PIPADOR REVISION

MRCOG Part 1 Revision Notes

Placental Hormones

ENDOCRINOLOGY • LECTURE 182

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG PART 1 REVISION NOTES | ENDOCRINOLOGY

182 Placental Hormones

hCG, hPL and placental GH, placental steroids and the fetoplacental unit, and other placental products

hCG	hPL	Progesterone	Oestriol
Rescues corpus luteum; peak 8–10 wk	Diabetogenic; ∝ placental mass	Placental from 7–9 wk	Fetoplacental unit

■ KEY FACTS: Learning objectives

- Describe the structure, regulation and functions of hCG, hPL and placental GH.
- Describe placental steroid production (progesterone, oestrogens) and the fetoplacental unit.
- Describe other placental products: CRH, PlGF/sFlt-1, PAPP-A, inhibin/activin, leptin, kisspeptin.
- Apply placental endocrinology to screening, diagnosis and disease.

182.1 Overview

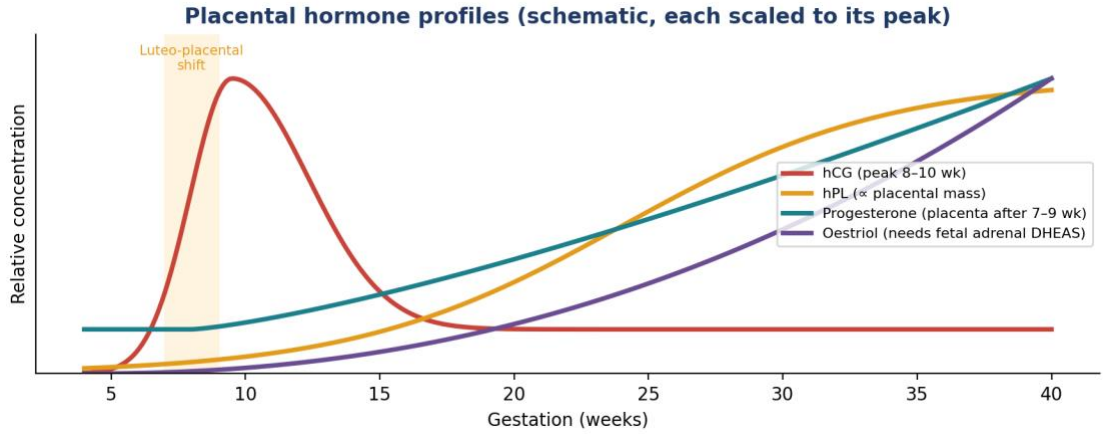


Figure 182.1 — Placental hormone profiles across gestation

The **syncytiotrophoblast** is the main endocrine cell. Unlike classical glands, the placenta is largely **not under feedback control** — hormone output reflects **placental mass and health**, which is why levels serve as markers of fetal number, aneuploidy and placental disease.

182.2 Human chorionic gonadotrophin

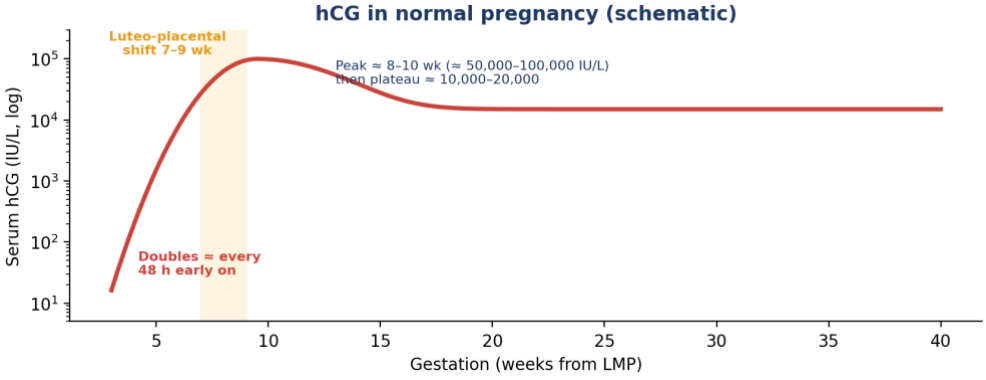


Figure 182.2 — hCG in normal pregnancy

Feature	Details
Structure	Glycoprotein: α-subunit identical to LH, FSH, TSH; β-subunit (145 aa) with a C-terminal peptide and extra sialic acid → long half-life (≈ 24–36 h); hyperglycosylated hCG from invasive cytotrophoblast
Receptor	LH/hCG receptor (Gs)
Functions	Rescues the corpus luteum (progesterone, relaxin) until the luteo-placental shift; stimulates fetal Leydig testosterone (male differentiation) and fetal adrenal; TSH-like effect (gestational thyrotoxicosis); immunomodulation, angiogenesis, myometrial quiescence
Detection	Urine tests detect ≈ 20–25 IU/L (≈ day of missed period); serum ≈ 8–10 days after ovulation; doubles ≈ every 48 h early
↑ hCG	Multiple pregnancy, molar pregnancy, choriocarcinoma, trisomy 21 (≈ 2 MoM), hyperemesis, hydrops
↓ hCG	Ectopic, failing pregnancy, trisomy 18/13

182.3 hPL and placental growth hormone

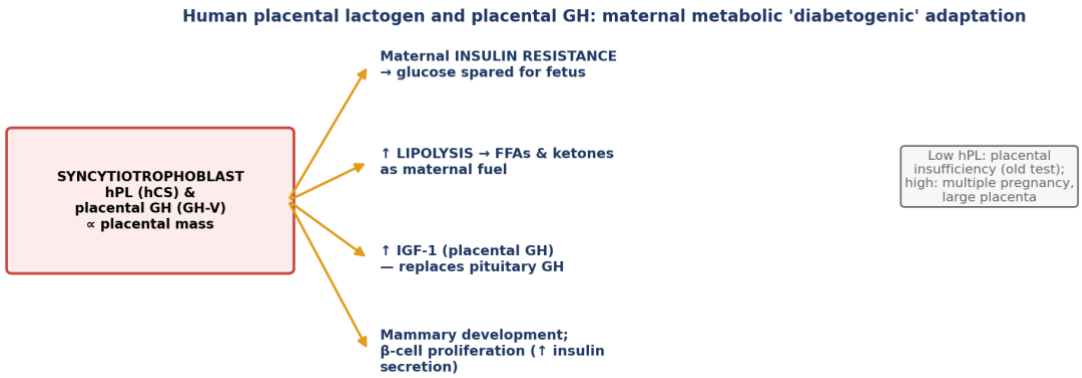


Figure 182.3 — Metabolic actions of hPL and placental GH

hPL (human chorionic somatomammotropin, 191 aa; structurally similar to GH and prolactin) rises in proportion to placental mass to reach the highest secretion rate of any human hormone (≈ 1 g/day at term). **Placental GH (GH-V)** progressively replaces pituitary GH in the second half of pregnancy, raising maternal **IGF-1**. Together with progesterone, cortisol and prolactin they produce the **insulin resistance** that diverts glucose to the fetus (Lecture 180).

182.4 Placental steroids

Steroid	Synthesis	Notes
Progesterone	From maternal LDL-cholesterol (no fetal precursors needed); ≈ 250–350 mg/day at term	Takes over from CL at 7–9 weeks; continues after fetal death
Oestrogens	Placenta lacks 17α-hydroxylase → needs fetal adrenal DHEAS (oestradiol, oestrone) and fetal liver 16-OH-DHEAS (oestriol); placental sulphatase + aromatase	Oestriol ≈ 90% — index of fetoplacental function; ↓ uE3 in trisomy 21, fetal death, anencephaly, sulphatase deficiency

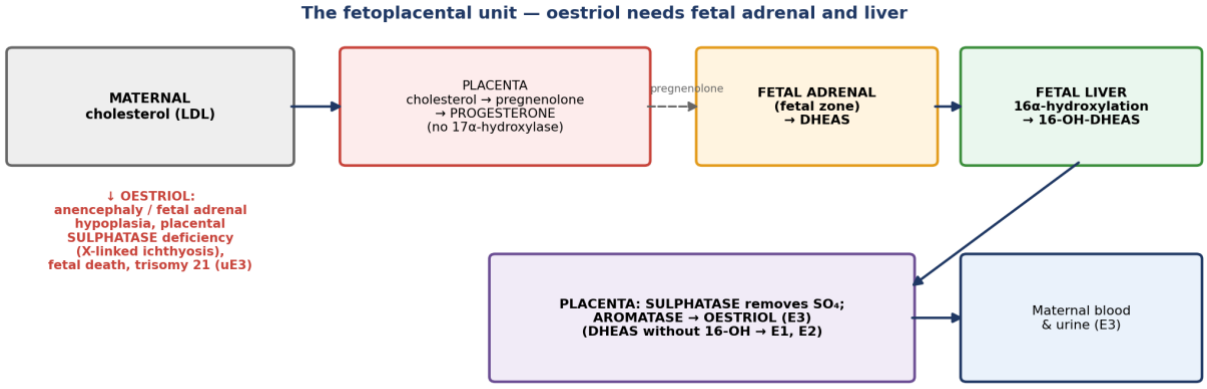


Figure 182.4 — The fetoplacental unit

182.5 Other placental products

Product	Role / clinical use
CRH	Exponential rise; 'placental clock' of parturition; stimulated by cortisol (Lecture 185)
PlGF / sFlt-1	Angiogenic balance; ↓ PlGF, ↑ sFlt-1 in pre-eclampsia — PlGF-based testing (NICE DG49)
PAPP-A	IGFBP-4 protease (↑ IGF bioavailability); low PAPP-A → trisomy 21/18, FGR, pre-eclampsia, stillbirth (combined test)
Inhibin A / activin A	↑ inhibin A in trisomy 21 (quadruple test); both ↑ in pre-eclampsia
Leptin, kisspeptin	Maternal metabolism; kisspeptin very high — trophoblast invasion; low in FGR/miscarriage
Relaxin, prolactin (decidua)	Decidual prolactin — amniotic fluid volume regulation; relaxin mainly from CL
11β-HSD2 (enzyme)	Inactivates maternal cortisol — fetal protection; ↓ in FGR

182.6 Must-know summary

■ **EXAM TIP**

- hCG: **α shared** with LH/FSH/TSH; β-specific; long half-life; rescues CL; TSH-like; fetal Leydig stimulation.
- hPL/placental GH: **insulin resistance, lipolysis, ↑ IGF-1**; ∝ placental mass.
- Placental progesterone from **maternal cholesterol**; oestriol needs **fetal adrenal + liver**.
- Screening: T21 → **↑ hCG, ↑ inhibin A, ↓ PAPP-A, ↓ uE3, ↓ AFP**.
- Pre-eclampsia: **↓ PlGF, ↑ sFlt-1**.

■ **MNEMONIC / MEMORY AID**

Placental hormones — 'CHOP PLaC': CRH, hCG, Oestrogens, Progesterone, PAPP-A, Lactogen (hPL), and Cytokines/angiogenic factors.