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Pancreas

Friday, January 11, 2008

11:00 AM

1. Lists the major contents of pancreatic secretions.
 - a. Enzymes
 - b. Bicarbonate rich fluid
 - c. Ions (Na^+ , Cl^- , HCO_3^-)
 - i. At low secretory rate, Cl^-
 - ii. At high rate, HCO_3^-
2. Describes the mechanisms by which chyme is neutralized in the duodenum.
 - a. Bicarbonate from CO_2 or $\text{Na}^+/\text{HCO}_3^-$ cotransporter into duct cell
 - b. Cells transport HCO_3^- into lumen and H^+ to the blood
 - c. Na^+/H^+ exchanger also sends H^+ out to blood
 - d. Secretin can cause H^+ ATPase to be implanted in membrane
 - e. CFTR ion channel ($\text{Cl}^-/\text{HCO}_3^-$ out) or $\text{Cl}^-/\text{HCO}_3^-$ exchanger sends HCO_3^- into lumen
 - f. CFTR channel activated by cAMP produced in response to secretin bound to basolateral membrane (adenylyl cyclase)
3. Describes the mechanism by which pancreatic zymogens are activated in the small intestine.
 - a. Synthesis on polysomes and transfer to RER
 - b. Protein modification in RER
 - c. Transfer to Golgi complex
 - d. Modification and sorting in Golgi and condensation in vacuoles
 - e. Vacuoles condense to form zymogen granules
 - f. Regulated exocytosis or constitutive secretion
 - g. In small intestine, proenzymes are cleaved by trypsin to be activated
 - i. Enterokinase and trypsin responsible for activation of trypsinogen \rightarrow trypsin
 - ii. Most pancreatic enzymes are proenzymes w/ exception of amylase, lipases
 - iii. Multiple forms of enzymes relates to specificity
4. States the stimuli that release secretin.: low pH
5. States the stimuli that release CCK.
 - a. Fat
 - b. Peptides and AA
6. States the effects of secretin and CCK on pancreatic secretion.
 - a. Secretin acts on duct cells to release HCO_3^-
 - b. CCK acts on acinar cells to increase enzyme secretion
 - c. CCK has potentiating effect on duct cells
 - d. CCK can also excite vagal afferents to neurally stimulate acinar cells (important in humans)
7. Identifies the intracellular mediators of secretin and CCK action.
 - a. Secretin acts on adenylyl cyclase \rightarrow PKA activation
 - b. CCK acts on PLC \rightarrow IP_3 + DAG
 - c. IP_3 stimulates release of Ca^{2+} from intracellular stores and Ca^{2+} influx
 - i. Calmodulin activated PP, PK
 - ii. Ca^{2+} activated PK-C
 - d. DAG activates PKC
8. Describes the role of CFTR in pancreatic ductular secretion.
 - a. See 2e and f
9. States the significance of the potentiating interaction of CCK and secretin on pancreatic secretions.
 - a. See 6
10. States the effects of the autonomic nerves to the pancreas on pancreatic secretion.
 - a. Vagal efferents release ACh to both acinar and duct cells
 - b. ACh acts to activate PLC cascade