



SNS COLLEGE OF ALLIED HEALTH SCIENCES

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai



**DEPARTMENT : OPERATION THEATRE AND ANAESTHESIA
TECHNOLOGY**

COURSE NAME : PHARMACOLOGY

UNIT : INSULIN

**TOPICS : DEFINITION, TYPES, MECHANISM OF ACTION,
PHARMACODYNAMICS, PHARMACOKINETICS,
INDICATIONS, CONTRAINDICATIONS, ADMINISTRATION,
SIDE EFFECTS**



INSULIN



- Insulin is a naturally occurring hormone made by your pancreas that helps your body use sugar for energy. If your pancreas doesn't work as it should, it may not make or release the insulin you need to control your blood sugars, resulting in diabetes.
- Diabetes is a condition in which your body doesn't make enough insulin or your body doesn't use insulin correctly.



TYPES OF INSULIN



Rapid-Acting Insulin:

- Onset: 15 minutes
- Peak: 1-2 hours
- Duration: 3-5 hours

Short-Acting Insulin:

- Onset: 30 minutes - 1 hour
- Peak: 2-4 hours
- Duration: 5-8 hours



Intermediate-Acting Insulin:

- Onset: 1-2 hours
- Peak: 4-12 hours
- Duration: 12-18 hours

Long-Acting Insulin:

- Onset: 1-2 hours
- Peak: Minimal peak effect
- Duration: Up to 24 hours or longer



MECHANISM OF ACTION



- After a meal, blood glucose levels rise, triggering the release of insulin from the pancreas.
- Insulin binds to insulin receptors on cell membranes, activating a signaling cascade that promotes glucose uptake by cells.



PHARMACODYNAMICS



- Insulin binds to its receptors on target cells (muscle, fat, liver), initiating a series of intracellular events.
- Activation of glucose transporter proteins (GLUTs), particularly GLUT-4, which translocate to the cell membrane, facilitating glucose entry into cells.
- Enhances glucose utilization, promotes glycogen synthesis in the liver and muscles, and inhibits gluconeogenesis (production of glucose) in the liver.



PHARMACOKINETICS



Absorption:

- Administered subcutaneously, absorption rates vary based on the type of insulin (rapid-acting, short-acting, intermediate-acting, long-acting).
- Factors like injection site, tissue perfusion, and physical activity influence absorption rates.



Distribution and Metabolism:

- Insulin is distributed throughout the body via the bloodstream and acts on various tissues with insulin receptors.
- Metabolized primarily in the liver and kidneys.

Excretion:

- Insulin is broken down in the body, and its metabolites are excreted via the kidneys.



INDICATIONS



Type 1 Diabetes Mellitus:

- Essential therapy as the pancreas produces little to no insulin.

Type 2 Diabetes Mellitus:

- Sometimes prescribed when oral medications fail to adequately control blood sugar levels.



CONTRAINDICATIONS



- Hypoglycemia (low blood sugar) or allergy to any components of insulin formulations.
- Caution in conditions like hypokalemia or during episodes of severe illness or stress.



ADMINISTRATION



Administered via injection (subcutaneous, intramuscular, or intravenous) using

- Syringes,
- Pens,
- Pumps
- Patches.



SIDE EFFECTS



- Hypoglycemia (Low Blood Sugar)
- Hypokalemia (Low Potassium Levels)
- Injection Site Reactions
- Weight Gain
- Allergic Reactions
- Lipodystrophy
- Fluid Retention
- Hypersensitivity Reactions



TECHNICIAN ROLE



- Regular blood glucose monitoring to adjust insulin doses and prevent hypoglycemia or hyperglycemia.



ASSESSMENT



- How do you Administer Insulin ?
- What is the all are the Types of Insulin ?