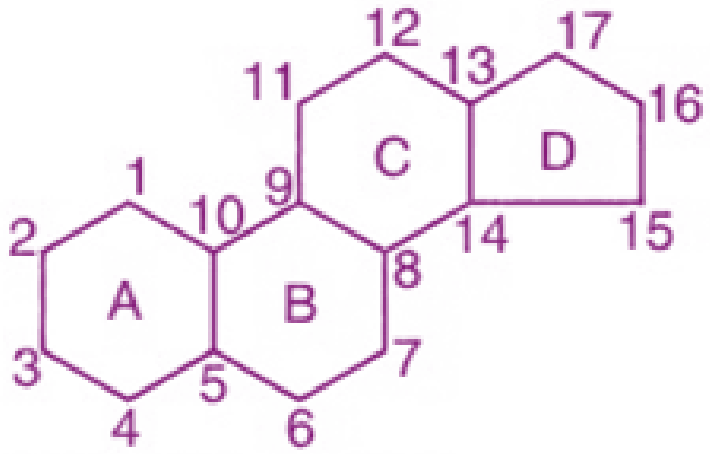
Drugs Acting on Endocrine System

Nomenclature of Steroid Drugs

Steroid Structure Basics:

Core Structure:

- Steroids share a common tetracyclic structure composed of three cyclohexane rings (A, B, C) and one cyclopentane ring (D), known as the **steroid nucleus**.



Functional Groups:

- Variations in functional groups attached to the core structure differentiate steroid types.

Naming Conventions:

Prefixes and Suffixes:

- **-olone:** Indicates a ketone group (e.g., **Testosterone**).
- **-ate:** Ester forms used in prodrugs (e.g., **Prednisone**).
- **-olone vs. -ol: -ol** denotes alcohol groups (e.g., **Etonogestrel**).

Classification-Based Names:

- **Glucocorticoids:** e.g., **Hydrocortisone**
- **Mineralocorticoids:** e.g., **Fludrocortisone**
- **Androgens:** e.g., **Dihydrotestosterone**
- **Estrogens:** e.g., **Estradiol**
- **Progestogens:** e.g., **Progesterone**

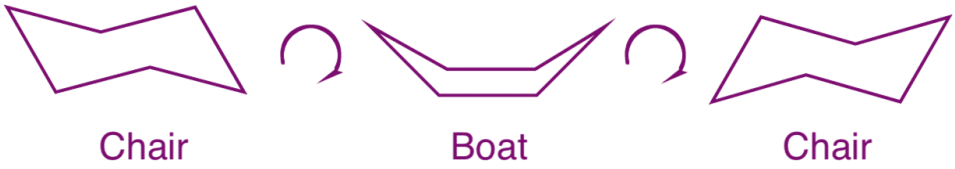
Examples:

- **Corticosteroids:** Prednisone, Dexamethasone
- **Anabolic Steroids:** Nandrolone, Oxandrolone

Stereochemistry of Steroid Drugs

Importance of Stereochemistry:

- **3D Orientation:** The spatial arrangement of atoms affects receptor binding and biological activity.
- **Chirality Centers:** Steroids contain multiple chiral centers, leading to various isomers with distinct effects.



Key Stereochemical Features:

Alpha (α) and Beta (β) Configurations:

- Define the orientation of functional groups relative to the steroid nucleus.

Double Bonds and Rings:

- **Δ4, Δ5, Δ9, etc.:** Indicate the position of double bonds, influencing drug activity and metabolism.

Substituent Positions:

- **C17α vs. C17β:** Placement of hydroxyl or other groups at carbon 17 affects potency and receptor affinity.

Examples:

- **Dexamethasone vs. Betamethasone:** Minor stereochemical differences lead to variations in glucocorticoid potency.
- **Testosterone vs. Dihydrotestosterone (DHT):** DHT has a different stereochemistry, making it a more potent androgen.

Metabolism of Steroid Drugs

Primary Sites of Metabolism:

- **Liver:** Main organ responsible for steroid metabolism through enzymatic processes.
- **Gut and Kidneys:** Participate in conjugation and excretion.

Key Metabolic Pathways:

1. Hydroxylation:

- Addition of hydroxyl groups by **Cytochrome P450** enzymes.
- Increases water solubility for excretion.

2. **Oxidation and Reduction:**
   - Modifies functional groups, altering activity and facilitating elimination.
3. **Conjugation:**
   - **Glucuronidation:** Addition of glucuronic acid.
   - **Sulfation:** Addition of sulfate groups.
   - Enhances solubility and reduces toxicity.
4. **De-esterification:**
   - Ester forms (prodrugs) are converted to active drugs (e.g., **Prednisone** to **Prednisolone**).

Factors Affecting Metabolism:

- **Enzyme Variability:** Genetic differences can influence enzyme activity, affecting drug levels.
- **Interactions:** Other drugs can inhibit or induce metabolic enzymes, altering steroid efficacy and safety.
- **Route of Administration:** Oral steroids undergo first-pass metabolism, reducing bioavailability compared to intravenous forms.

Examples:

- **Prednisone:** Metabolized to Prednisolone in the liver.
- **Testosterone:** Converted to DHT or Estrogen via specific enzymes like 5α-reductase and aromatase.

Brand Names Of Important Marketed Products

Drugs affecting **hormonal systems**.

Hormone/Agent	Brand Name(s)	Use
Insulin (Regular)	**Humulin R, Actrapid**	Type 1 and 2 diabetes
Insulin Glargine	**Lantus, Basalog**	Long-acting insulin
Metformin (Biguanide)	**Glyciphage, Glucophage**	Type 2 diabetes
Levothyroxine	**Eltroxin, Thyronorm**	Hypothyroidism
Carbimazole	**Neomercazole, Antithyrox**	Hyperthyroidism
Prednisolone	**Omnacortil, Predmet**	Corticosteroid replacement
Hydrocortisone	**Cortef, Hydrocart**	Adrenal insufficiency
Oral Contraceptives	**Ovral, Loette**	Contraception
Estrogen + Progesterone	**Premarin, Progynova**	HRT

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