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Unit-IV/Part-C

Corticosteroids

Presented By;-

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Specialization:- Pharmaceutical Chemistry

Corticosteroids

- ▶ Corticosteroids are steroid hormones produced by the adrenal cortex or their synthetic analogs.
- ▶ They are derived from cholesterol and play essential roles in regulating metabolism, inflammation, immune response, and electrolyte balance.

Classification of Corticosteroid

1. Glucocorticoids

Mainly affect **metabolism, inflammation, and immune response**.

Examples:

- ▶ **Natural:** Cortisol (Hydrocortisone), Cortisone.
- ▶ **Synthetic:** Prednisone, Prednisolone, Methylprednisolone, Dexamethasone, Betamethasone, Triamcinolone.

2. Mineralocorticoids

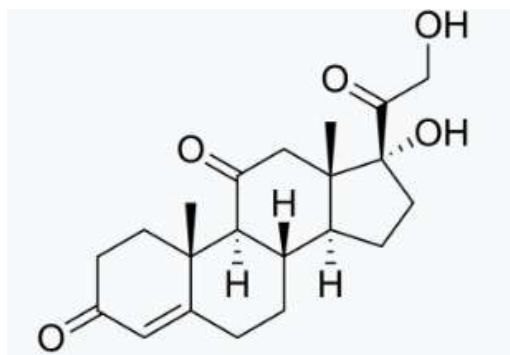
Mainly regulate **electrolyte and water balance** by acting on renal tubules.

Examples:

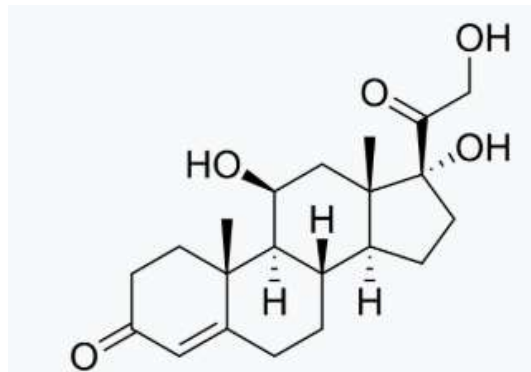
- ▶ **Natural:** Aldosterone.
- ▶ **Synthetic:** Fludrocortisone, Deoxycorticosterone acetate (DOCA).

Table with Mechanism of Action (MOA) and Uses of [Corticosteroids](#)

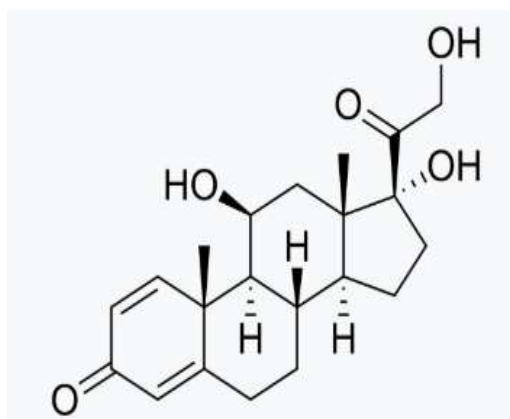
Drug	Mechanism of Action (MOA)	Uses (Working)
Cortisone	Prodrug converted to hydrocortisone in the liver → binds intracellular glucocorticoid receptors → alters gene transcription → inhibits inflammatory mediators (prostaglandins, cytokines).	- Replacement therapy in adrenal insufficiency (Addison's disease) - Anti-inflammatory in arthritis and skin disorders.
Hydrocortisone	Natural glucocorticoid (cortisol) → inhibits phospholipase A2 → ↓ prostaglandins and leukotrienes → reduces inflammation and immune response.	- Acute adrenal insufficiency (Addisonian crisis) - Allergic reactions, asthma, and dermatitis.
Prednisolone	Synthetic glucocorticoid; binds glucocorticoid receptors → suppresses immune cell activity and inflammatory mediator release.	- Autoimmune diseases (RA, lupus) - Asthma, allergies, and inflammatory bowel disease (IBD).
Betamethasone	Potent long-acting glucocorticoid; suppresses cytokine and inflammatory mediator production.	- Severe allergic and inflammatory conditions - Fetal lung maturation in preterm labor (IM injection).
Dexamethasone	Long-acting glucocorticoid; inhibits inflammatory gene transcription and reduces capillary permeability.	- Cerebral edema (reduces brain swelling) - Severe allergies, shock, and chemotherapy-induced nausea (with antiemetics).



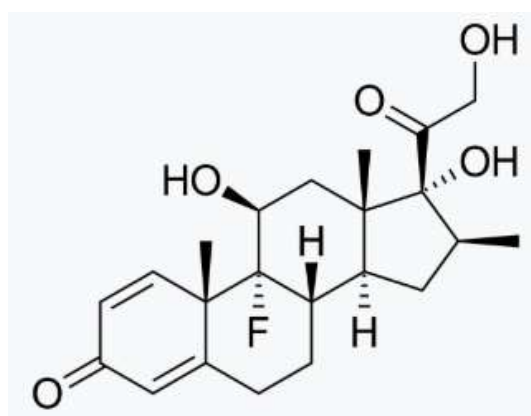
Cortisone



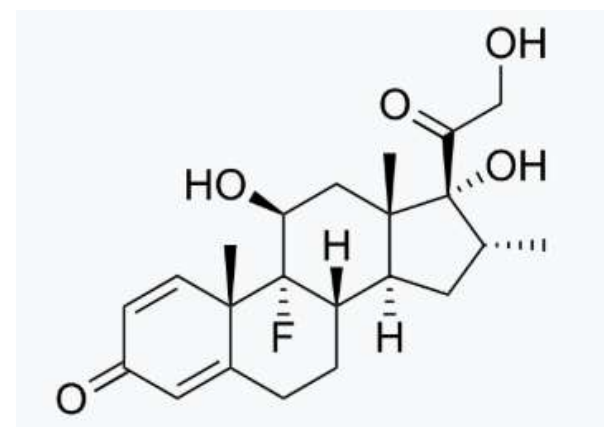
Hydrocortisone



Prednisolone



Betamethasone



Dexamethasone

Unit-IV/Part-C

Thyroid & Anti-thyroid Drugs

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Specialization:- Pharmaceutical Chemistry

Thyroid & Anti-thyroid Drugs

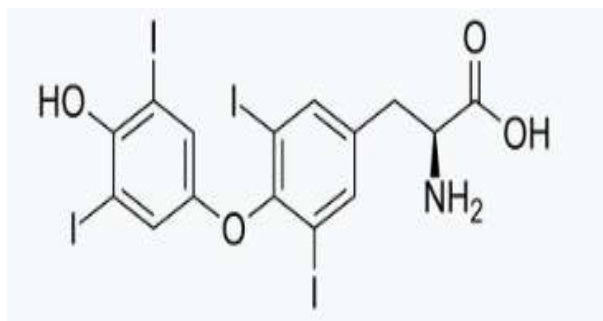
Thyroid Drugs

- **Definition:** Thyroid drugs are medications that **supplement or replace thyroid hormones** in the body. They are primarily used in **hypothyroidism (underactive thyroid)** to restore normal metabolic activity. **Examples:** **Levothyroxine (T4)** – synthetic thyroxine, **Liothyronine (T3)** – synthetic triiodothyronine.

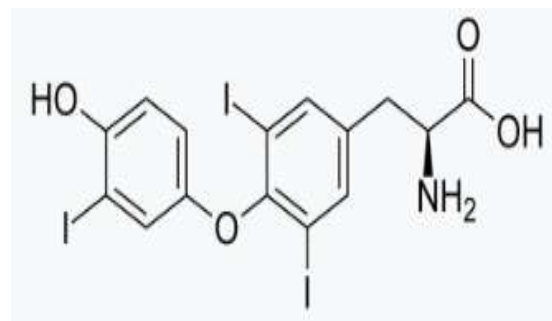
Anti-thyroid Drugs

- **Definition:** Anti-thyroid drugs are agents that **suppress the synthesis, release, or effects of thyroid hormones**, used to manage **hyperthyroidism (overactive thyroid)**. **Example:** **Propylthiouracil (PTU)**, **Methimazole**, **Carbimazole** (prodrug of methimazole).

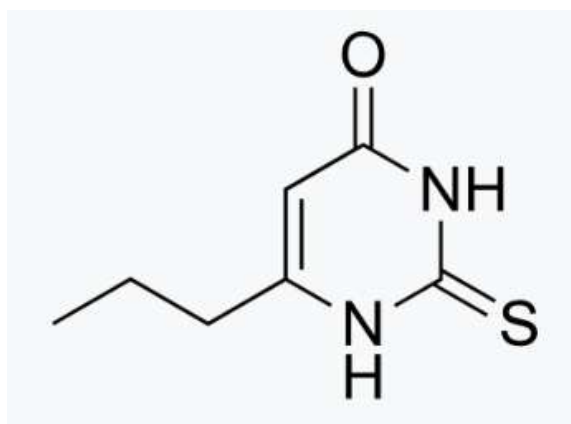
Drug	Mechanism of Action (MOA)	Uses (Working)
L-Thyroxine (Levothyroxine, T4)	Synthetic T4; converted to active T3 in peripheral tissues → binds thyroid hormone receptors → regulates gene transcription and increases basal metabolic rate.	- Replacement therapy for hypothyroidism (e.g., Hashimoto's disease). - Treatment of myxedema coma. - TSH suppression therapy in thyroid cancer.
L-Thyronine (Liothyronine, T3)	Synthetic T3; directly binds nuclear thyroid receptors → faster onset and higher potency than T4.	- Severe hypothyroidism or myxedema coma (emergency). - When rapid action is needed due to shorter half-life.
Propylthiouracil (PTU)	Inhibits thyroid peroxidase (blocks iodination and coupling of tyrosine residues) → prevents T3/T4 synthesis. Also inhibits peripheral conversion of T4 to T3.	- Hyperthyroidism (Graves' disease). - Thyroid storm (preferred due to T4→T3 inhibition). - Preoperative preparation for thyroidectomy.
Methimazole	Inhibits thyroid peroxidase, blocking iodination and coupling reactions → prevents thyroid hormone synthesis.	- Hyperthyroidism (Graves' disease). - Long-term management of hyperthyroidism. - Preoperative preparation for thyroidectomy.



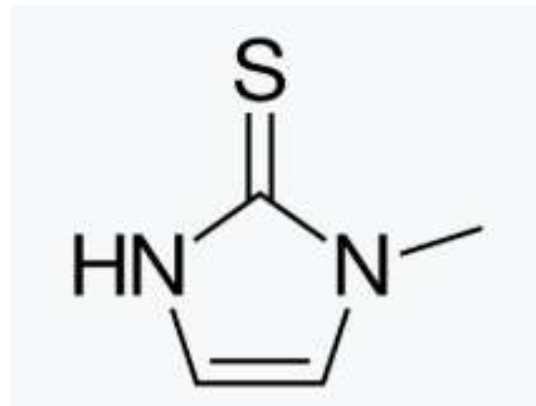
Levothyroxine



Liothyronine



Propylthiouracil



Methimazole



THANK YOU

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