PIPADOR REVISION

MRCOG Part 1 Revision Notes

Postpartum Physiology

PHYSIOLOGY • LECTURE 148

VISUAL EXAMINATION REVISION NOTES

2026 Edition

148

MRCOG PART 1 REVISION NOTES | PHYSIOLOGY

Postpartum Physiology

Uterine involution, systemic recovery, return of fertility, and the physiology of lactation

1000 → 60 g	≈ day 10–14	Day 21	≈ 750–800 mL
Uterine weight over 6 weeks	Uterus no longer palpable abdominally	Contraception needed (non-breastfeeding)	Milk per day (established)

■ **KEY FACTS: Learning objectives**

- Describe uterine involution, lochia and recovery of the genital tract.
- Describe systemic and endocrine changes of the puerperium and the return of fertility.
- Describe breast development, the stages of lactogenesis and the neuroendocrine control of lactation.
- Describe milk composition and clinical aspects of breastfeeding.

148.1 Uterine involution

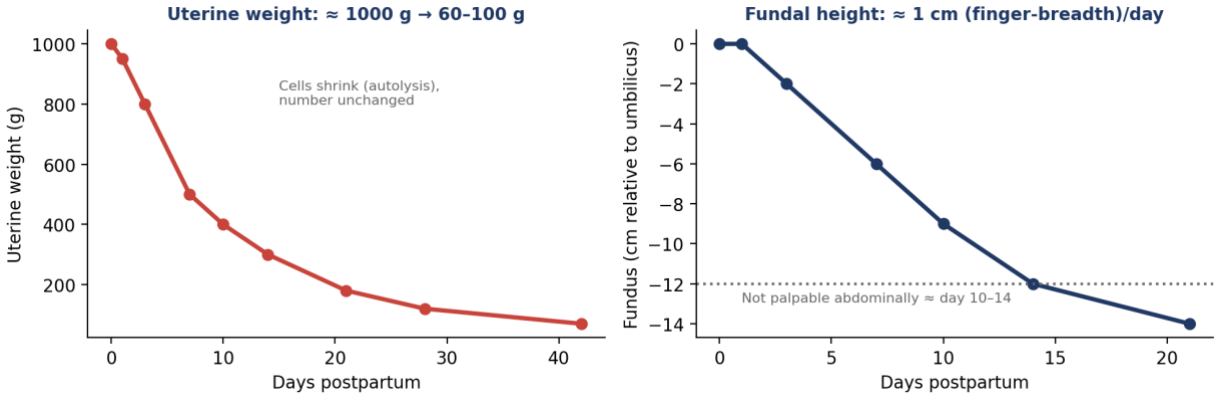


Figure 148.1 — Uterine weight and fundal height after birth

- **Mechanisms**: sustained myometrial contraction/retraction ('living ligatures') compresses vessels; **autolysis** — myocytes shrink by proteolysis (cell **number unchanged**); ↓ oestrogen/progesterone; oxytocin release with breastfeeding accelerates involution (after-pains).
- **Decidua** separates into a superficial layer (shed as lochia) and basal layer (regenerates endometrium by ≈ 2–3 weeks); the **placental site** heals last (≈ 6 weeks) by exfoliation — failure → **subinvolution**, secondary PPH.
- **Cervix**: closes to a finger-breadth by ≈ 1 week; external os becomes a transverse slit. **Vagina**: rugae reappear ≈ 3 weeks; hypo-oestrogenic (atrophic) in breastfeeding women → dyspareunia.

Lochia	Timing	Composition
Rubra	Days 1–3/4	Blood, decidua, membranes
Serosa	Days 4–10	Pink/brown: serous exudate, leucocytes, less blood
Alba	Up to 4–6 weeks	Yellow-white: leucocytes, mucus, epithelial cells

■ **RED FLAGS**

- **Secondary PPH** (24 h – 12 weeks): retained products, **endometritis**, subinvolution — offensive lochia, fever, tender uterus. **Sepsis** (group A streptococcus) is a leading cause of maternal death — escalate early.

148.2 Systemic and endocrine changes

System	Postpartum course
Cardiovascular	CO ↑ 60–80% immediately (autotransfusion) — highest-risk time for cardiac disease; most changes resolve by 2 weeks, fully by 12–24 weeks (Lecture 126)
Haematological	Hypercoagulability persists → VTE risk highest in first 6 weeks (Lecture 135); WCC up to 25–30 in first days; platelets rise
Renal	Diuresis days 2–5 (loss of ≈ 2 L ECF); GFR normalises by ≈ 8 wk; ureteric dilatation resolves 6–12 wk; urinary retention after epidural/instrumental birth
Respiratory	FRC and diaphragm position recover within days; $PaCO_2$ normalises as progesterone falls
Endocrine	Placental hormones (hPL, E2, P) fall within hours–days; hCG negative by ≈ 3–4 weeks; insulin sensitivity returns quickly — stop GDM treatment; fasting glucose 6–13 wk or HbA1c thereafter (NICE NG3)
Thyroid	Postpartum thyroiditis (5–10%, ↑ with TPO antibodies, type 1 diabetes): thyrotoxic phase 1–4 months → hypothyroid 4–8 months
Mood	'Baby blues' (≈ 50–80%, days 3–5); postnatal depression (≈ 10–15%); puerperal psychosis (≈ 1–2/1000 — emergency; ↑ with bipolar disorder)

Return of fertility



Lactational amenorrhoea: frequent suckling → prolactin and neural signals suppress **kisspeptin/GnRH pulsatility** → low LH, anovulation. Combined hormonal contraception (UKMEC): **< 6 weeks if breastfeeding = UKMEC 4** (UKMEC 2 from 6 weeks to 6 months); **not breastfeeding: < 21 days = UKMEC 3** (VTE risk), 21–42 days = UKMEC 2 (3 with other VTE risk factors).

148.3 Breast development (mammogenesis)

Stage	Hormones	Changes
Puberty	Oestrogen (ducts), GH/IGF-1, progesterone (lobules)	Ductal elongation and branching
Pregnancy	Oestrogen (ducts), progesterone (lobuloalveolar), prolactin, hPL, cortisol, insulin	Lobuloalveolar proliferation; breast enlarges; differentiation of secretory alveolar cells
Lactation	Prolactin (synthesis), oxytocin (ejection)	Secretory alveoli surrounded by myoepithelial cells
Involution	Weaning — milk stasis, ↓ prolactin	Apoptosis of alveolar epithelium

148.4 Lactogenesis and its control

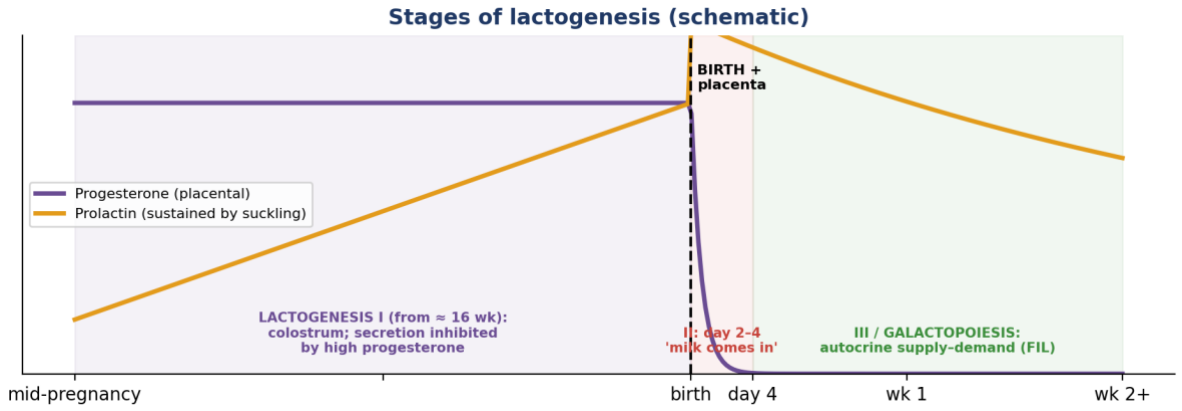


Figure 148.2 — Lactogenesis I, II and III

- **Lactogenesis I** (from ≈ 16 weeks): alveolar cells can make **colostrum**; copious secretion is **inhibited by high placental progesterone**.
- **Lactogenesis II** (≈ **30–72 h** postpartum — 'milk comes in'): triggered by the **fall in progesterone** after delivery of the placenta with high prolactin, cortisol and insulin. **Delayed** by retained placental fragments, diabetes, obesity, caesarean section, stress, PPH (Sheehan's — failure of lactation).
- **Lactogenesis III / galactopoiesis**: maintenance by **local autocrine control** — removal of milk removes **feedback inhibitor of lactation (FIL)**; supply matches demand. Prolactin remains permissive.

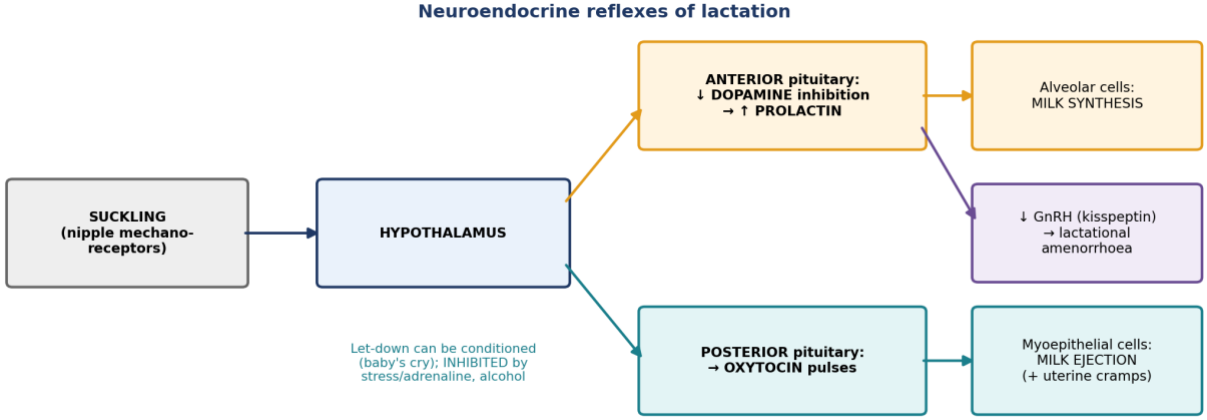


Figure 148.3 — The suckling reflex: prolactin (synthesis) and oxytocin (ejection)

Drug	Effect on lactation
Dopamine agonists — cabergoline, bromocriptine	Suppress prolactin → lactation suppression (e.g. after stillbirth); avoid in hypertension/pre-eclampsia
Dopamine antagonists — domperidone, metoclopramide	↑ Prolactin → galactagogues
Combined hormonal contraception (oestrogen)	↓ Milk supply — avoided < 6 weeks in breastfeeding
Contraindicated in breastfeeding (examples)	Cytotoxics, radioactive isotopes, amiodarone, lithium (caution), high-dose iodine

148.5 Milk composition

	Colostrum (days 1–4)	Mature milk
Energy	Lower (≈ 58 kcal/100 mL)	≈ 70 kcal/100 mL
Protein	High (≈ 2–3%) — secretory IgA, lactoferrin, leucocytes	≈ 1% (whey > casein, α-lactalbumin)

	Colostrum (days 1–4)	Mature milk
Fat	Lower	≈ 3.5–4.5% — hindmilk richer than foremilk; DHA depends on maternal diet
Lactose	Lower	≈ 7% (main carbohydrate; oligosaccharides are prebiotic)
Other	Yellow (β-carotene); laxative (meconium passage)	Low in vitamin K and vitamin D; iron low but highly bioavailable

■ CLINICAL CORRELATION

- Benefits: ↓ infant infections (gastroenteritis, otitis, respiratory), NEC (preterm), SIDS; maternal ↓ breast and ovarian cancer, type 2 diabetes.
- Contraindications/cautions: **galactosaemia** (infant), some maternal drugs, untreated active TB; **HIV** — UK guidance (BHIVA) supports informed shared decision-making for women with sustained undetectable viral load; otherwise formula feeding advised.
- Problems: engorgement, **mastitis** (*Staphylococcus aureus*; continue feeding/expressing), breast abscess, nipple trauma, tongue-tie.

148.6 Must-know summary

■ EXAM TIP

- Uterus ≈ 1000 g → 60–100 g by 6 weeks (cell **size**, not number); not palpable after ≈ day 10–14; placental site heals last.
- Lochia rubra (1–3/4 d) → serosa (to ≈ day 10) → alba (to 4–6 wk).
- Lactogenesis II is triggered by **progesterone withdrawal** (placental delivery); retained placenta delays it.
- **Prolactin → synthesis** (anterior pituitary; dopamine inhibits); **oxytocin → ejection** (posterior; inhibited by stress).
- Earliest ovulation ≈ day 25–28 if not breastfeeding; contraception from **day 21**.

■ MNEMONIC / MEMORY AID

Lochia — 'Red, Serous, White' (rubra → serosa → alba). **'Prolactin Produces, Oxytocin Outputs'**.