The disaccharide sucrose from diet cleaved, releases amount of fructose and glucose.

Fructose is also found as a free monosaccharide in many fruits, vegetable and honey.

Entry of fructose into cells is not insulin dependent.

In the cells, fructose must be phosphorylated by hexokinase (have a low affinity for fructose) or fructokinase form fructose 1 phosphate.

Fructose 1 phosphate cleaved by Aldolase B into DHAP and D glyceraldehyde.

DHAP can directly enter glycolysis or gluconeogenesis in liver.
FRUCTOSE METABOLISM

- D glyceraldehyde can be metabolized into triacylglycerols synthesis or glyceraldehyde 3 phosphate → enter glycolysis (gluconeogenesis)
- Fructose is more rapidly glycolyzed by liver than glucose
  → bypasses the step in glucose metabolic catalyzed by PFK, which metabolic control is exerted on the rate of catabolism of glucose
- This allow fructose to flood the pathway in the liver, leading to enhanced fatty acid synthesis, increased esterification of fatty acids and increased VLDL secretion
Conversion of Glucose to Fructose by Way of Sorbitol

- Aldose reductase reduces glucose to produce sorbitol in many tissue such as the lens, retina, kidney, liver, ovaries, sperm and seminal vesicles.
- In the liver, seminal vesicles, sperm and ovaries, a second enzyme sorbitol dehydrogenase can oxidize the sorbitol to produce fructose.
  - Energy source for sperm cells.
- Insulin is not required for entry of glucose into the cells listed above.
- Large amounts of glucose may enter these cells during times of hyperglycemia (in uncontrolled DM).
Conversion of Glucose to Fructose by Way of Sorbitol

- Elevated intracellular glucose concentrations and adequate supply of NADPH cause aldose reductase to produce sorbitol.
- Sorbitol unlike glucose cannot pass efficiently through cells membrane.
- Therefore remains trapped inside the cell.
- When sorbitol dehydrogenase is low or absent (in retina, lens nerve cells), sorbitol accumulates in these cells.
Conversion of Glucose to Fructose by Way of Sorbitol

- It causing strong osmotic effects and there cells swelling due water retention
  → including cataract formation, peripheral neuropathy and vascular problems leading to nephropathy and retinopathy
FRUCTOSE METABOLISM