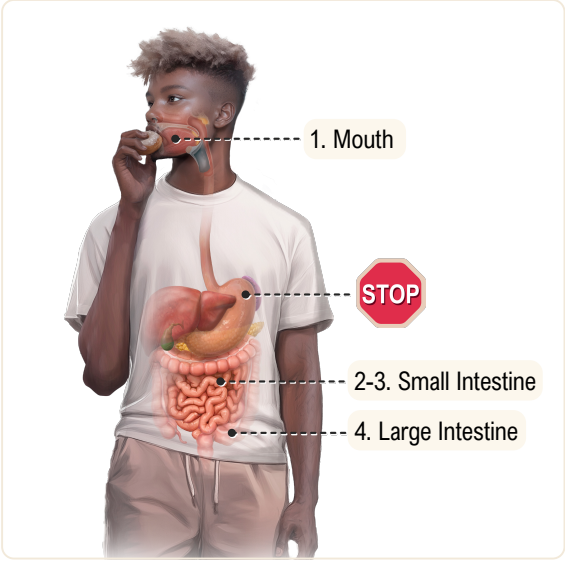
TOPIC: CARBOHYDRATE DIGESTION

Most Carbohydrate Digestion Occurs in Our Small Intestine

◆ Carbohydrate digestion *begins* in our _____, STOPS in stomach, but *resumes* in _____ intestine.

- Enzymes made by the pancreas & cells lining the small intestine help digest most carbs into monosaccharides:



Step #	Location	Target substrate(s)	Enzyme(s)	Product(s)
1	Mouth	Starch	_____ Amylase	Maltose + starch fragments
STOP	**Carbohydrate digestion PAUSES in the stomach.**			
2	Small Intestine	Undigested starch	Pancreatic Amylase	Maltose
3	Wall of Small Intestine	Sucrose, Lactose, Maltose	Sucrase, Lactase, Maltase	Glucose, Fructose, Galactose
4	Large Intestine	Bacteria may ferment *fiber* but most is excreted.		

EXAMPLE

Which of the following options correctly shows the steps of starch breakdown in the gastrointestinal tract?

a) Starch → fructose → glucose.

b) Starch → amylopectin → amylose → glucose.

c) Starch → glycogen → glucose.

d) Starch → maltose → glucose.

PRACTICE

Which of the following answer options describes how the body breaks down carbohydrates?

a) Mechanical breakdown in the mouth via chewing.

b) Chemical breakdown in the mouth via salivary amylase.

c) Chemical breakdown in the small intestine via pancreatic amylase.

d) All of the above.

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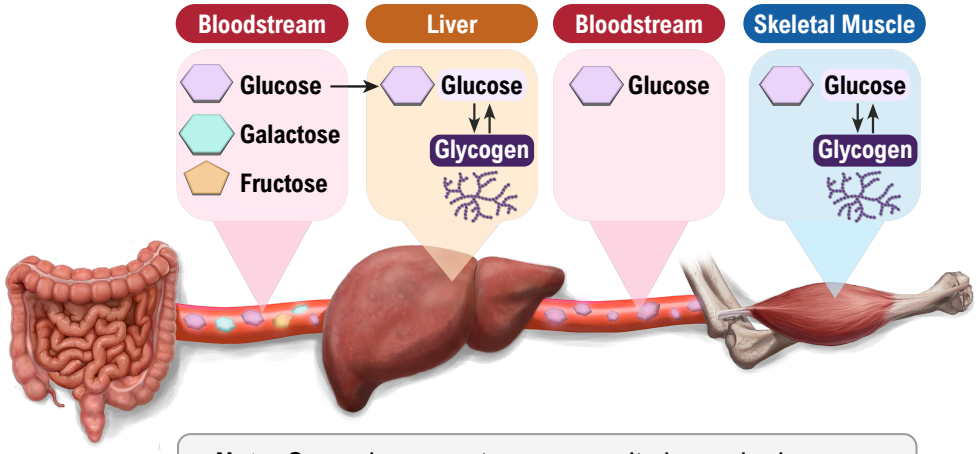
How the Body Manages & Stores Glucose

◆ The liver converts non-glucose monosaccharides (e.g. fructose, galactose) into _____.

- The liver may *release* glucose into the blood to be utilized by body cells or may *store* it as _____.
  - **Glycogenesis:** process that *combines* excess glucose to _____ *glycogen*.
  - **Glycogenolysis:** process that _____-_____ glycogen, releasing glucose.

Occurs in liver & muscles.



Note: Once glycogen storage capacity is reached, excess glucose is stored as _____ in adipose tissue.

EXAMPLE

_____ will occur when blood glucose levels get too low. On the other hand, when blood glucose levels get too high, _____ will occur.

a) Glycogenolysis; glycogenesis.
b) Glycogenesis; glycogenolysis.
c) Glycogenolysis; gluconeogenesis.
d) Gluconeogenesis; glycogenolysis.

PRACTICE

Why are fructose & galactose converted into glucose by the liver?

a) Fructose & galactose are too large to be used by the body's cells; glucose is much smaller.
b) Glucose is the body's preferred energy source – especially for red blood cells & nervous tissue.
c) Having too much fructose & galactose in the blood stream causes blood pH to decrease (ketoacidosis).
d) All of the above.

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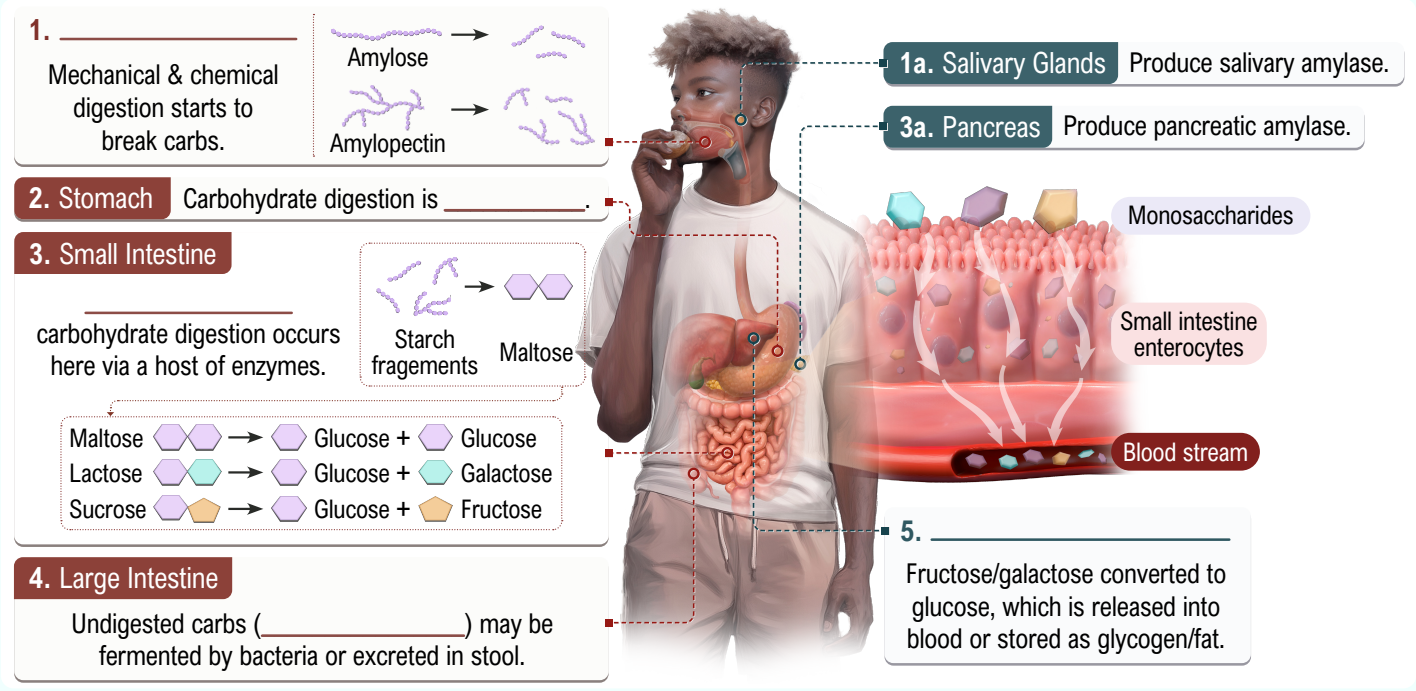
EXAMPLE

Fill in all of the blanks throughout the image to review carbohydrate digestion.



PRACTICE

After a high-carbohydrate meal, glucose levels in the bloodstream rise. Which of the following correctly describes how the body manages this influx of glucose?

a) The liver immediately converts all excess glucose into fat since glycogen storage is limited.

b) Skeletal muscles store glucose as glycogen & can later release it into the bloodstream during fasting.

c) The liver & muscles both perform glycogenesis, but only the liver can release stored glucose back into circulation when blood sugar levels drop.

d) Glycogenolysis occurs in the liver to store excess glucose for future energy needs.

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Lactose Intolerance

- Millions of people have a digestive condition called _____ *intolerance*.
- **Lactose Intolerance:** the reduced ability to fully digest lactose due to insufficient production of lactase.
  - Symptoms include gas, bloating, discomfort, & diarrhea.
  - Managed by limiting lactose in the diet (consuming lactose-free alternatives) or using _____ supplements.

PRACTICE

Dave has lactose intolerance. Is he able to eat any dairy products?

a) No, he should never consume any lactose because it could cause major health complications.

b) Yes, he should eat as much lactose as he wants because it won't affect him that much.

c) Yes, he can try consuming products with small amounts of lactose, or lactose-free alternatives.

d) Yes, but only once per month.