

Primary Intestinal Tract Endocrine Hormones

Gastrin:

- Endocrine hormone, secreted by G-cells in antrum stomach mucosa
- Stimulates secretion of gastric acids, lowers pH
- Stimulates growth of gastric mucosa (cell-proliferative)
- Exists in glycine-bound precursor in intercellular fluid (progastrin), the probable growth-stimulating factor
- Stimulates pancreatic, gallbladder and small intestinal secretions
- Diminished gastric acid, increased serum gastrin
- Increased gastric acidity, decreased serum gastrin
- Too much gastrin, stomach mucosa hyperplasia
- Enterochromaffin-like cells (ECL, found only in the acid-secreting stomach) proliferate in diminished acidity, dangerously so when inhibited by H2 blockers - even anticholinergics.
- Infection with *Helicobacter pylori* causes hypergastrinemia, often causing gastric ulcer
- Yeast metabolites (such as in beer or bread) stimulate gastrin
- Normal gastrin response stimulates acquired immunity in gut
- Diminished OR excessive levels impair normal resistance

Secretin:

- Endocrine hormone, secreted by cells in upper small-intestinal mucosa
- Stimulates stomach enzymes, water and alkali secretions from pancreas and liver:
SUPPRESSES gastric acids
- Complex meals stimulate the most; fluids and sugars the least

Somatostatin:

- Paracrine/endocrine hormone (in the intestinal tract)
- Made by D-cells in gastric mucosa
- Suppresses gastric secretions; Gastrin rises, until suppressed by a combination of luminal acids and somatostatin
- Infection with *Helicobacter pylori* causes somatostatin suppression, usually causing duodenal ulcer
- Somatostatin also produced in small intestines and large intestines.
- Somatostatin also produced in brain, and released by myenteric plexus cells
- It inhibits motility and tone of stomach and small intestines and gall bladder, and inhibits formation of liver bile, but NOT bilirubin
- It STIMULATES motility and tone of esophagus
- It is elevated in blood and cerebrospinal fluids of obsessive-compulsives
- It inhibits the release of ALL known GI hormones
- It inhibits saliva, gastric, pancreatic, small intestinal and liver secretions
- It inhibits splanchnic blood flow

- It inhibits intestinal absorption
- In the brain it inhibits somatotropin release by the hypothalamic/pituitary axis.
- It is also secreted into the bloodstream by the hypothalamus, where it acts on the primary target tissues in the gut.
- Like epinephrine, it is made LOCALLY (paracrine), and secreted SYSTEMICALLY (endocrine)

Bombesin

- A paracrine hormone in brain, it moderates blood flow (somehow)
- It is an endocrine hormone, secreted from cells in the duodenum and jejunum.
- It stimulates gastric ACID and pancreatic ENZYMES.
- It stimulates contractions of the gall bladder and the biliary duct
- It relaxes the common duct and sphincter of Oddi (see: Garfield)
- It strongly stimulates acquired immunity and antibody response in biliary apparatus AND duodenum/jejunum
- It helps trigger Cholecystokinin release
- It is a vasoconstrictor to breast arteries (??)

Cholecystokinin (CCK)

- An endocrine hormone secreted by cells in the mucosa of the duodenum the jejunum, also (natch) by the hypothalamus
- Meals stimulate CCK secretions by BOTH the gut and CNS simultaneously
- It stimulates gall bladder contractions and pancreatic enzymes
- Release of CCK GENERALLY satiates the appetite for more food.
- Coincidentally, it is also the LAST major gut hormone secreted in a food cycle
- A secondary rise of CCK (following the initial release) inhibits stomach motility and emptying, but NOT peristaltic action.
- CCK can slow colon transit (unpredictable)
- CCK has no effect on small intestinal transit.
- CCK is secreted MORE with unsaturated dietary fats than with saturated fats, and least of all with butterfats.
- Coffee (intact or decaffeinated) increases intestinal CCK secretions.
- Secretion stimulated by phenylalanine
- It is part of the "antianalgesia response" in the spinal cord, following endorphin or opiate activity.
- It is directly involved in opiate tolerance
- CCK-4 (CCK-tetrapeptide) is associated, and may induce, panic states
- CCK-8 (CNS) stimulates and modifies appetite for food
- CCK-8 is VERY low in those with anorexia and/or bulimia
- Anorectic/bulimics produce less gut CCK (usually CCK-4)
- CCK is also a gut immuno-stimulant, but less active than gastrin and Bombesin (the most active)