PIPADOR REVISION

MRCOG Part 1 Revision Notes

Nutritional Requirements in Pregnancy

PHYSIOLOGY • LECTURE 139

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG PART 1 REVISION NOTES | PHYSIOLOGY

139 Nutritional Requirements in Pregnancy

Energy cost, weight gain, maternal metabolism, supplements, food safety, special groups and lactation

+ 200 kcal per day — 3rd trimester ONLY (NICE)	**400 µg** Folic acid: pre-conception → 12 weeks	**10 µg** Vitamin D daily (pregnancy & lactation)
< 200 mg Caffeine per day	**0 units** Alcohol — no known safe level (UK CMO)	**11.5–16 kg** Weight gain, normal BMI (IOM)

■ KEY FACTS: Learning objectives

- Describe the energy cost of pregnancy and the components of gestational weight gain.
- Describe maternal metabolic adaptation and placental nutrient transfer.
- State UK recommendations for supplements and foods to avoid in pregnancy.
- Describe nutritional needs of special groups (vegan, obesity, bariatric surgery, hyperemesis, adolescents, multiple pregnancy) and lactation.

139.1 Energy cost and weight gain

- Total energy cost of pregnancy ≈ **77,000–80,000 kcal** (Hytten): new tissue (fetus, placenta, maternal fat) plus ↑ BMR (≈ 15–20% by term) — offset in many women by ↓ physical activity.
- UK guidance (**NICE PH27, SACN**): **no extra energy in the first two trimesters; ≈ 200 kcal/day in the third trimester**. 'Eating for two' is a myth.

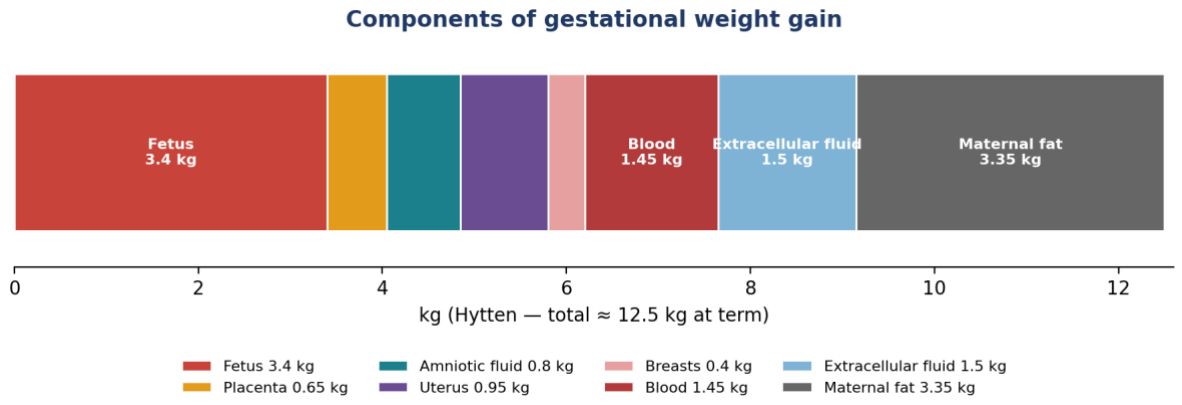


Figure 139.1 — Where the weight goes: components of ≈ 12.5 kg gestational weight gain

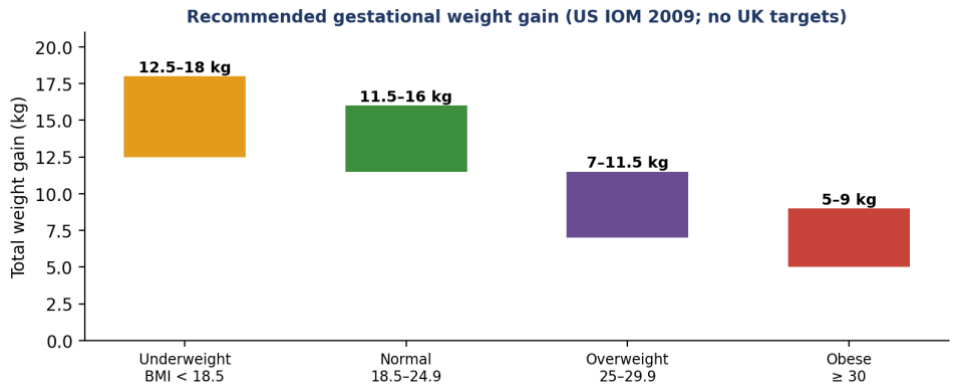


Figure 139.2 — Recommended weight gain by pre-pregnancy BMI

The UK has no formal weight-gain targets; NICE recommends weighing at booking (BMI), giving dietary and physical activity advice, and **not routinely re-weighing** unless clinically indicated. Excess gain → GDM, macrosomia, CS, postpartum weight retention; inadequate gain → FGR, preterm birth.

139.2 Maternal metabolism and placental transfer

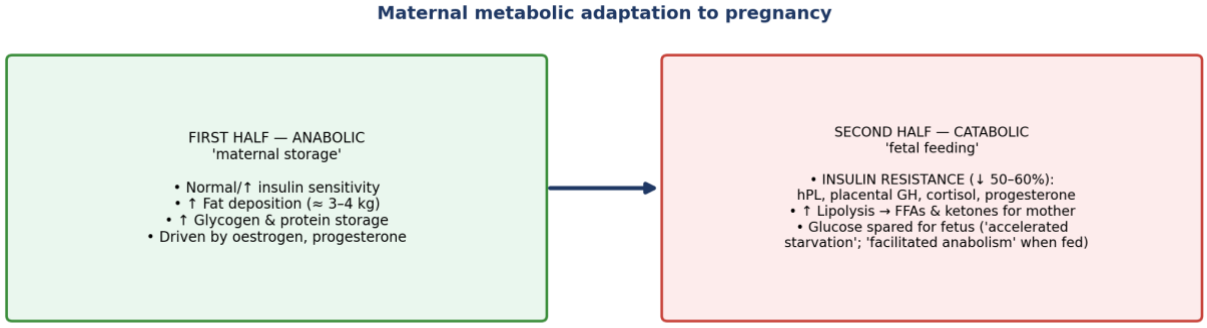


Figure 139.3 — Anabolic then catabolic phases of maternal metabolism

Nutrient	Placental transfer	Notes
Glucose	Facilitated diffusion (GLUT1) down a concentration gradient	Fetal glucose ≈ 70–80% of maternal; fetal hyperglycaemia → fetal hyperinsulinaemia (Pedersen hypothesis) → macrosomia
Amino acids	Active transport (fetal levels > maternal)	↓ in FGR (system A transporter activity)
Fatty acids	Lipoprotein lipase + fatty-acid binding/transport proteins	Selective transfer of DHA/arachidonic acid ('biomagnification') in 3rd trimester
Ketones, lactate	Diffusion	Ketones used by fetal brain during maternal fasting
Insulin, glucagon	Do not cross	Fetus makes its own insulin from ≈ 10–12 weeks
Vitamins/minerals	Mostly active (iron via transferrin receptor; Ca^{2+} pumps)	Fetal levels often > maternal

139.3 UK supplement recommendations

Nutrient	Recommendation	Rationale
Folic acid	400 µg/day from pre-conception to 12 weeks. 5 mg/day if: previous NTD or family history, either partner with NTD, diabetes, antiepileptics, BMI ≥ 30, sickle cell disease/thalassaemia, coeliac/malabsorption	↓ NTD by ≈ 70% (MRC Vitamin Study 1991). Neural tube closes by day 28 post-conception. UK mandatory fortification of non-wholemeal wheat flour has been legislated

Nutrient	Recommendation	Rationale
Vitamin D	10 µg (400 IU) daily throughout pregnancy and breastfeeding; higher doses for high-risk women per local policy	Prevents maternal deficiency, neonatal hypocalcaemia and rickets; high-risk: darker skin, covered skin, BMI ≥ 30, little sun exposure
Iron	Not routine; treat anaemia/iron deficiency (Lecture 135)	Side effects; absorption ↑ physiologically
Vitamin A	Avoid supplements containing retinol and liver/liver products	Retinol excess is teratogenic (cranial neural crest, cardiac, CNS)
Iodine	UK RNI 140 µg (WHO advises 250 µg in pregnancy); dairy and fish main sources	Thyroid hormone for fetal brain (Lecture 141); avoid kelp supplements
Calcium	No routine increment (UK RNI 700 mg); WHO 1.5–2 g/day where intake is low to ↓ pre-eclampsia	Absorption doubles physiologically
Healthy Start	Free vitamins (folic acid, vitamin C, vitamin D) and food vouchers for eligible families	Reduce inequality

139.4 Food safety in pregnancy

Avoid / limit	Reason
Unpasteurised milk; mould-ripened soft cheese (brie, camembert) and soft blue cheese unless cooked; all pâté	Listeria (miscarriage, stillbirth, preterm labour, neonatal sepsis; meconium in preterm)
Raw/undercooked meat; unwashed fruit/vegetables; cat litter, soil	Toxoplasma
Raw/partly cooked eggs unless British Lion-stamped	Salmonella
Liver, liver products, vitamin A supplements	Retinol teratogenicity
Shark, swordfish, marlin; tuna ≤ 4 cans or 2 steaks/week; oily fish ≤ 2 portions/week	Mercury, dioxins/PCBs (oily fish still advised for DHA)
Caffeine < 200 mg/day (≈ 2 mugs instant coffee)	↑ FGR and miscarriage at higher intakes
Alcohol — none	Fetal alcohol spectrum disorder (no safe threshold)
Peanuts	No need to avoid unless allergic

139.5 Special groups

Group	Key nutritional issues
Vegan / vegetarian	B_{12} (supplement essential for vegans), iron, iodine, calcium, vitamin D, DHA, protein quality
Obesity (BMI ≥ 30)	5 mg folic acid, vitamin D 10 µg; healthy eating rather than weight loss during pregnancy; GDM screening
After bariatric surgery	Delay conception 12–18 months; monitor iron, B_{12}, folate, vitamin D/calcium, vitamin A, thiamine; avoid OGTT (dumping syndrome) — use glucose monitoring; serial growth scans
Hyperemesis gravidarum	Dehydration, ketosis, electrolyte loss; thiamine to prevent Wernicke's encephalopathy (give before dextrose); refeeding risk (RCOG GTG 69)
Adolescents	Own growth competes with fetus — higher energy, calcium, iron needs
Multiple pregnancy	↑ Energy, iron and folate needs; anaemia more common
Eating disorders / underweight	FGR, preterm birth; specialist support; refeeding risk
Gestational diabetes	Low glycaemic-index carbohydrate, portion control, exercise (NICE NG3)

139.6 Lactation

+ ≈ 330 kcal	≈ 750–800 mL	+ 550 mg	8.5–10 µg
per day — exclusive breastfeeding (SACN)	Milk per day	Calcium RNI increment (UK lactation)	Vitamin D for breastfed infants from birth

Breast milk is low in **vitamin K** (hence neonatal vitamin K) and vitamin D; DHA content depends on maternal intake. Lactation mobilises maternal bone calcium (PTHrP) — recovered after weaning.

139.7 Must-know summary

■ **EXAM TIP**

- Extra energy **only in the 3rd trimester (≈ 200 kcal/day)**; lactation ≈ 330 kcal/day.
- **Folic acid 400 µg** to 12 weeks (**5 mg** if high risk incl. BMI ≥ 30, diabetes, AEDs, previous NTD); **vitamin D 10 µg** throughout.
- Avoid **vitamin A/liver**, unpasteurised and mould-ripened cheese, pâté, raw meat, shark/swordfish/marlin; caffeine < 200 mg; **no alcohol**.
- Glucose crosses by **facilitated diffusion (GLUT1)**; amino acids by **active transport**; insulin does **not** cross.
- Hyperemesis → **thiamine before dextrose**; bariatric surgery → avoid OGTT.

■ **MNEMONIC / MEMORY AID**

Pregnancy food hazards — 'LTS ARM': Listeria, Toxoplasma, Salmonella, Alcohol, Retinol, Mercury.