Estimation of Blood Glucose level
Importance

• Diagnosis and treatment of carbohydrate metabolism disorders
• Monitor the effectiveness and response to an ongoing treatment procedure
Control mechanism

- Bile duct
- Duodenum
- Pancreas
- Pancreatic duct
Insulin and glucagon

High blood sugar

Promotes insulin release

Promotes glucagon release

Stimulates glycogen breakdown

Stimulates glycogen formation

Stimulates glucose uptake from blood

Lowers blood sugar

Tissue cells

Low blood sugar

Glycogen

Glucose

Liver

Pancreas

Glucagon

Insulin
Post prandial variations
Post meal sugar level

[Graph showing the post meal sugar levels for normal, prediabetic, and diabetic conditions over 6 hours.]
Clinically

Determination of glucose concentration is important in the diagnosis and treatment of disorders of carbohydrate metabolism. Values higher or lower than the reference are of diagnostic significance.
Symptoms of high blood sugar

- Thirst
- Frequent urination
- Vision abnormalities
- Fatigue
- Muscular pain
- Delayed healing
- Endothelial dysfunction
- Kidney failure
Clinical significance

Hyperglycemia: blood glucose level goes above 7.0mmol/L.

The levels are increased in diabetes mellitus, hyperthyroidism and in the hyperactivity of the pituitary gland.

Hypoglycemia: blood glucose level falls below 3.0mmol/L, this would lead to a loss of consciousness (coma).

Decreased levels are observed in cases of overproduction of insulin by the pancreas, with tumors of the pancreas, as well as with hypofunction of the organs involved in glucose synthesis and carbohydrate metabolism.
Diabetes Mellitus
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.

Insulin is the substance that converts glucose to a form that is usable by the body.
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.

Insulin is the substance that converts glucose to a form that is usable by the body.
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.

Insulin is the substance that converts glucose to a form that is usable by the body.

Thus, low insulin equal high glucose
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.

Insulin is the substance that converts glucose to a form that is usable by the body.

Thus, low insulin equal high glucose circulating in the blood but not
Diabetes Mellitus

Inability of the pancreas to either produce enough insulin or the body’s inability to utilize the insulin it has.

Insulin is the substance that converts glucose to a form that is usable by the body.

Thus, low insulin equal high glucose circulating in the blood but not utilized by the cells.
Diabetes Mellitus

A condition in which the body either does not produce enough, or does not properly respond to insulin or both. This causes glucose to accumulate in the blood, often leading to various complications.

Two main common forms:

Type 1 diabetes
Other names:
“Juvenile” diabetes
Insulin dependent diabetes mellitus (IDDM)

Type 2 diabetes
Other names:
“Adult onset” diabetes
Non-insulin dependent diabetes mellitus (NIDDM)
Standard reference test in diagnosis

- The fasting blood glucose (BSF) test
  - (person who has not eaten in the past 10-14 hours)
- Random blood glucose (BSR)
  - (measuring plasma glucose without regard to the last food intake)
- 2-hour post meal blood glucose test (2h-PP)
- Oral glucose tolerance test (OGTT)
  - (2 hours after ingestion of a glucose load of 75 g)
- Glycosylated hemoglobin (HbA1c)
- (Both tests require a second confirmation)
Insulin resistance

- Glucose (sugar) enters the body.
- Insulin signal arrives.
- Glucose does not go into the cell.
- Insulin resistance occurs.