

Pancreas

HORMONE: Insulin:

PRODUCTION: Beta cell

TARGETS: Metabolism of glucose on a cellular level

ACTION: Insulin converts glucose into glycogen through glycogenesis; decreases the breakdown of glycogen, converts glucose into fatty acids and stimulates protein synthesis

TARGETS: Metabolism of glucose on a cellular level in insulin-dependent tissues

HORMONE: Glucagon: Produced by Alpha cells

ACTION: Glucagon accelerates the conversion of glycogen store in liver into glucose via glycogenolysis and the through the process of gluconeogenesis converts protein or fats into glucose

STATES OF BLOOD SUGAR LEVELS

The following are conditions of blood sugar levels. They are used to describe when these levels rise or fall. These terms are not diseases in and of themselves but may be used to describe symptoms of diseases.

Hypoglycemia a drop the blood sugar levels due to hypersecretion of insulin, lack of food, or excessive exercise

Characteristics: Sweating, tremors, tachycardia, palpation, Slow depression of CNS -headaches, confusion, lightheadedness, coma

Hyperglycemia absence or inadequate amount of insulin in the blood stream causing an increase in blood sugar levels. Also can be caused by an increase in the secretion of glucagon. Even diet can temporary mimic this condition

Characteristics: polyuria, polyphagia, dehydration, polydipsia, headaches, muscle aches,

DIABETES MELLITUS:

Results from a break down in the body's ability to produce or utilize insulin,

Type I - juvenile onset diabetes

Approximately 10% of cases

Type I- Juvenile onset

Linked to genetic predisposition with an environmental trigger

Autoimmune response leading to the destruction of the Beta Cells

Environmental Factors which contribute:

Drugs / chemicals: Alloxan, Pentamidine

Nutrition: Bovine Milk, Nitrosamines (nitrates from cured or smoked meats)

Viruses: Mumps, Rubella (congenital)

Increase in bacterial growth due to the increase of glucose in the blood

Hormones in the Metabolic Process

Just ate a candy bar → Hyperglycemia

→ Need to get glucose out of blood into cells to lower blood sugar

1. Carbohydrates are broken down to monosaccharides → absorbed in the small intestine

Glucose → Cell use in the production of ATP via glycolysis, Krebs cycle & electron transport chain

2. Glycogenesis – formation of glycogen

Glucose → Glycogen store in the liver and muscles

3. Lipogenesis – formation of neutral fats

Glucose → Adipose Tissue for storage

Hormone which controls the above processes is Insulin

Human Growth Hormone will also stimulate Lipogenesis

Fasting / starving → Hypoglycemia

→ Need to get glucose out of storage in cells & into blood to increase blood sugar levels

1 Glycogenolysis – break down glycogen to release glucose

Glycogen out of liver & muscle → Glucose into blood

2. Lipolysis

Adipose Tissue → Fatty acids & glycerol into blood

3. Gluconeogenesis

Protein & Lipids out of liver & muscle → Glucose into blood

Hormones of: Glycogenolysis = Glucagon & Epinephrine

Lipolysis = Epinephrine, NE, Cortisol, hGH, T3&T4

Gluconeogenesis = Cortisol & Glucagon