ACOG
The American College of Obstetricians and Gynecologists

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Clinical Management Guidelines for Obstetrician–Gynecologists

NUMBER 230

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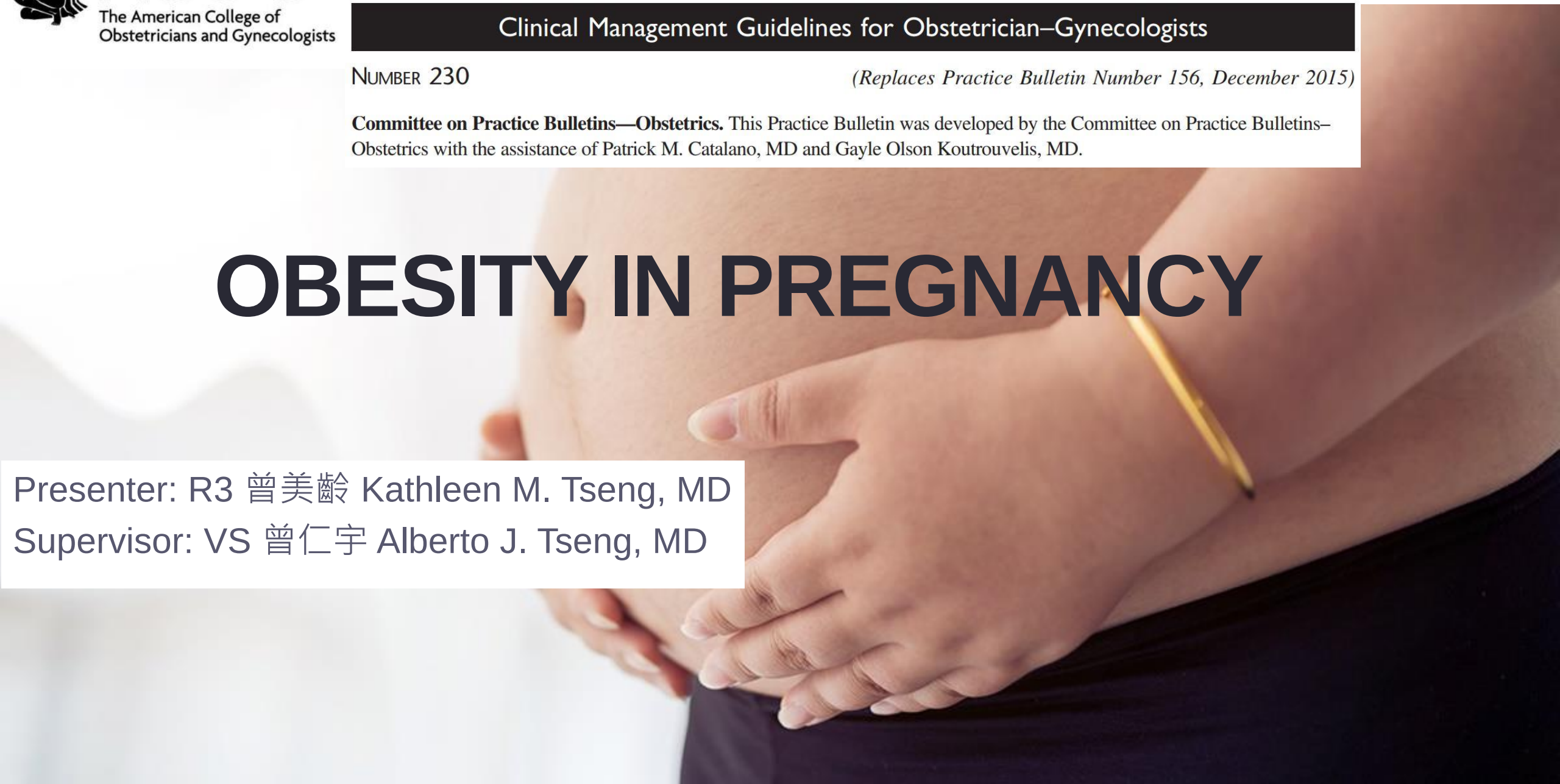
Committee on Practice Bulletins—Obstetrics. This Practice Bulletin was developed by the Committee on Practice Bulletins–Obstetrics with the assistance of Patrick M. Catalano, MD and Gayle Olson Koutrouvelis, MD.



OBESITY IN PREGNANCY

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BACKGROUND

Obesity

- 2017-2018 National Health and Nutrition Examination Survey: Prevalence of obesity in women of reproductive age (20–39 years) in the United States is **39.7%**

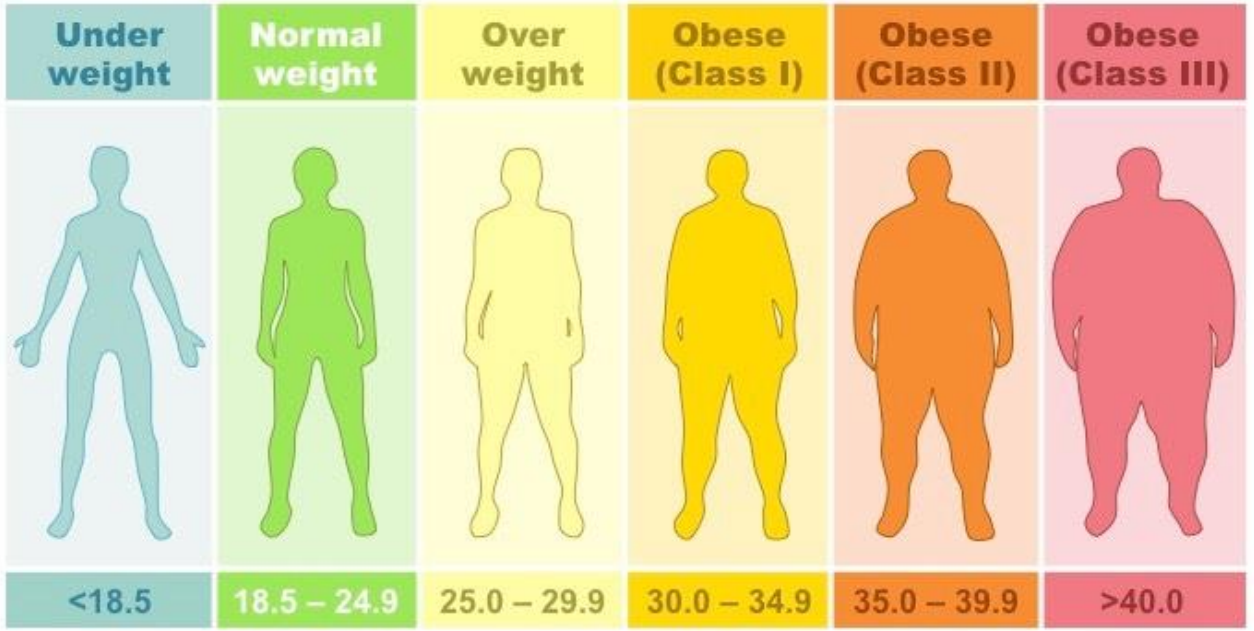
- Taiwan: about 25~30% in women of reproductive age

(依衛福部「國民營養健康狀況調查」最新週期統計 2021/06/09)

Table 1. World Health Organization Body Mass Index Categories

Category	BMI*
Underweight	Less than 18.5
Normal weight	18.5–24.9
Overweight	25.0–29.9
Obesity class I	30.0–34.9
Obesity class II	35.0–39.9
Obesity class III	40 or greater

BMI, body mass index.



Effects on Pregnancy

- Pregnancy Loss
- Antepartum Complications
- Intrapartum Complications
- Postpartum Complications and Long-Term Outcomes
- Fetal Complications and Childhood Morbidities
- Facilities and Equipment Considerations

Pregnancy Loss

- Spontaneous abortion ↗
- Neural tube defects; hydrocephaly; and cardiovascular, orofacial, and limb reduction anomalies ↗
- Gastroschisis ↘

Table 2. Increases in Congenital Anomalies in Obese Versus Nonobese Gravidas

Congenital Anomaly	Increased Risk
Neural tube defects	OR, 1.87; 95% CI, 1.62–2.15
Spina bifida	OR, 2.24; 95% CI, 1.86–2.69
Cardiovascular anomalies	OR, 1.30; 95% CI, 1.12–1.51
Septal anomalies	OR, 1.20; 95% CI, 1.09–1.31
Cleft palate	OR, 1.23; 95% CI, 1.03–1.47
Cleft lip and palate	OR, 1.20; 95% CI, 1.03–1.40
Anorectal atresia	OR, 1.48; 95% CI, 1.12–1.97
Hydrocephaly	OR, 1.68; 95% CI, 1.19–2.36
Limb reduction anomalies	OR, 1.34; 95% CI, 1.03–1.73

Abbreviations: CI, confidence interval; OR, odds ratio.

Data from Stothard KJ, Tennant PW, Bell R, Rankin J. Maternal overweight and obesity and the risk of congenital anomalies: a systematic review and meta-analysis. *JAMA 2009;301:636–50.*

Antepartum Complications

- Cardiac dysfunction, proteinuria, sleep apnea, nonalcoholic fatty liver disease, gestational diabetes mellitus, and pre-eclampsia

Table 3. Absolute Risks Per 10,000 Pregnancies for Body Mass Index Categories 20, 25, and 30

	Maternal BMI		
	20	25	30
Fetal death	76	82 (95% CI, 76–88)	102 (95% CI, 93–112)
Stillbirth	40	48 (95% CI, 46–51)	59 (95% CI, 55–63)
Perinatal death	66	73 (95% CI, 67–81)	86 (95% CI, 76–98)
Neonatal death	20	21 (95% CI, 19–23)	24 (95% CI, 22–27)
Infant death	33	37 (95% CI, 34–39)	43 (95% CI, 40–47)

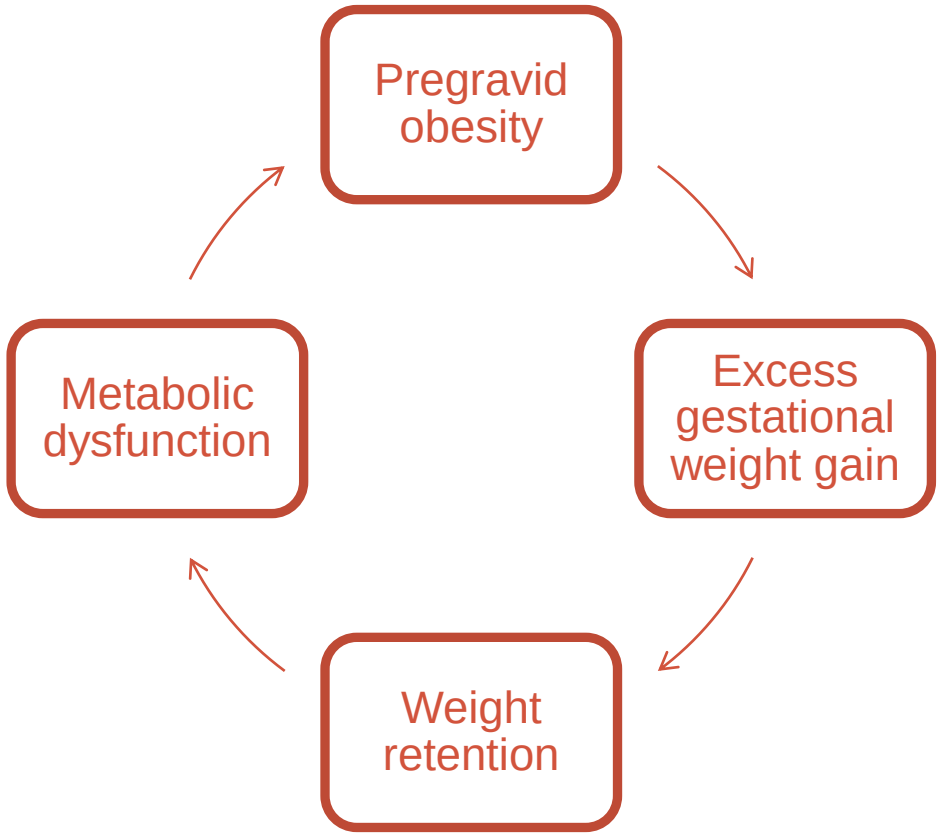
Abbreviations: BMI, body mass index; CI, confidence interval.

Intrapartum Complications

- Cesarean delivery, failed trial of labor, endometritis, wound rupture or dehiscence, and venous thrombosis
- TOLAC: 2x maternal morbidity and 5x neonatal injury

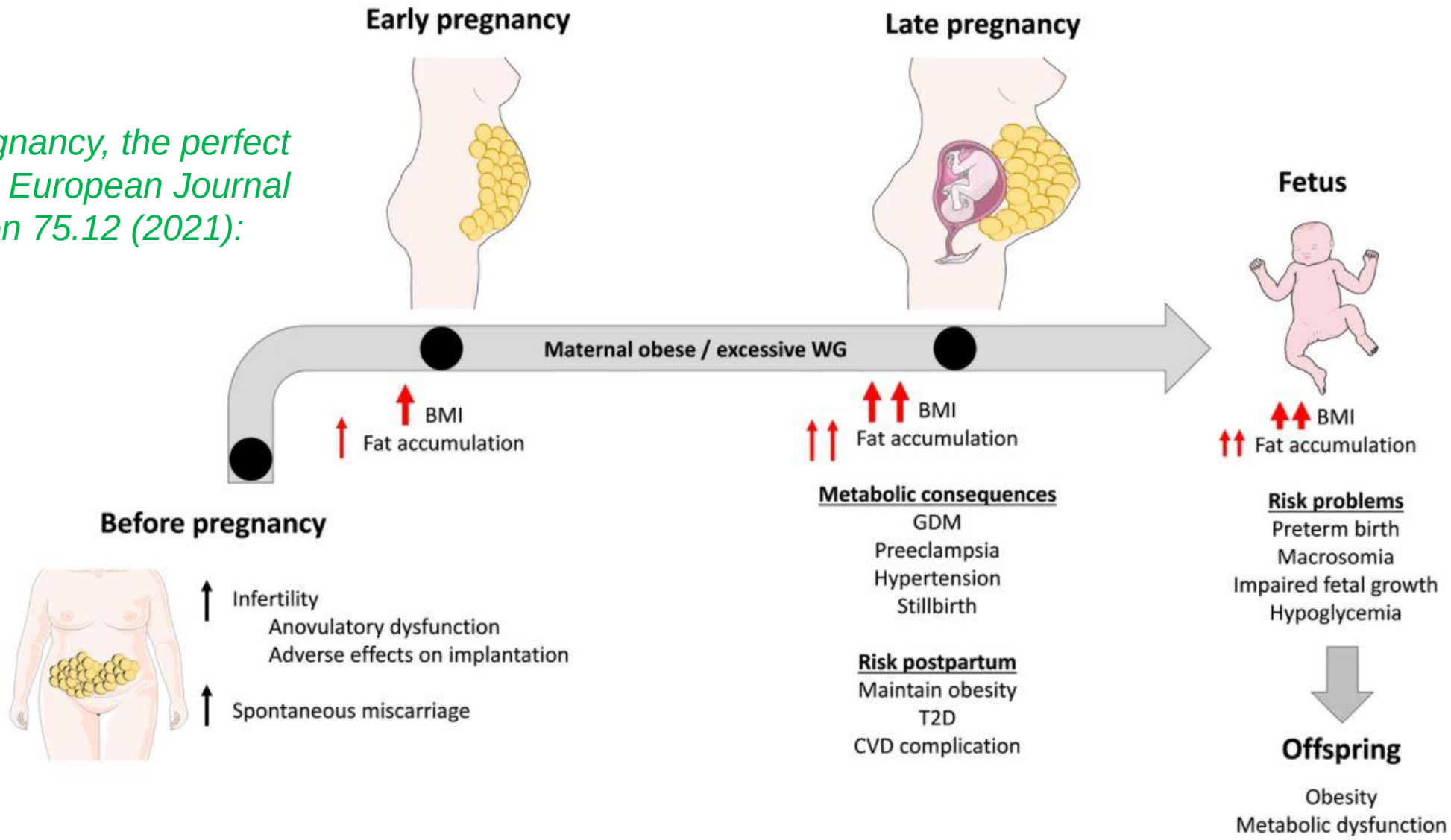
Postpartum Complications and Long-Term Outcomes

- 46% obese pregnant women have gestational weight gain in excess of the Institute of Medicine (IOM) pregnancy weight gain guidelines.



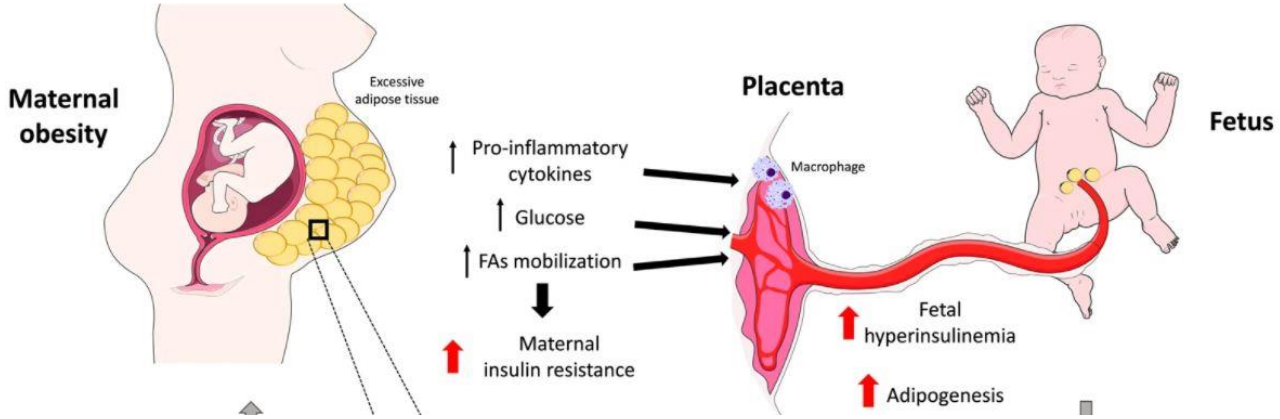
Obesity before pregnancy and during gestation

"Obesity and pregnancy, the perfect metabolic storm." European Journal of Clinical Nutrition 75.12 (2021): 1723-1734.



Fetal Complications and Childhood Morbidities

- Macrosomia and impaired growth
- Childhood obesity
- Childhood asthma
- Childhood developmental delay and disorders



- Impossible to separate different prenatal and postnatal influences on outcomes in the offspring of obese women (Family socioeconomic issues, behavior, activity, and diet → metabolic outcomes)

Facilities and Equipment Considerations

Everything large and spacious for patient's safety

CLINICAL CONSIDERATIONS AND RECOMMENDATIONS

Are there any interventions for the management of obesity before and during pregnancy?

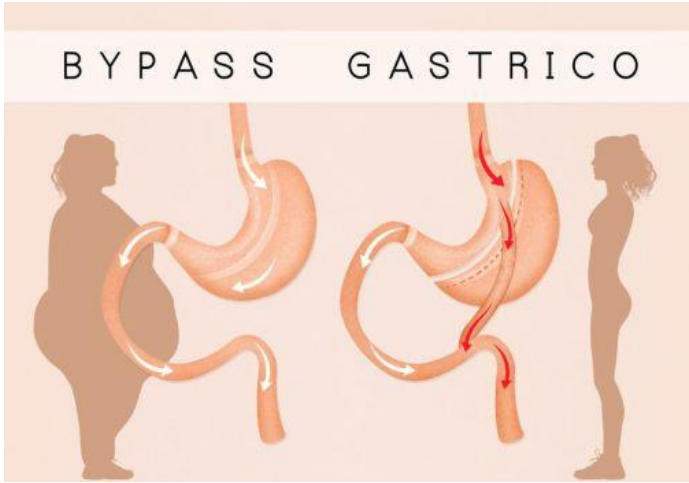
- Weight loss before pregnancy, achieved by surgical or nonsurgical methods, is the most effective intervention to improve medical comorbidities!

Obstet Gynecol 2009;113:1405–13

- Weight loss of 5–7% over time can significantly improve metabolic health.

Obes Rev 2011;12:709–23

- Motivational interviewing: individualized, patient-centered approach → behavior interventions



Medications for weight management?

- **Not recommended** before or during pregnancy due to safety concerns

✘Typical anorectics: alter the release and reuptake of neurotransmitters → suppress appetite

✘Orlistat: ↓ intestinal fat absorption by inhibiting pancreatic lipase

Metformin: ↓gestational weight gain (used in mild gestational diabetes)

- Overweight or obese without DM pregnant patients: Metformin in addition to diet and lifestyle advice starting at 10–20 weeks did not improve pregnancy or birth outcomes.

Lancet Diabetes Endocrinol 2019;7:15–24

Recommendations for weight gain in pregnancy for overweight and obese women

Prepregnancy weight category	BMI (kg/m2)	IOM recommended weight gain (kg)	Recommended weight gain rate in 2nd and 3rd trimesters (kg/week)
Underweight	< 18.5	12.5~18	0.5
Normal weight	18.5~24.9	11.5~16	0.4
Overweight	25~29.9	7~11.5	0.3
Obese	≥ 30	5~9	0.2

Inadequate weight gain or weight loss during pregnany?

- Prevention Pregnancy Nutrition Surveillance System: Women with class I obesity (BMI 30~34.9), no weight gain or weight loss up to 4.9 kg ↑ risk of SGA

Am J Clin Nutr 2010;92:644–5

- The neonates of women who gained ≤ 5 kg were more likely to be SGA (lower birth weight, smaller length, lower lean and fat mass, and smaller head circumference).

Am J Obstet Gynecol 2014; 211:137.e1–e7.

- Systematic review: Obese women with gestational weight loss identified ↑ risk of SGA below the 10th percentile and 3rd percentile

PLoS One 2015;10:e0132650

Antepartum care for the obese patient

- Antenatal diagnosis of congenital anomalies
- Metabolic disorders of pregnancy
- Stillbirth and antenatal fetal surveillance

Antenatal diagnosis of congenital anomalies

- ↗ Maternal BMI: Ultrasound detection of fetal anomalies ↘ by at least 20% in obese women

Obstet Gynecol 2009;113:1001–7

- Markers that are not altered by BMI: increased nuchal fold, echogenic bowel, echogenic cardiac focus

Prenat Diagn 2010;30:14–22

- Cell-free DNA test (NIPT during GA 10~14 weeks) failure ↗ with obesity

Ultrasound Obstet Gynecol 2019;53:804–9

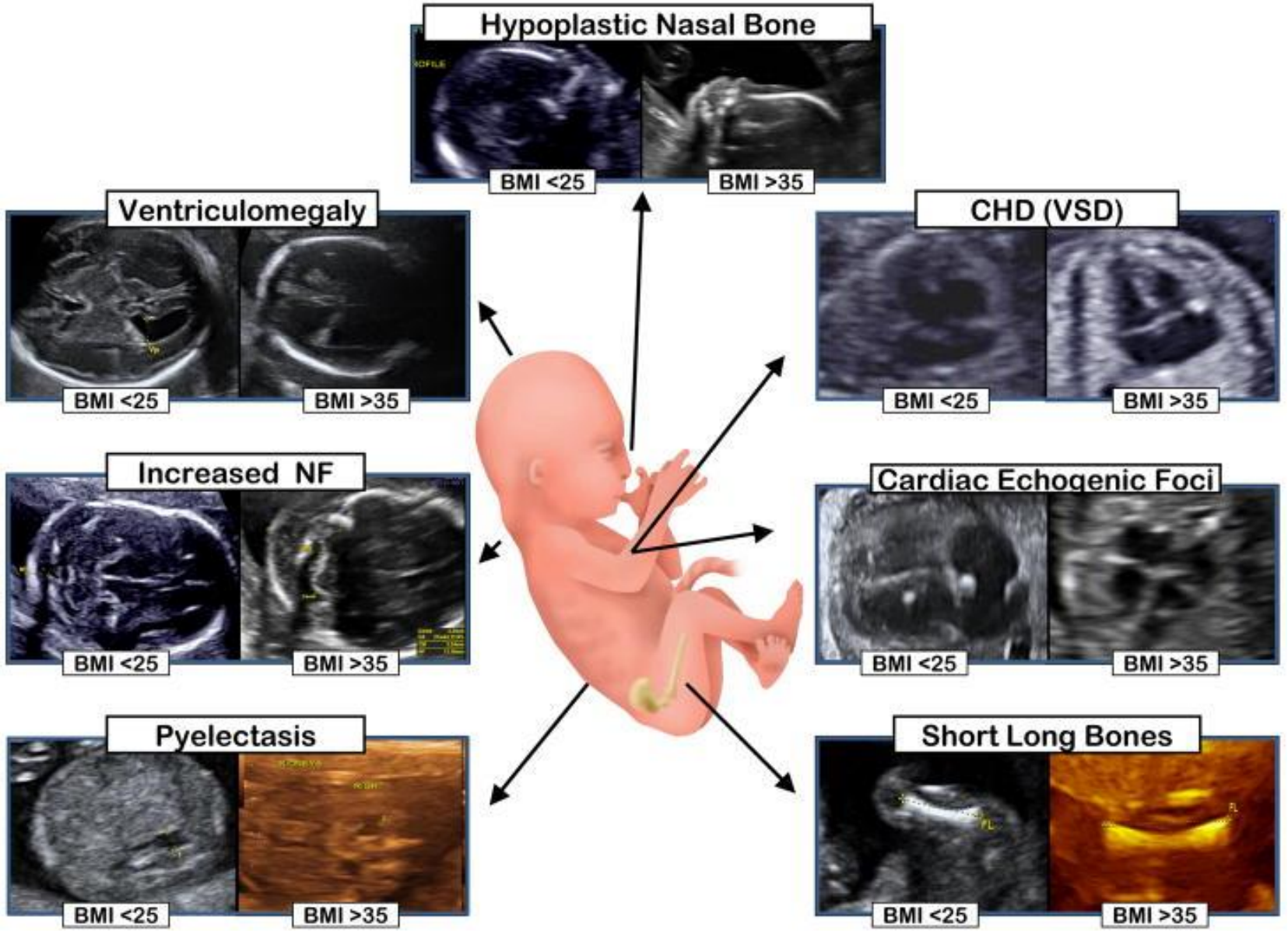
Table 5. Detection of Fetal Anomalies

Body Mass Index	Standard Ultrasonography	Targeted Ultrasonography
Normal (less than 25)	66%	97%
Overweight (25-29.9)	49%	91%
Class I obesity (30-34.9)	48%	75%
Class II obesity (35-39.9)	45%	88%
Class III obesity (40 or more)	22%	75%

Data from Dashe JS, McIntire DD, Twickler DM. Effect of maternal obesity on the ultrasound detection of anomalous fetuses. Obstet Gynecol 2009;113:1001–7.

Techniques to help:

1. Vaginal approach in the 1st trimester
2. Maternal umbilicus as an acoustic window
3. Tissue harmonic imaging



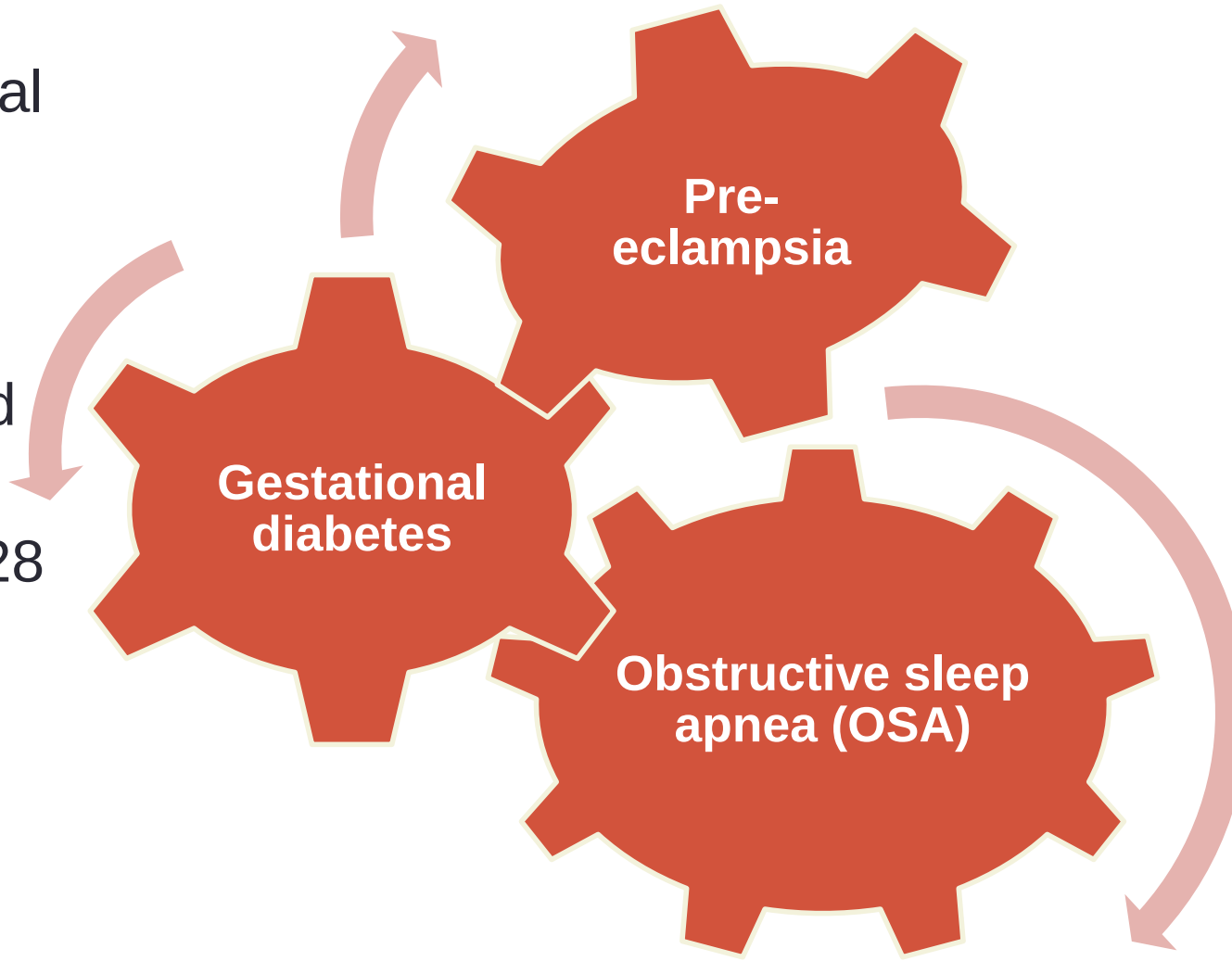
Seminars in Perinatology, 01 Jun 2012, 36(3):213-221

Metabolic disorders of pregnancy

- Increased insulin resistance during pregnancy → preexisting but subclinical cardiometabolic dysfunction ↑

Thorax 2014;69:371–7

- Obese pregnant women should be screened for **glucose intolerance** and **OSA** at the first antenatal visit.
- If negative, GDM survey again at 24~28 weeks of gestation



Stillbirth and antenatal fetal surveillance

- Obesity in pregnancy ↗ early fetal loss and stillbirth

Obstet Gynecol 2007;109:419–33

- Weekly antenatal fetal surveillance

Prepregnancy BMI	Beginning at GA
≤ 35	38+0 weeks
35.0~39.9	37+0 weeks
≥ 40	34+0 weeks

Obstet Gynecol 2021;137:e177–97

Intrapartum care for the obese patient

- ↑Maternal BMI + nulliparous → longer labor *Obstet Gynecol 2004;103:452–6*

- Median duration from 4cm to 10 cm of cervical dilation: significantly longer in overweight and obese women *Obstet Gynecol 2004;104:943–51*
- ↑Maternal BMI ≠ longer second stage of labor *Obstet Gynecol 2011;118:1309–13*

- **Allowing a longer <u>first stage of labor</u>** before performing cesarean delivery for labor arrest should be considered in obese women.

- TOLAC (class III obesity, BMI>40): ↑ composite morbidity (prolonged hospital stay, endometritis, rupture or dehiscence) and ↑ neonatal injury (fractures, brachial plexus injuries, and lacerations)

Operative and perioperative considerations in labor and delivery for the obese patient

Epidural or spinal anesthesia: technically difficult

- ↑ Hypotension and prolonged fetal heart rate deceleration
- May impair respiratory function (up to 2 hrs after procedure)
- General anesthesia? Difficult airway due to excessive tissue and edema!!!

Adjusted dose of antibiotics: 2-g prophylactic cefazolin dose for women who weigh more than 80 kg

Operative and perioperative considerations in labor and delivery for the obese patient

Incision

- After adjustment for confounding factors, **vertical incision** was associated with a significantly **lower risk of wound complications**.
- Chlorhexidine–alcohol skin preparation
- Povidone–iodine for vaginal cleansing before cesarean delivery in laboring patients and those with ruptured membranes
- No need for subcutaneous drain (↑ wound complication)

Postpartum care for the obese patient

- Increasing obesity, immobility, preeclampsia, fetal growth restriction, infection, and emergency cesarean delivery are among the conditions noted to increase the risk of **venous thromboembolism**.

J Gen Intern Med 2013;28:1504–10

Thromboprophylaxis:

1. Pneumatic compression devices
2. Early mobilization
3. LMW heparin: commonly enoxaparin 40mg QD

Weight-based (0.5 mg/kg enoxaparin Q12H) dosage, started 12 hrs after Cesarean section

Effective postpartum care and inter-pregnancy strategies for weight loss before the next pregnancy

- Weight loss between pregnancies in obese women ↓ the risk of a large-for-gestational-age infant
- Gestational weight gain > the IOM recommendations retained 3.06 kg after 3 years and 4.72 kg after 15 years, compared with those who gained weight within the recommendations.

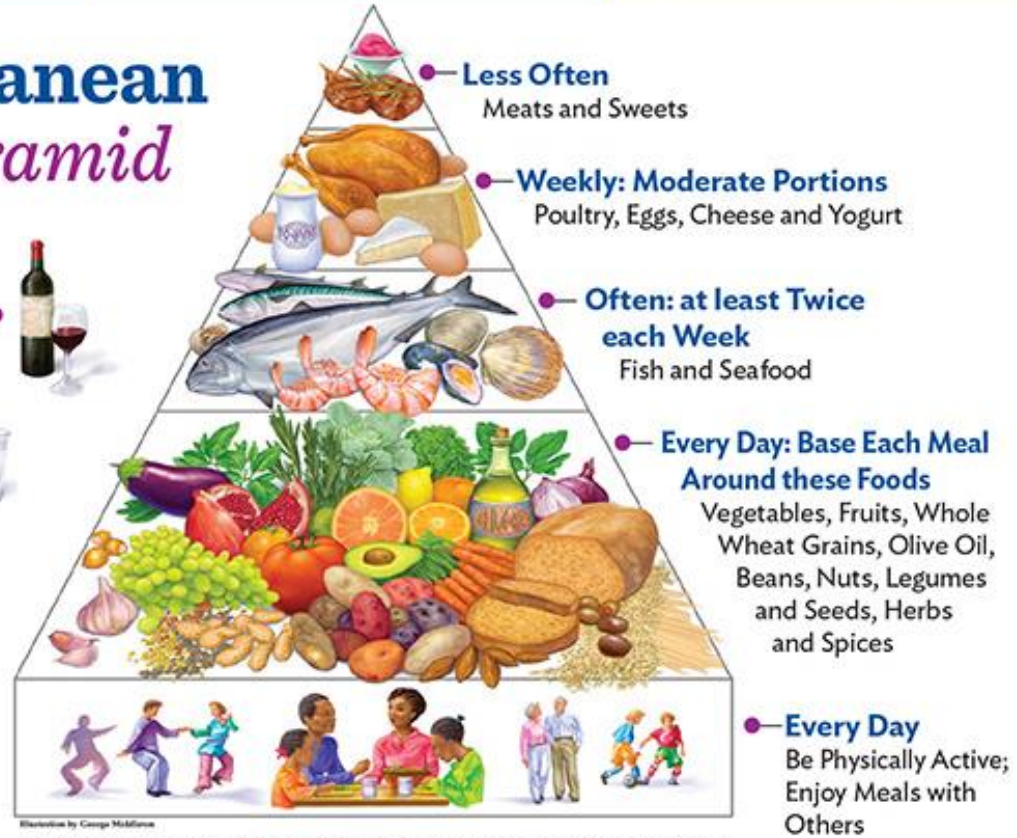
Am J Clin Nutr 2011; 94:1225–31

- Only baseline energy intake, work status, and breastfeeding were significant predictors of weight change.

J Acad Nutr Diet 2013;113:54–62

- Cochrane review: Diet alone or diet plus exercise but not exercise alone helped women lose weight postpartum. → Nutrient counseling

Mediterranean Diet *Pyramid*



Less Often
Meats and Sweets

Weekly: Moderate Portions
Poultry, Eggs, Cheese and Yogurt

Often: at least Twice each Week
Fish and Seafood

Every Day: Base Each Meal Around these Foods
Vegetables, Fruits, Whole Wheat Grains, Olive Oil, Beans, Nuts, Legumes and Seeds, Herbs and Spices

In Moderation
Wine

Every Day
Water

Every Day
Be Physically Active; Enjoy Meals with Others

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MyPyramid For Moms

MyPyramid.gov

When you are pregnant, you have special nutritional needs. Follow the MyPyramid Plan below to help you and your baby stay healthy. The Plan shows different amounts of food for different trimesters, to meet your changing nutritional needs.

Food Group	1st Trimester	2nd and 3rd Trimesters	What counts as 1 cup or 1 ounce?	Remember to...
	Eat this amount from each group daily.*			
Fruits	2 cups	2 cups	1 cup fruit or juice ½ cup dried fruit	*Focus on fruits*—Eat a variety of fruits.
Vegetables	2½ cups	3 cups	1 cup raw or cooked vegetables or juice 2 cups raw leafy vegetables	*Vary your veggies*—Eat more dark-green and orange vegetables and cooked dry beans.
Grains	6 ounces	8 ounces	1 slice bread 1 ounce ready-to-eat cereal ½ cup cooked pasta, rice, or cereal	*Make half your grains whole*—Choose whole instead of refined grains.
Meat & Beans	5½ ounces	6½ ounces	1 ounce lean meat, poultry, or fish ¼ cup cooked dry beans ½ ounce nuts or 1 egg 1 tablespoon peanut butter	*Go lean with protein*—Choose low-fat or lean meats and poultry.
Milk	3 cups	3 cups	1 cup milk 8 ounces yogurt 1½ ounces cheese 2 ounces processed cheese	*Get your calcium-rich foods*—Go low-fat or fat-free when you choose milk, yogurt, and cheese.

*These amounts are for an average pregnant woman. You may need more or less than the average. Check with your doctor to make sure you are gaining weight as you should.

In each food group, choose foods that are low in "extras"—solid fats and added sugars.

Pregnant women and women who may become pregnant should not drink alcohol. Any amount of alcohol during pregnancy could cause problems for your baby.

Most doctors recommend that pregnant women take a prenatal vitamin and mineral supplement every day **in addition to** eating a healthy diet. This is so you and your baby get enough folic acid, iron, and other nutrients. But don't overdo it. Taking too much can be harmful.

MyPyramid For Moms

Get a MyPyramid Plan for Moms designed just for you.
Go to www.MyPyramid.gov for your Plan and more.
Click on "Pregnancy and Breastfeeding."

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SUMMARY OF RECOMMENDATIONS

Level A (based on good or consistent scientific evidence)

- BMI calculated at the first prenatal visit → diet and exercise counseling guided by IOM recommendations (gestational weight gain)
- Subcutaneous drains ↗ risk of postpartum cesarean wound complications, and thus should not be used routinely
- Outcomes of behavioral interventions on both Diet and Exercise > Exercise alone

Level B (based on limited or inconsistent scientific evidence)

- Weight loss in women with obesity before pregnancy should be encouraged. (Improved pregnancy outcome)
- Allowing a longer first stage of labor before performing cesarean delivery for labor arrest should be considered in obese women.
- **Mechanical thromboprophylaxis** is recommended before and after cesarean delivery.
- Weight-based rather than BMI-stratified dosage may be considered for venous thromboembolism thromboprophylaxis in class III obese women after C/S.
- Referral to behavioral counseling interventions focused on improving healthy diet and exercise in order to achieve a healthier weight before another pregnancy

Level C (based primarily on consensus and expert opinion)

- Obese women should be counseled about the limitations of ultrasound in identifying structural anomalies.
- **Early pregnancy screening for glucose intolerance** (gestational diabetes or overt diabetes) should be based on risk factors (maternal BMI ≥ 30, known impaired glucose metabolism, previous gestational diabetes).
- Weekly antenatal fetal surveillance should begin at 37 0/7 weeks of gestation (prepregnanacy BMI 35~39.9) and at 34 0/7 weeks (prepregnancy BMI ≥ 40).
- Anesthesia consultation: obese pregnant women with OSA due to ↑ risk of hypoxemia, hypercapnia, and sudden death

Thank you for listening (to my mama's presentation). Any questions?