Cholecystokinin (CCK)

Cholecystokinin (CCK) is a hormone primarily secreted by I cells located in the duodenum and jejunum, which also serve as neurotransmitters in the peripheral nerves lining the intestine. CCK plays a vital role in digestion by increasing pancreatic enzyme secretion, stimulating gallbladder contraction, and relaxing the sphincter of Oddi, allowing digestive enzymes and bile to enter the duodenum for nutrient breakdown. Additionally, CCK slows gastric emptying by stimulating vagal afferent nerve fibers, promoting satiety and ensuring proper digestion and absorption of nutrients. The secretion of CCK is primarily regulated by the ingestion of fatty acids and amino acids, which signal the need for increased pancreatic and gallbladder activity to aid in the breakdown of these nutrients.



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LOCATION

Secreted by I Cells
Secretion from Eye Cell
CCK-containing cells (known as I-cells) are most concentrated in the duodenum and jejunum. It has been hypothesized that these cells connect with enteric nerves, offering a direct connection between the nervous system and the gut.

Duodenum and Jejunum
Dodo-denim and Judge-Judy
CCK is secreted by I cells, which are located in the duodenum and jejunum.

Physiology

Increase Pancreatic Secretions
Up-arrow Pancreas Secretion
One of the actions of CCK is to increase the secretion of pancreatic juices into the GI tract. These juices contain various enzymes that aid in the breakdown of ingested food. This process is crucial for the digestion of fats, proteins, and carbohydrates.

Increase Gallbladder Contraction
Up-arrow Gallbladder Flexing
CCK induces gallbladder contraction, which promotes emptying of bile into the GI tract and aids in digestion. This function is especially important in emulsifying dietary fats for absorption.

Induce Relaxation of Sphincter of Oddi
Relaxing-massage Sphinx O-D
CCK acts to release the sphincter of Oddi, which is the sphincter that controls the opening of the common bile duct into the duodenum. Relaxation of the sphincter of Oddi allows the emptying of pancreatic and gallbladder secretions into the intestine, allowing them to aid in digestion.

Decrease Gastric Emptying
Down-arrow Stomach Vomiting
CCK reduces gastric emptying through multiple mechanisms. One of these is stimulating vagal afferent nerve fibers, which causes a feedback mechanism that slows gastric emptying and induces satiety. This slowing effect is important in ensuring adequate time for digestion and nutrient absorption.

Increases Satiety
Up-arrow Sated-tummy
Acts on vagal afferents and brain centers to induce feelings of satiety, reducing further food intake.

Regulation

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Increased by Fatty Acids and Amino Acids

Up-arrow Bacon Acidic-lemon and A-mean-ol' Acidic-lemon

Ingestion of amino and fatty acids in meals stimulates secretion of CCK, which in turn stimulates secretion of various digestive enzymes by the pancreas and gallbladder to aid in the breakdown of the very same amino and fatty acids.

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