

ADRENAL DISORDERS

FEATURES	ADDISON DISEASE (Primary Adrenal Insufficiency)	CONN SYNDROME (Primary Hyperaldosteronism)
Cause	Autoimmune destruction / TB / Adrenalitis → ↓ Cortisol & ↓ Aldosterone	Aldosterone secreting adenoma / Hyperplasia
Aldosterone	↓ Low	↑ High
Cortisol	↓ Low	Normal or ↑
Renin	↑ High	↓ Low (due to negative feedback)
Blood Pressure	↓ Low / Normal	↑ High (Hypertension)
Sodium (Na ⁺)	↓ Low (<135 mEq/L)	↑ High (>145 mEq/L) (usually mild)
Potassium (K ⁺)	↑ High (>5.5 mEq/L)	↓ Low (<3.5 mEq/L)
Acid-Base	Metabolic acidosis	Metabolic alkalosis
Clinical Features	- Hyperpigmentation (↑ ACTH) - Weakness, fatigue, weight loss - Nausea, vomiting, abdominal pain - Salt craving, postural hypotension	- Hypertension - Headache - Muscle weakness, cramps - No pedal edema
Key Point	Hyperpigmentation + Low Na ⁺ + High K ⁺ = Think ADDISON	Hypertension + Low K ⁺ + Low Renin = Think CONN

RENAL TUBULAR DISORDERS (Hypokalemic Metabolic Alkalosis)

FEATURES	BARTTER SYNDROME	GITELMAN SYNDROME	LIDDLE SYNDROME
Inheritance	Autosomal recessive	Autosomal recessive	Autosomal dominant
Defect (Site)	Defect in Na ⁺ -K ⁺ -2Cl ⁻ co-transporter (NKCC2) in Thick ascending limb	Defect in Na ⁺ -Cl ⁻ co-transporter (NCC) in Distal convoluted tubule	Gain of function mutation in ENaC (Epithelial Na ⁺ channel) in Collecting duct
Blood Pressure	Normal or Low	Normal or Low	High (Hypertension)
Renin	↑ High	↑ High	↓ Low
Aldosterone	↑ High	↑ High	↓ Low
Potassium (K ⁺)	↓ Low	↓ Low	↓ Low
Acid-Base	Metabolic alkalosis	Metabolic alkalosis	Metabolic alkalosis
Urinary Calcium	↑ Increased (Hypercalciuria)	↓ Decreased (Hypocalciuria)	Normal or ↓
Serum Magnesium	Normal	↓ Low (Hypomagnesemia)	Normal
Other Findings	- Polyuria, polydipsia - Growth retardation - Nephrocalcinosis	- Muscle cramps, fatigue - Paresthesia - Chondrocalcinosis	- Early onset hypertension - Family history
Key Point	Normal/Low BP + ↑ Urine Ca ²⁺ = Think BARTTER	Normal/Low BP + ↓ Urine Ca ²⁺ + ↓ Mg ²⁺ = Think GITELMAN	Hypertension + ↓ Renin + ↓ Aldosterone = Think LIDDLE

QUICK DIFFERENTIATION

- FIRST LOOK AT BLOOD PRESSURE**
 - High BP → Think Liddle or Conn
 - Normal/Low BP → Think Bartter or Gitelman
- IF HIGH BP**
 - ↑ Aldosterone → Conn syndrome
 - ↓ Aldosterone → Liddle syndrome
- IF NORMAL/LOW BP**
 - ↑ Urine calcium → Bartter syndrome
 - ↓ Urine calcium + ↓ Magnesium → Gitelman syndrome

NORMAL RANGES

Sodium (Na ⁺)	135 – 145 mEq/L
Potassium (K ⁺)	3.5 – 5.5 mEq/L
Chloride (Cl ⁻)	98 – 106 mEq/L
Bicarbonate (HCO ₃ ⁻)	22 – 28 mEq/L
Magnesium (Mg ²⁺)	1.7 – 2.2 mg/dL

Urine Calcium (Ca²⁺)

Usually not given as a number in exams.

They will mention as:

- Increased (Hypercalciuria)
- Decreased (Hypocalciuria)

HIGH-YIELD PEARLS

- Addison** → Hyperpigmentation, Low BP, Low Na⁺, High K⁺, Metabolic acidosis
- Conn** → Hypertension, Low K⁺, Metabolic alkalosis, Low Renin, High Aldosterone
- Bartter** → Hypercalciuria
- Gitelman** → Hypocalciuria + Hypomagnesemia
- Liddle** → Hypertension, Low Renin, Low Aldosterone
- All (Bartter, Gitelman, Liddle, Conn)** → Hypokalemic metabolic alkalosis (except Addison)

★ REMEMBER: BP → Aldosterone → Urine Ca²⁺ → Magnesium = **DIAGNOSIS**