PIPADOR REVISION

MRCOG Part 1 Revision Notes

Endocrinology of Implantation and Early Pregnancy

ENDOCRINOLOGY • LECTURE 183

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG PART 1 REVISION NOTES | ENDOCRINOLOGY

183 Endocrinology of Implantation and Early Pregnancy

Endometrial preparation, corpus luteum rescue, luteo-placental shift, early pregnancy hormone testing and clinical applications

Day 20–24	Day 8–10	7–9 wk	63% / 48 h
Window of implantation	hCG detectable after ovulation	Luteo-placental shift	Minimum hCG rise (viable IUP likely)

■ KEY FACTS: Learning objectives

- Describe the endocrine preparation of the endometrium and the endocrinology of implantation.
- Describe corpus luteum rescue by hCG and the luteo-placental shift.
- Describe the interpretation of hCG and progesterone in early pregnancy and pregnancy of unknown location.
- Apply early pregnancy endocrinology to IVF, ectopic and molar pregnancy and hyperemesis gravidarum.

183.1 Preparing the endometrium

Oestrogen (follicular): proliferation, **induces PR** ▶ LH surge → **progesterone** from CL ▶ Secretory transformation; **window of implantation** (≈ LH + 7–10) ▶ Receptivity markers: pinopodes, **integrin αvβ3, LIF, HOXA10**, glycodelin, ↓ MUC1 ▶ **Decidualisation** (progesterone + cAMP): prolactin, IGFBP-1, uNK recruitment

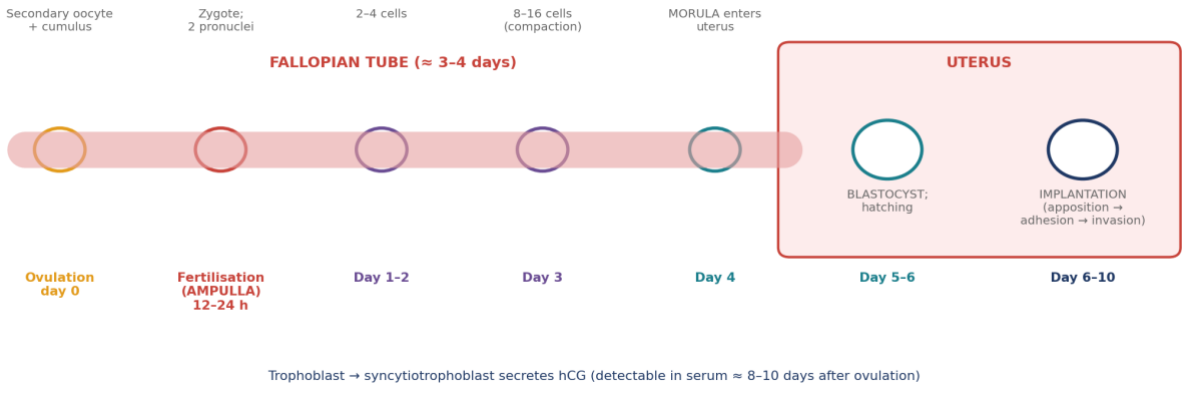


Figure 183.1 — From ovulation to implantation

183.2 Maternal recognition of pregnancy

- The blastocyst secretes **hCG** from ≈ day 7–8 (syncytiotrophoblast). hCG acts on the **corpus luteum LH receptor** to prevent luteolysis — **'rescue'** — maintaining progesterone, oestradiol, **relaxin** and inhibin A.
- Without hCG, the CL regresses at ≈ 14 days ($PGF_2\alpha$, ↓ LH) → progesterone withdrawal → menstruation.
- Early hCG also modulates decidual immune cells and angiogenesis and promotes trophoblast invasion.

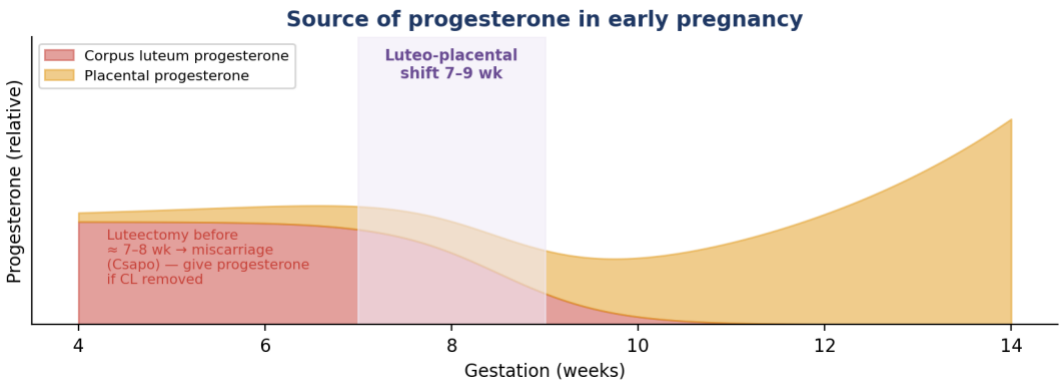


Figure 183.2 — The luteo-placental shift

183.3 hCG and progesterone in early pregnancy

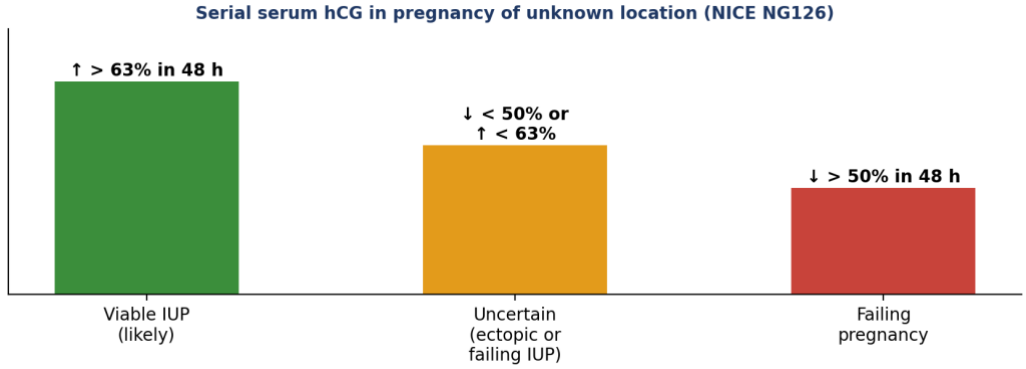


Figure 183.3 — Serial hCG in pregnancy of unknown location (NICE NG126)

Test	Interpretation
Serum hCG (48-h interval)	↑ > 63% → likely developing intrauterine pregnancy (scan in 7–14 days; ectopic still possible); ↓ > 50% → likely failing pregnancy (urine test in 2 weeks); in between → review in EPU within 24 h
Discriminatory level	An intrauterine sac is usually visible on TVS when hCG ≈ 1500 IU/L (local policies vary) — empty uterus above this → suspect ectopic
Serum progesterone	Not recommended by NICE for diagnosis; very low levels (< ≈ 20 nmol/L) suggest a failing pregnancy
hCG and methotrexate for ectopic	Offer methotrexate first-line if no pain, no heartbeat, mass < 35 mm and hCG < 1500 IU/L; option up to 5000 IU/L (NICE NG126)

183.4 Clinical applications

Situation	Endocrine basis
IVF luteal support	GnRH analogues/antagonists and aspiration of granulosa cells impair CL → progesterone support (± hCG); hCG trigger mimics LH surge (OHSS risk ↑ with hCG — GnRH agonist trigger safer)
Programmed frozen embryo transfer	No CL → exogenous oestrogen + progesterone until ≈ 10–12 weeks; absent relaxin (↑ pre-eclampsia — Lecture 174)
OHSS	hCG (exogenous or pregnancy) → ↑ VEGF from luteinised granulosa cells → capillary leak; late OHSS driven by pregnancy hCG
Threatened miscarriage	Vaginal progesterone 400 mg bd to 16 weeks if previous miscarriage (NICE NG126)
Molar pregnancy	Very high hCG → hyperemesis, early pre-eclampsia, hyperthyroidism, theca-lutein cysts; hCG follow-up (UK registration — Charing Cross/Sheffield/Dundee)

Situation	Endocrine basis
Hyperemesis gravidarum	Associated with high hCG (twins, molar) and oestrogen; recent evidence implicates fetal/placental GDF15 acting on the brainstem (with maternal sensitivity); gestational thyrotoxicosis
Luteectomy	Removal of the CL before ≈ 7–8 weeks causes miscarriage unless progesterone replaced (Csapo)

183.5 Must-know summary

■ **EXAM TIP**

- Oestrogen primes (PR induction) → progesterone transforms; window of implantation ≈ day 20–24.
- hCG from syncytiotrophoblast **rescues the CL**; luteo-placental shift **7–9 weeks**.
- Serial hCG: ↑ **> 63%** likely IUP; ↓ **> 50%** failing; in between → EPU review.
- Methotrexate first-line if hCG < 1500 IU/L (and criteria met).
- High hCG: molar, twins, T21, hyperemesis, OHSS; hyperemesis also linked to GDF15.

■ **MNEMONIC / MEMORY AID**

hCG at 48 h — '63 up, 50 down'.