

Diabetes Mellitus (DM)

Introduction to basic Points

Classification | KD Tripathi

TYPE- I Diabetes Mellitus
 Insulin Dependent
 Juvenile onset D. Mellitus

TYPE- II Diabetes Mellitus
 Non Insulin Dependent
 Maturity onset Juvenile DM

As name indicate “Insulin Dependent” that means body is dependent on Insulin from outside source, because body’s Insulin production center (beta cell in Pancreases) is destroyed due to any reason. And if there is no Functional beta cell available so how Insulin will be made, that’s why we take Insulin to manage deficiency.

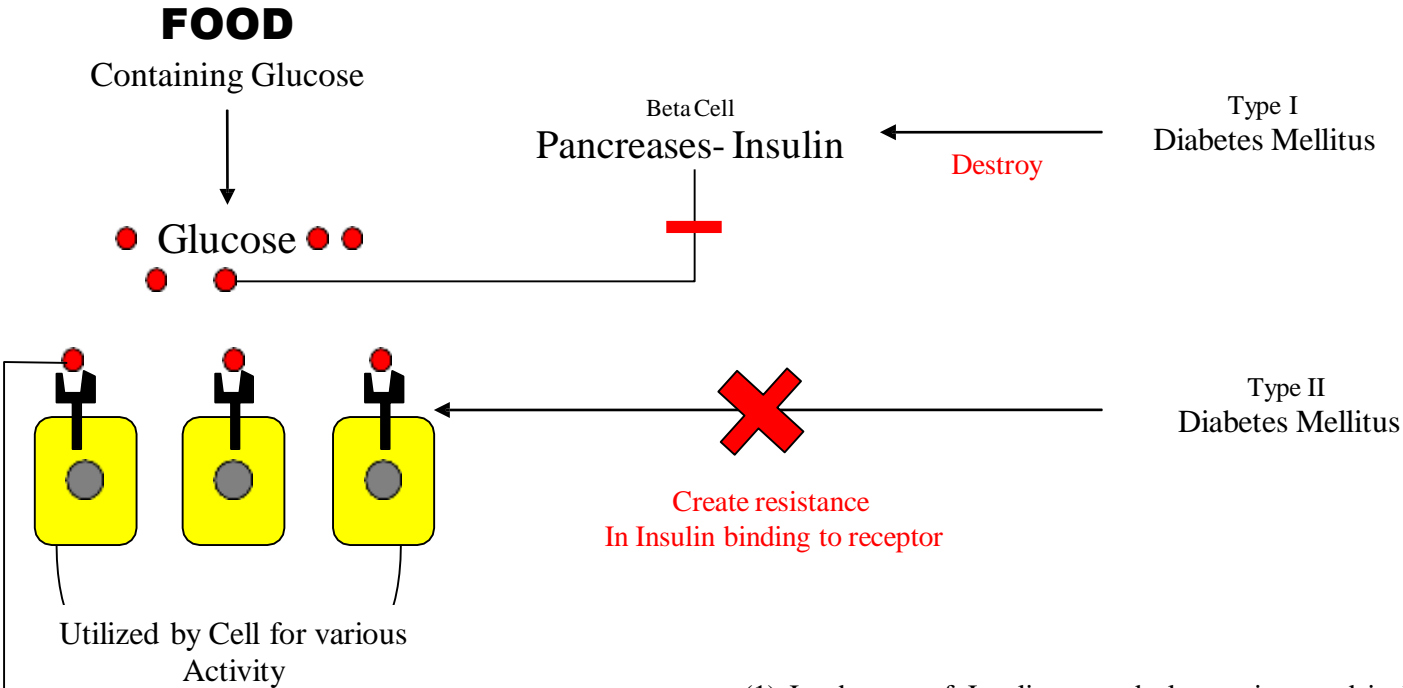
In case of Non Insulin dependent diabetes mellitus the situation is not same as “Insulin Dependent” because the Insulin production center is get weakened but not destroyed, so if we try to make that center healthier our problem will be solved. There is one more reason that is- Insulin is in appropriate amount but there is some resistance to its binding to Insulin receptor.

Profile	Insulin Dependent	Non Insulin Dependent
Insulin production	Body is not in condition to make sufficient Insulin	Body can make sufficient Insulin
Status of Beta cell	Destruction of Beta cell	No loss or Destruction of Beta cell
Cause	Autoimmune disorder	(1) Abnormality of gluco-receptor (2) Reduced sensitivity of peripheral tissue for Insulin (3) Excess of hyperglycemic hormones
Treatment	Insulin from external sources	Oral hypo glycaemic Drugs

Non Insulin Dependent Diabetes Mellitus (DM)

Improve Insulin Availability
 Exogenous Insulin
 Sulfonylureas
 Meglitinide/Phenylalanine analogus

Overcome Insulin Resistance
 Biguanides
 Thiazolidinediones
 Alfa-Glucosidase Inhibitors



- (1) In absence of Insulin unused glucose is stored in blood and excreted in urine (2) Increase blood sugar increase osmotic difference and demand more water (Trust)
- (3) Excess sugar in tiny capillary may obstruct eye’s vessels
- (4) Unavailability of glucose in cell cause weakness

Hormonal Regulation of Blood Glucose Level

Hormones play important role in regulation of blood glucose level

Hypoglycemic effect

Insulin

- Glucose uptake ↑
- Glycolysis ↑
- Glycogenesis ↑
- HMP shunt ↑
- Lipid synthesis ↑
- Gluconeogenesis ↓
- Glycogenolysis ↓

Hyperglycemic effect

Glucagon

- Gluconeogenesis ↑
- Glycogenolysis ↑

Epinephrine

- Glycogenolysis ↑

Thyroxine

- Gluconeogenesis ↑

Glucocorticoids

- Gluconeogenesis ↑
- Glucose utilization ↑
(extrahepatic)

Growth hormone and ACTH

- Glucose uptake ↓
- Glucose utilization ↓

Insulin

Tissue of Origin: Pancreatic β Cells

1. Insulin is a **peptide hormone** produced by **beta cells** in the **pancreas**.
2. It regulates the **metabolism** of **carbohydrates** and **fats** by promoting the absorption of **glucose** from the blood to **skeletal muscles** and **fat tissue** and by causing fat to be stored rather than used for energy.

Metabolic Effect

1. Enhances entry of glucose into cells;
2. Enhances storage of glucose as glycogen, or conversion to fatty acids;
3. Enhances synthesis of fatty acids and proteins;
4. Suppresses breakdown of proteins into amino acids, of **adipose tissue** into free fatty acids.

Effect on Blood Glucose- Lowers

Glucagon

1. It is a peptide hormone, produced by alpha cells of the pancreas that raises the concentration of glucose in the bloodstream.
2. Its effect is opposite that of insulin, which lowers the glucose concentration.
3. The pancreas releases glucagon when the concentration of glucose in the bloodstream falls too low. Glucagon causes the liver to convert stored glycogen into glucose, which is released into the bloodstream.

Tissue of Origin: Pancreatic α Cells

Metabolic Effect

1. Enhances release of glucose from glycogen;
2. Enhances synthesis of glucose from amino acids or fatty acids.

Effect on Blood Glucose- Raises

Epinephrine

Tissue of Origin: Adrenal medulla

Metabolic Effect

1. Enhances release of glucose from glycogen;
2. Enhances release of fatty acids from adipose tissue.

Effect on Blood Glucose- Raises

Cortisol

Tissue of Origin: Adrenal cortex

Metabolic Effect

1. Enhances gluconeogenesis;
2. Antagonizes Insulin.

Effect on Blood Glucose- Raises

ACTH

Tissue of Origin: Anterior pituitary

Metabolic Effect

1. Enhances release of cortisol;
2. Enhances release of fatty acids from adipose tissue.

Effect on Blood Glucose- Raises

Growth Hormone

Tissue of Origin: Anterior pituitary

Metabolic Effect: Antagonizes Insulin

Effect on Blood Glucose- Raises

Hyperglycemic hormones such as glucagon, adrenalin, cortisol, and the growth hormone act on the muscles and liver to promote glycogen decomposition and also inhibit glucose infiltration into the heart and muscles, which are organs that consume glucose.

Thyroxine

Tissue of Origin: Thyroid

Metabolic Effect

1. Enhances release of glucose from glycogen;
2. Enhances absorption of sugars from intestine

Effect on Blood Glucose- Raises