele Bruno, Elisabetta Petrella, Valentina Bertarini, Isabella Neri, Fabio Facchinetti

139 women with

- **BMI ≥ 25**
- **9th-12th week**

→ Lifestyle program:

- ***low glycemic diet with caloric restriction (1800 kcal/day)***
- ***physical activity***

BIA was performed at enrolment and at 35th-36th week.

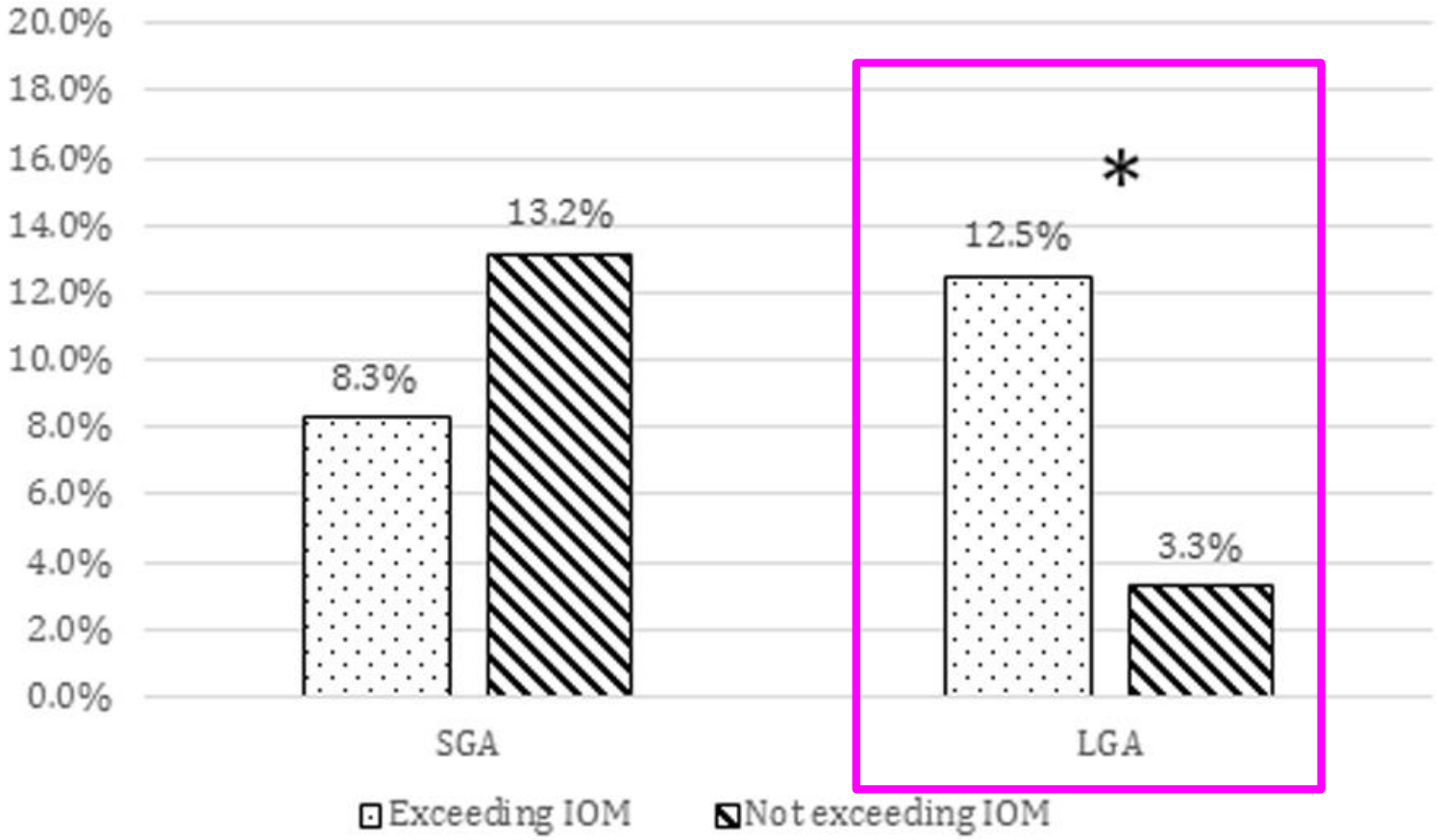
GDM → **28.1% women**

GDM was higher in obese (33.3%) vs overweight (13.5%, p = 0.022).

Women who developed GDM had babies with

- **higher birthweight (3,573 ± 364 vs. 3,400 ± 337 grams, p = 0.03)**
- **higher occurrence of LGA babies (12.8% vs. 4%, p = 0.05)**

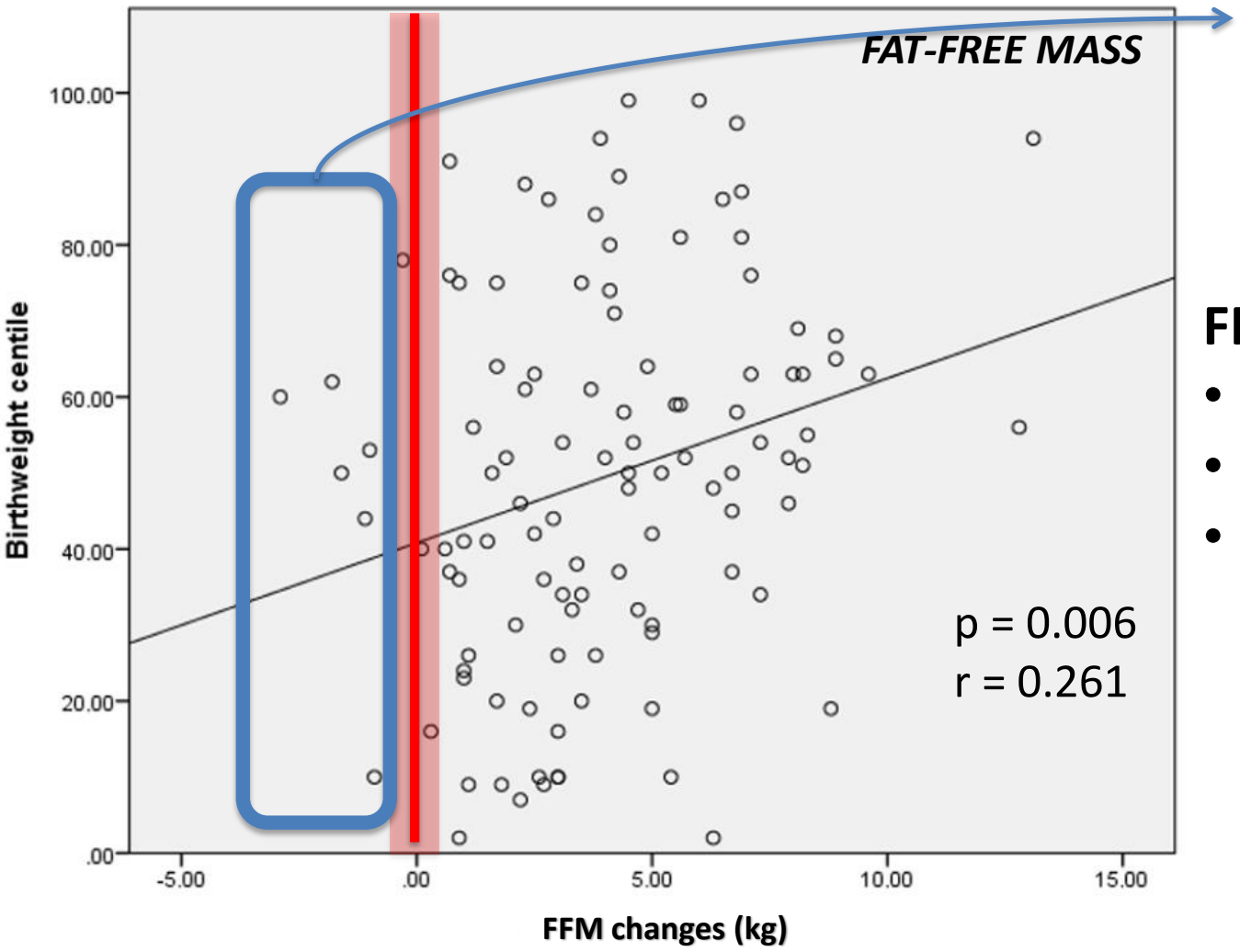
while occurrence of SGA was not affected (7% vs. 13%).



As expected… ↑ **GWG = ↑ Birthweight**

But GWG is just an approximate parameter…

A positive correlation was found between birthweight centile and fat free mass (FFM) variation

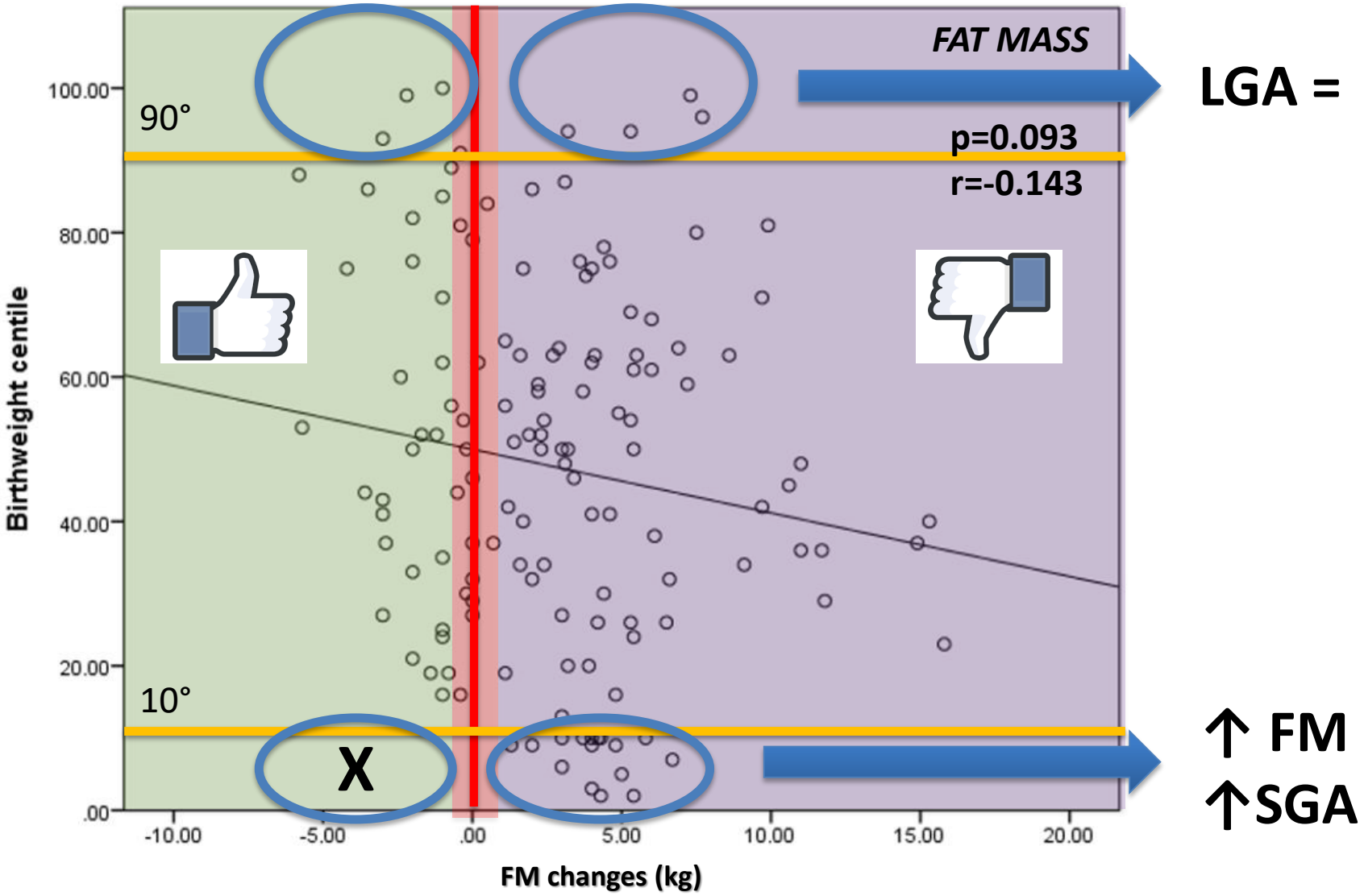


FFM also accounts for:

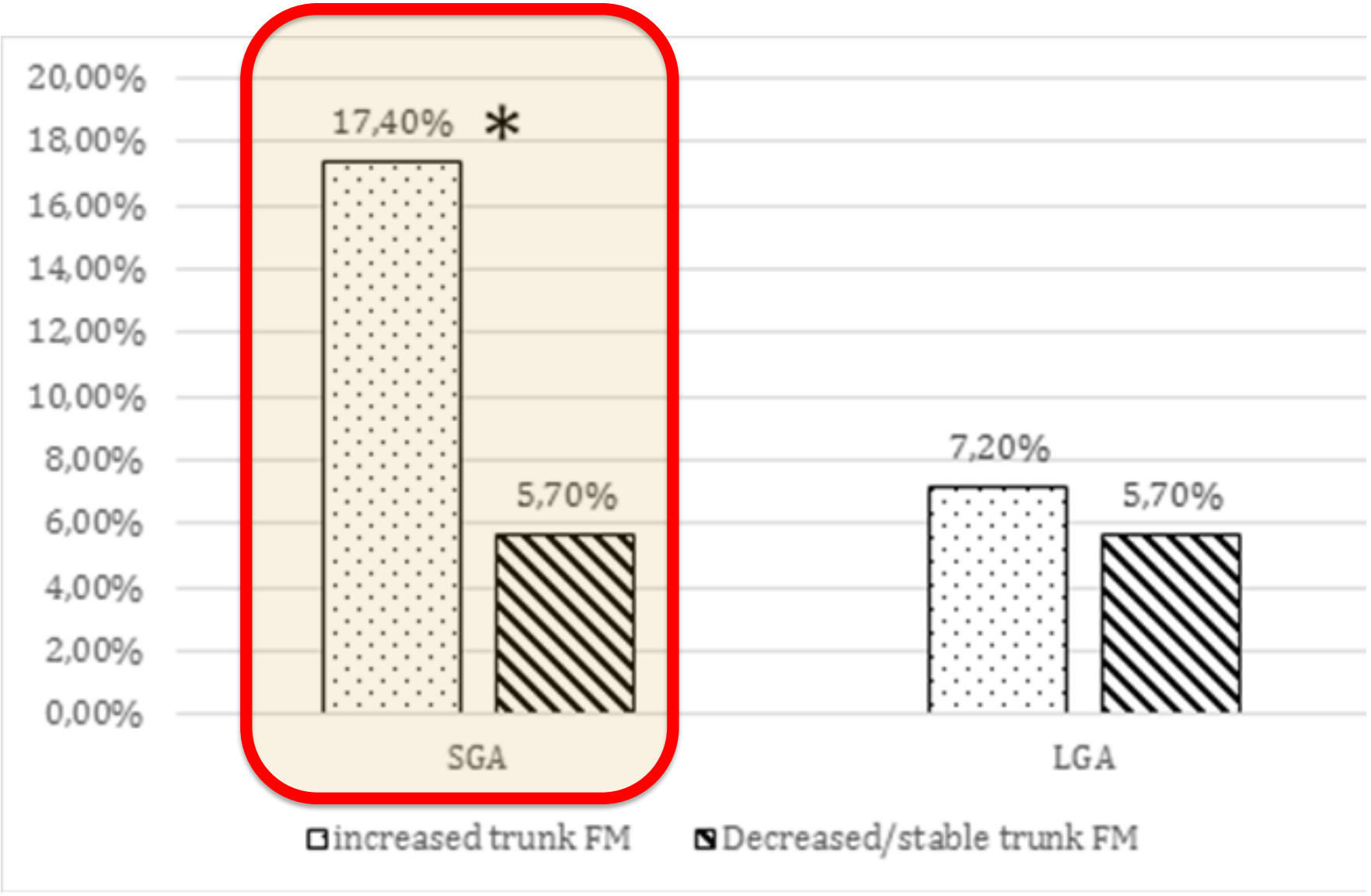
- **growing uterus**
- **foetus**
- **adnexes**

INCREASED FAT MASS AND RISK OF SGA BABIES

Lifestyle-induced maternal body composition changes and birthweight in overweight/obese pregnant women



MASSA GRASSA VISCERALE e SGA



Contents lists available at ScienceDirect

Best Practice & Research Clinical Obstetrics and Gynaecology

journal homepage: www.elsevier.com/locate/bpobgyn

2014

8

Obesity in obstetrics

Salzer Liat, MD [a], Luis Cabero, MD [b], Moshe Hod, MD [a], Yariv Yogev, MD [a,*]

Treatment in these patients should be **multidisciplinary** and involve nutritionists, dietitians, other internal medicine specialists, psychologists, and psychiatrists.

Pregnancy of the obese patient should be considered a high risk and thus be more **closely monitored**.

The obstetrician should inform the patients on the different risks and complications and keep them actively involved in the treatment.

Physician and patient cooperation and attention can lead to early detection of complications and better fetal and maternal outcome.

The obstetrician's role does not end until after pregnancy, when…

…every effort should be made
to encourage weight reduction and lifestyle modification
in order to minimize the risks for the mother and her future offspring.

GWG

THE COCHRANE COLLABORATION®

Diet or exercise, or both, for preventing excessive weight gain in pregnancy (Review)

Muktabhant B, Lawrie TA, Lumbiganon P, Laopaiboon M

2015

Evidence from 65 RTCs using:

- **Diet**
- **Excercise**
- **Both strategies combined**

⟺ **Compared with no intervention**

"HIGH QUALITY EVIDENCE INDICATES THAT

- **DIET**
- **EXERCISE**
- **BOTH**

DURING PREGNANCY CAN REDUCE THE RISK OF EXCESSIVE GWG"

"Other benefits may include a lower risk of :

- ***Caesarean delivery***
- ***Macrosomia***
- ***Maternal hypertension***
- ***neonatal respiratory morbidity***

...particularly for high-risk women receiving combined diet and exercise interventions

Cochrane Library

Cochrane Database of Systematic Reviews

GDM

2017

Dietary advice interventions in pregnancy for preventing gestational diabetes mellitus (Review)

Tieu J, Shepherd E, Middleton P, Crowther CA

11 RCT
2.786 women

Authors' conclusions

Very low-quality evidence from five trials suggests a possible reduction in GDM risk for women receiving dietary advice versus standard care, and low-quality evidence from four trials suggests no clear difference for women receiving low- versus moderate- to high-GI dietary advice. A possible reduction in pregnancy-induced hypertension for women receiving dietary advice was observed and no clear differences were seen for other reported primary outcomes. There were few outcome data for secondary outcomes.

For outcomes assessed using GRADE, evidence was considered to be low to very low quality, with downgrading based on study limitations (risk of bias), imprecision, and inconsistency.

More high-quality evidence is needed to determine the effects of dietary advice interventions in pregnancy. Future trials should be designed to monitor adherence, women's views and preferences, and powered to evaluate effects on short- and long-term outcomes; there is a need for such trials to collect and report on core outcomes for GDM research. We have identified five ongoing studies and four are awaiting classification. We will consider these in the next review update.

Pre-eclampsia

Effect of diet- and lifestyle-based metabolic risk-modifying interventions on preeclampsia: a meta-analysis.

Allen R *Acta Obstet Gynecol Scand 2014 Oct*

18 studies included :

- **6 diet**
- **6 diet + physical excercise + lifestyle changes**
- **6 essential fatty acid implementation**

… compared with control group

The *interventions overall* reduced the risk of preeclampsia
(RR 0.81, 95% CI 0.69-0.94; p = 0.0006)

There was no reduction in the risk of preeclampsia with
mixed interventions **(RR 0.93, 95% CI 0.66-1.32, p = 0.68)**
fatty acid supplementation **(RR 0.92, 95% CI 0.71-1.18; p = 0.49)**

Preterm birth

Pre-pregnancy BMI and weight gain: where is the tipping point for preterm birth?

Saba W Masho[1,2,3*], Diane L Bishop[1] and Meaghan Munn[1]

Table 2 Association between pre-pregnancy weight, weight gain during pregnancy and preterm birth – unadjusted analysis

	Underweight			Overweight			Obese		
	Spontaneous births		Induced	Spontaneous births		Induced	Spontaneous births		Induced
Weight gain (kg)	PTB with PROM	PTB without PROM	PTB	PTB with PROM	PTB without PROM	PTB	PTB with PROM	PTB without PROM	PTB
< 7.0	1.66***	1.75***	0.72	0.70***	0.57***	0.68*	0.58***	0.54***	0.87
	(1.36, 2.03)	(1.38, 2.21)	(0.37, 1.42)	(0.58, 0.79)	(0.46, 0.69)	(0.47, 0.98)	(0.47, 0.70)	(0.42, 0.69)	(0.58, 1.30)
7.0-9.4	1.22	1.23	1.13	0.86	0.68*	0.90	0.88	0.38*	0.74
	(0.96, 1.57)	(0.92, 1.65)	(0.63, 2.03)	(0.67, 1.09)	(0.50, 0.94)	(0.52, 1.57)	(0.59, 1.32)	(0.19, 0.76)	(0.27, 2.03)
9.5-12.7	1.39*	1.52**	1.17	1.00	0.97	1.14	0.99	0.57	2.82*
	(1.12, 1.73)	(1.19, 1.95)	(0.60, 2.06)	(0.79, 1.26)	(0.73, 1.29)	(0.66, 1.99)	(0.64, 1.52)	(0.29, 1.11)	(1.45, 5.49)
>12.7	0.82	1.11	1.11	1.19	1.00	1.05	1.35	1.65*	1.29
	(0.62, 1.09)	(0.82, 1.51)	(0.60, 2.07)	(0.96, 1.49)	(0.75, 1.34)	(0.59, 1.87)	(0.97, 1.88)	(1.13, 2.41)	(0.56, 3.00)

*$p < 0.05$.
**$p < 0.001$.
***$p < 0.0001$.

Lifestyle interventions for overweight and obese pregnant women to improve pregnancy outcome: systematic review and meta-analysis

Eugene Oteng-Ntim[1,2,3*], Rajesh Varma[1,3], Helen Croker[4], Lucilla Poston[3] and Pat Doyle[2]

2012

13 RCTs: 1,228 women
6 non RCTS: 1,534 women

The nature of interventions varied widely between studies (i.e. individual or group sessions)

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year
Polley 2002	0	27	0	22		Not estimable	2002
Thornton 2009	9	116	4	116	6.5%	2.36 [0.70, 7.88]	2009
Guelinckx 2010	5	42	3	43	4.6%	1.80 [0.40, 8.07]	2010
Phelan 2011	14	81	14	86	19.9%	1.07 [0.48, 2.42]	2011
Luoto 2011	26	216	34	179	57.9%	0.58 [0.34, 1.02]	2011
Nascimento 2011	8	39	8	41	11.0%	1.06 [0.36, 3.18]	2011
Total (95% CI)		**521**		**487**	**100.0%**	**0.91 [0.62, 1.32]**	
Total events	62		63				

Heterogeneity: Chi² = 5.88, df = 4 (P = 0.21); I² = 32%
Test for overall effect: Z = 0.51 (P = 0.61)

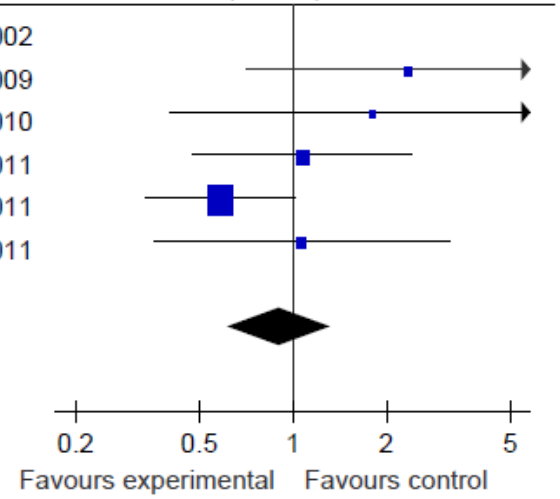


Figure 5 Forest plot of randomised trials investigating the effect of lifestyle advice versus standard care on risk of large for gestational age baby.

BMJ

BMJ 2014;348:g1285 doi: 10.1136/bmj.g1285 (Published 10 February 2014)

2014

RESEARCH

Antenatal lifestyle advice for women who are overweight or obese: LIMIT randomised trial

Study Design: Multicenter RCT

- **Dietary and Lifestyle Advice Group**
- **Standard Care Group**

Inclusion Criteria:

- Singleton pregnancy
- between 10^{+0}-20^{+0} weeks
- BMI≥25 kg/m^2

2008-2011:
2.152 women

Exclusion Criteria: Multiple pregnancy, or type 1 or 2 diabetes

To determine the effect of antenatal dietary and lifestyle interventions on health outcomes in overweight and obese pregnant women

BMJ

BMJ 2014;348:g1285 doi: 10.1136/bmj.g1285 (Published 10 February 2014) Page 1 of 12

2014

RESEARCH

Antenatal lifestyle advice for women who are overweight or obese: LIMIT randomised trial

Primary outcome: LGA (>90° centile)

Table 2| **Prespecified outcomes in infants born to women with BMI ≥25 at trial entry by treatment group. Values are numbers (%) of women and treatment effects are relative risks based on imputed data**

Outcome	Lifestyle advice (n=1075*)	Standard care (n=1067*)	Treatment effect (95% CI), P value	
Large for gestational age	203 (19)	224 (21)	0.90 (0.76 to 1.07), 0.23	0.90 (0.77 to 1.07), 0.24
Major congenital anomaly	25 (2)	14 (1)	1.76 (0.92 to 3.37), 0.09	1.77 (0.93 to 3.39), 0.08
Birth weight above 4000 g	164 (15)	201 (19)	0.81 (0.67 to 0.98), 0.03	
Hypoglycaemia requiring treatment	107 (10)	103 (10)	1.03 (0.79 to 1.33), 0.85	1.02 (0.79 to 1.31), 0.91
Admission to NICU or SCBU	394 (37)	385 (36)	1.02 (0.91 to 1.14), 0.79	1.00 (0.90 to 1.12), 0.99
Hyperbilirubinaemia requiring phototherapy	73 (7)	88 (8.)	0.82 (0.61 to 1.11), 0.19	0.81 (0.60 to 1.09), 0.16
Nerve palsy	4 (0.4)	2 (0.2)	(N/A), 0.69‡	NA
Fracture	4 (0.4)	2 (0.2)	(N/A), 0.69‡	NA
Birth trauma	6 (0.6)	7 (0.7)	0.85 (0.29 to 2.52), 0.77	NA
Shoulder dystocia	44 (4)	35 (3)	1.25 (0.81 to 1.93), 0.32	1.25 (0.81 to 1.93), 0.32

18% reduction

Maternal & Child Nutrition

DOI: 10.1111/mcn.12333

Original Article

Adherence to a lifestyle programme in overweight/obese pregnant women and effect on gestational diabetes mellitus: a randomized controlled trial

…Follow-up:16th, 20th, 28th & 36th week

Table 4. Maternal and neonatal outcomes

	Group I (69)	Group SC (62)	*P*-value
GDM diagnosis	13 (18.8%)	23 (37.1%)	0.019
Pregnancy-induced hypertension	2 (2.9%)	13 (21%)	0.001
Preterm birth	0	5 (8.1%)	0.016
Gestational age at delivery (days)	277.3 ± 8.3	275 ± 10.6	0.142
Induction of labour	24 (34.8%)	34 (54.8%)	0.021
Caesarean delivery	17 (24.6%)	25 (40.3%)	0.055
Birth-weight (g)	3432.5 ± 333.7	3512.3 ± 447.3	0.246
LGA infants (≥90th centile)	1 (1.4%)	7 (11.3%)	0.019
Macrosomia (>4000 g)	2 (2.9%)	7 (11.3%)	0.058
SGA infants (≤10th centile)	6 (8.7%)	5 (8.1%)	0.897

GDM, gestational diabetes mellitus; LGA, large for gestational age; SGA, small for gestational age.

… Try to help future baby's development…