PIPADOR REVISION

MRCOG Part 1 Revision Notes

Adrenal Cortex

ENDOCRINOLOGY • LECTURE 176

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG PART 1 REVISION NOTES | ENDOCRINOLOGY

176 Adrenal Cortex

Aldosterone, cortisol and adrenal androgens — physiology, pregnancy changes and disorders

Glomerulosa	Fasciculata	Reticularis	≈ 08:00
ALDOSTERONE (Ang II, K^+)	CORTISOL (ACTH)	ANDROGENS (DHEA/DHEAS)	Cortisol peak (circadian)

■ KEY FACTS: Learning objectives

- Describe the zones of the adrenal cortex, their hormones and regulation.
- Describe the actions of cortisol, aldosterone and adrenal androgens.
- Describe adrenal function in pregnancy and the fetus.
- Describe Cushing's syndrome, Addison's disease, hyperaldosteronism and CAH in obstetric practice, including steroid cover.

176.1 Structure and synthesis

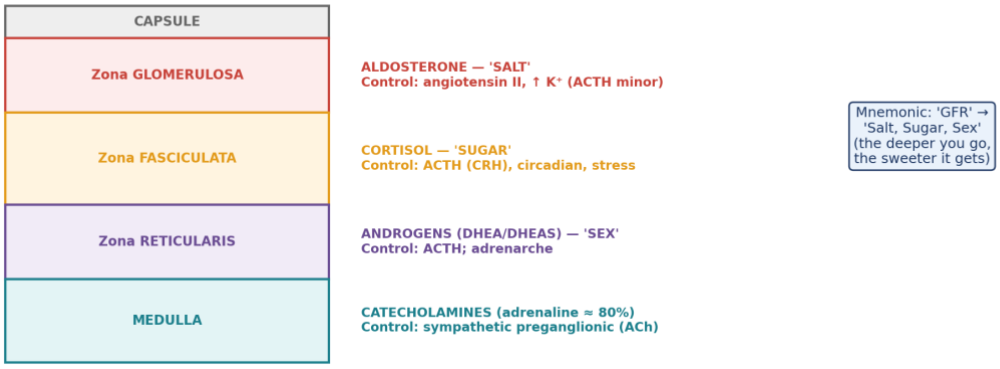


Figure 176.1 — Zones of the adrenal gland

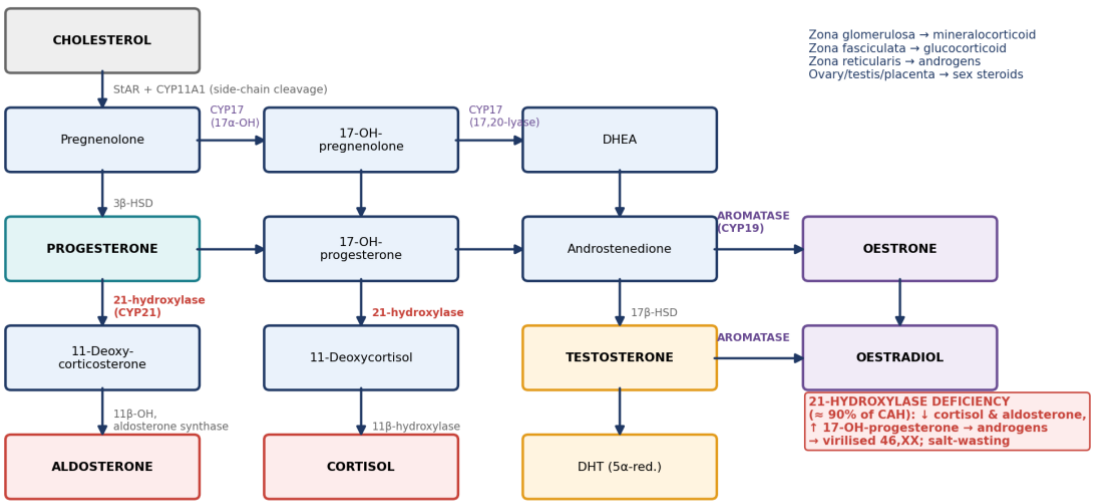


Figure 176.2 — Adrenal steroid synthesis

176.2 Cortisol

Stress, circadian clock (peak ≈ 08:00), hypoglycaemia ▶ Hypothalamic **CRH** (+ ADH) ▶ Pituitary **ACTH** (POMC) ▶ Zona fasciculata **cortisol** (≈ 90% bound to **CBG**/albumin) ▶ Negative feedback on CRH and ACTH

System	Actions of cortisol
Metabolic	↑ Gluconeogenesis, glycogen storage, insulin resistance → hyperglycaemia; protein catabolism; lipolysis with central fat redistribution
Cardiovascular	Permissive for catecholamine vasoconstriction (vascular tone); maintains BP — deficiency → refractory hypotension
Immune	Anti-inflammatory/immunosuppressive (↓ cytokines, eosinophils, lymphocytes; ↑ neutrophils)
Other	Bone resorption, ↓ collagen (striae, poor healing), mood; fetal lung maturation (surfactant), PNMT induction in medulla
Kidney	Mineralocorticoid effect at high doses — protected by 11β-HSD2 (cortisol → cortisone); liquorice inhibits

176.3 Aldosterone

Secreted by the zona glomerulosa in response to **angiotensin II** (Lecture 178) and **↑ plasma K^+** (ACTH has a minor, transient effect). Acts on the **mineralocorticoid receptor** in the collecting duct → **ENaC** and Na^+/K^+-ATPase → Na^+/water retention, **K^+ and H^+ excretion**. In pregnancy aldosterone rises ≈ 5–10-fold but **progesterone** competes at the receptor (natriuretic), so K^+ is retained.

176.4 Adrenal androgens

DHEA and DHEAS from the zona reticularis (ACTH-driven) — rise at **adrenarche** (≈ 6–8 yr), peak in the 20s, then decline ('adrenopause'). In women they contribute ≈ 25% of testosterone (via peripheral conversion). The **fetal zone** produces large amounts of DHEAS for placental oestrogen synthesis (Lecture 187).

176.5 The adrenal cortex in pregnancy

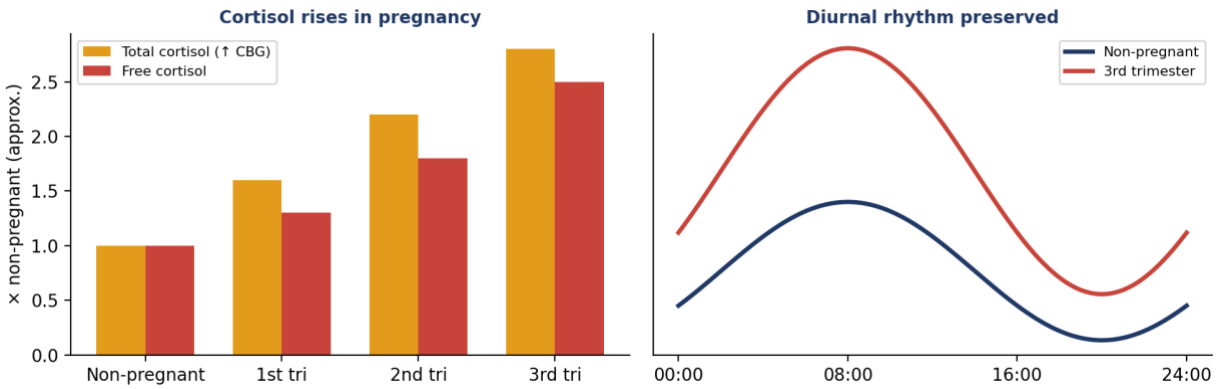


Figure 176.3 — Cortisol in pregnancy

- **CBG ↑** (oestrogen) → total cortisol ↑ ≈ 2–3-fold; **free cortisol also ↑** (placental CRH, ↓ cortisol clearance); diurnal rhythm preserved — overlaps with Cushing's biochemistry.
- **Placental 11β-HSD2** inactivates maternal cortisol (protects fetus; betamethasone/dexamethasone are resistant — used for fetal lung maturation).
- **Aldosterone, renin and angiotensinogen ↑** (Lecture 178); DHEAS falls (↑ clearance to placental oestrogen).

176.6 Disorders in obstetric practice

Disorder	Key points
Addison's disease (primary adrenal insufficiency)	Autoimmune; fatigue, hyperpigmentation (↑ ACTH/MSH), hypotension, ↓ Na^+/↑ K^+; may be unmasked by hyperemesis or postpartum. Continue hydrocortisone + fludrocortisone; ↑ hydrocortisone in 3rd trimester; IV hydrocortisone cover for labour/CS
Adrenal crisis	Shock, hypoglycaemia, vomiting → hydrocortisone 100 mg IV/IM then infusion, IV fluids
Long-term glucocorticoids (≥ 5 mg prednisolone > 3–4 weeks)	HPA suppression → steroid cover in labour/surgery (e.g. hydrocortisone 50–100 mg IV at onset/6-hourly); sick-day rules
Cushing's syndrome	Rare in pregnancy (anovulation); adrenal adenoma relatively commoner than in non-pregnant; ↑ pre-eclampsia, GDM, preterm birth, fetal loss; distinguish from physiological striae/hypercortisolism (urinary free cortisol > 3× ULN, loss of diurnal rhythm)
Primary hyperaldosteronism	Hypertension + hypokalaemia; progesterone may ameliorate; spironolactone avoided (anti-androgenic → feminises male fetus) — use amiloride/standard antihypertensives
Congenital adrenal hyperplasia	21-hydroxylase deficiency (Lecture 164): maternal CAH — continue glucocorticoids (hydrocortisone/prednisolone, not dexamethasone); fetal CAH risk — prenatal counselling, cfDNA sexing; neonatal salt-wasting screening

176.7 Must-know summary

■ **EXAM TIP**

- Zones: **Glomerulosa → aldosterone (Ang II, K^+); Fasciculata → cortisol (ACTH); Reticularis → androgens**.
- Cortisol: gluconeogenesis, insulin resistance, anti-inflammatory, fetal lung maturation; **11β-HSD2** protects kidney and fetus.
- Pregnancy: ↑ CBG, **↑ total and free cortisol**, rhythm preserved; ↑ aldosterone/renin.
- Adrenal insufficiency/long-term steroids → **parenteral hydrocortisone cover** in labour and CS.
- Spironolactone avoided in pregnancy (anti-androgen).

■ **MNEMONIC / MEMORY AID**

'GFR — Salt, Sugar, Sex' (outer → inner). **Addison's — 'low Na, high K, low BP, dark skin'**.