

# WELCOME TO



This is an Education Platform

We Provide PDF Notes for Pharmacy Students

Web Site <http://www.fdspharmacy.in/>

You tube <https://www.youtube.com/c/FDSpharmacy>

Telegram <https://t.me/Fdspharmacy>

App <https://play.google.com/store/apps/details?id=com.FDSPharmacyMedia.FDSPharmacy>

E-mail [fdspharmacyinfo@gmail.com](mailto:fdspharmacyinfo@gmail.com)

## Bachelor of Pharmacy Industrial Pharmacy I

### NOTES

- ✓ Unit 1
  - ✓ Unit 2
  - ✓ Unit 3
  - ✓ Unit 4
  - ✓ Unit 5
- All Unit  
in  
One PDF**

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## Bachelor of Pharmacy Medicinal Chemistry II

### NOTES

- ✓ Unit 1
  - ✓ Unit 2
  - ✓ Unit 3
  - ✓ Unit 4
  - ✓ Unit 5
- All Unit  
in  
One PDF**

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## Bachelor of Pharmacy Pharmacognosy and Phytochemistry II

### NOTES

- ✓ Unit 1
  - ✓ Unit 2
  - ✓ Unit 3
  - ✓ Unit 4
  - ✓ Unit 5
- All Unit  
in  
One PDF**

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## Bachelor of Pharmacy Pharmaceutical Jurisprudence

### NOTES

- ✓ Unit 1
  - ✓ Unit 2
  - ✓ Unit 3
  - ✓ Unit 4
  - ✓ Unit 5
- All Unit  
in  
One PDF**

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)



## Bachelor of Pharmacy Pharmacology II

### NOTES

- ✓ Unit 1
  - ✓ Unit 2
  - ✓ Unit 3
  - ✓ Unit 4
  - ✓ Unit 5
- All Unit  
in  
One PDF**

Visit our Website  
[WWW.fdspharmacy.in](http://WWW.fdspharmacy.in)





## D.Pharma B.Pharma

- 👉 PDF Notes
- 👉 Practical Manual
- 👉 Important Questions
- 👉 Assignment etc

 **Download Now**



# [www.fdpharmacy.in](http://www.fdpharmacy.in)

# MEDICINAL CHEMISTRY - II

## UNIT 5

TOPIC :

- **Anti diabetic agents:**  
Insulin and its preparations



# Antidiabetic Agents

- **Diabetes mellitus (DM)** is a chronic metabolic disorder characterized by **hyperglycemia** due to **defective insulin secretion, insulin action, or both**.
- Persistent hyperglycemia leads to **microvascular and macrovascular complications**.
- **Antidiabetic agents** are drugs used to **control blood glucose levels**.

## Classified as:

- ✚ **Insulin and insulin analogs**
- ✚ **Oral hypoglycemic agents (for Type 2 DM)**
- ✚ **Adjunctive agents**



# Insulin and Its Preparations

- Insulin is a peptide hormone produced by the  $\beta$ -cells of the islets of Langerhans in the pancreas.
- It regulates glucose, protein, and lipid metabolism by promoting uptake of glucose into cells, glycogen formation, and inhibition of gluconeogenesis.
- Used therapeutically in diabetes mellitus, particularly Type 1 diabetes and sometimes in Type 2 diabetes when oral hypoglycemic agents fail.

## Structure of Insulin

- Composed of two polypeptide chains (A & B) linked by disulfide bonds.
- A chain: 21 amino acids
- B chain: 30 amino acids
- Proinsulin: Precursor  $\rightarrow$  cleaved to active insulin + C-peptide

## Mechanism of Action

1. Insulin binds to insulin receptors (tyrosine kinase receptor) on target cells.
2. Activates intracellular signaling  $\rightarrow$  GLUT-4 translocation to cell membrane  $\rightarrow$  glucose uptake.
3. Metabolic effects:
  - Carbohydrates:  $\uparrow$  glycogenesis,  $\downarrow$  gluconeogenesis,  $\downarrow$  glycogenolysis
  - Lipids:  $\uparrow$  lipogenesis,  $\downarrow$  lipolysis,  $\downarrow$  ketogenesis
  - Proteins:  $\uparrow$  amino acid uptake and protein synthesis,  $\downarrow$  proteolysis

## Types of Insulin Preparations

Insulin preparations differ in onset, peak, and duration, allowing basal and bolus coverage.

| Type                           | Onset     | Peak      | Duration  | Examples                            | Clinical Use                        |
|--------------------------------|-----------|-----------|-----------|-------------------------------------|-------------------------------------|
| Rapid-acting                   | 10–30 min | 30–90 min | 3–5 hrs   | Lispro, Aspart, Glulisine           | Postprandial glucose control        |
| Short-acting (Regular insulin) | 30–60 min | 2–4 hrs   | 6–8 hrs   | Humulin R, Novolin R                | Meal coverage, DKA, IV infusion     |
| Intermediate-acting            | 1–2 hrs   | 4–12 hrs  | 18–24 hrs | NPH, Lente                          | Basal insulin, twice-daily dosing   |
| Long-acting                    | 1–2 hrs   | Minimal   | ~24 hrs   | Glargine, Detemir, Degludec         | Basal insulin, once daily           |
| Premixed                       | Varies    | Varies    | 12–24 hrs | 70/30 NPH/Regular, 75/25 Lispro Mix | Convenience, basal + bolus coverage |

## Routes of Administration

- Subcutaneous (SC): Most common
- Intravenous (IV): Regular insulin in emergencies (DKA, hyperosmolar states)
- Intramuscular (IM): Rarely used
- Inhalational insulin: Rapid-acting forms for prandial use

## Clinical Uses

1. Type 1 Diabetes Mellitus: Lifelong insulin therapy
2. Type 2 Diabetes Mellitus: When oral agents are insufficient
3. Diabetic Ketoacidosis (DKA) and Hyperosmolar Hyperglycemic State (HHS)
4. Hyperkalemia: IV insulin with glucose shifts potassium into cells
5. Gestational Diabetes: When diet and exercise fail

## Adverse Effects

- Hypoglycemia: Most common, can cause tremors, sweating, confusion, coma
- Allergic reactions: Local (rash, lipodystrophy) or systemic (rare)
- Weight gain: Due to increased anabolic effects
- Lipodystrophy: At injection site if repeated injections at same site
- Edema: Rare with high doses

## Storage and Handling

- Store unopened vials at 2–8°C (refrigerator)
- Do not freeze
- Once opened, can be stored at room temperature ( $\leq 30^{\circ}\text{C}$ ) for 28 days
- Protect from direct sunlight and heat