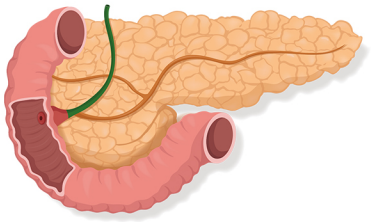
TOPIC: PANCREAS

Pancreas

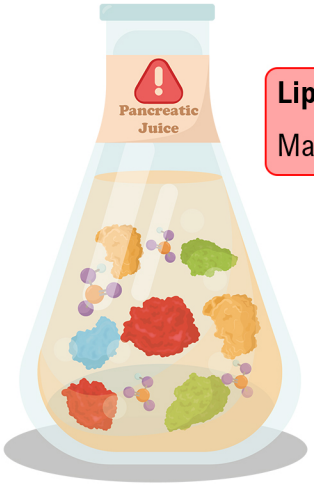


- **Pancreas:** glandular organ that produces _____ and hormones.
  - **Pancreatic Juice**: _____ of water, inactive enzymes, & bicarbonate.
    - Over _____ produced each day.
    - Inactive enzymes become _____ in the duodenum: prevents pancreas from digesting _____.
- Composition of pancreatic juice:

Bicarbonate: _____ chyme.

Amylase: digests _____.

Proteases: digest _____.
E.g., trypsinogen → trypsin.



Lipase: digest _____.
Main source of lipases.

Nucleases: digest nucleic acids.

EXAMPLE

Listed below are the enzymes found in pancreatic juice and some different food items. Write the letter on the line next to each food to indicate which enzymes you would expect to be active in digesting it. Note: some foods may require multiple enzymes and not all food will be digested by the pancreatic juice.

a. Amylase. b. Lipases. c. Nucleases. d. Proteases.

Steak: _____

Ice Cream: _____

Apple: _____

Rock Candy (sucrose): _____

French Fries: _____

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PRACTICE

Which product of the pancreas is correctly matched to its function?

a) Amylase: digest sugars.

b) Proteases: breaks down lipids.

c) Nucleases: digests nucleic acids.

d) Bicarbonate: lowers the pH of pancreatic juice.

PRACTICE

What may be one reason that many of the enzymes in pancreatic juice are inactive in the pancreas, only to be activated once they enter the small intestine?

a) Protects the enzymes from degrading.

b) Decreases the total amount of enzymes needed.

c) Allows the digestion process to happen faster.

d) Prevents enzymes digesting tissues of the pancreas.

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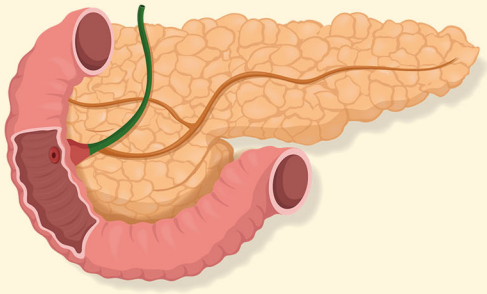
Anatomy of the Pancreas

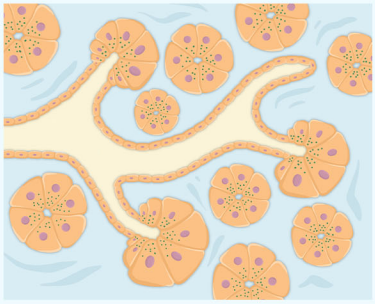
Gross Anatomy

- **Tail:** _____ end; lateral
- **Head:** _____ end: medial.
- **Body:** _____ section.
- **Pancreatic Duct :** main _____ duct.
- **Accessory Pancreatic Duct:** ____ always present.



Microscopic Anatomy

- **Acini:** clusters of _____ cells.
  - **Acinar cells:** secrete _____ enzymes
- **Duct:** transports secretions to _____ duct.
  - **Duct cells:** secrete water and _____.



EXAMPLE

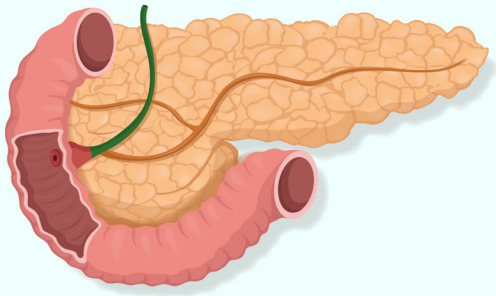
A patient with pancreatic cancer undergoes an operation to remove a tumor on the tail of the pancreas. During the operation, approximately 1/3 of the of the pancreas is removed.

a) On the diagram, circle the approximate region that was removed as part of the surgery.

b) Would you expect a surgery to remove the head or the tail of the pancreas to be more complicated? Explain why.

_____

_____



c) After such surgeries, some patients require additional digestive enzyme supplements. Based on where in the digestive system different enzymes are produced, which class of digestive enzyme would you expect it is the most important to supplement?

_____

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PRACTICE

Which pair below correctly matches the cell type with their secretion?

a) Duct cells: proteases.
b) Duct cells: bicarbonate.
c) Acinar cells: water.
d) Acinar cells: bile salts.

PRACTICE

The clusters of secretory cells in the pancreas are called:

a) Ducts.
b) Lobules.
c) Acini.
d) Paneth cells.