Proton Pump Inhibitors (PPIs)

Proton pump inhibitors are a class of drugs that act directly on the H⁺/K⁺/ATPase pump to prevent secretion of acid. They are indicated for GERD, peptic ulcer disease, treatment of gastritis and for gastrinomas, such as Zollinger-Ellison syndrome. These drugs are easy to remember, as they share a common suffix, "prazole," exemplified by the medication omeprazole. Common side effects of these medications include hip fracture, as this drug class decreases calcium absorption, as well as pneumonia, due to bacterial overgrowth in a less acidic environment.



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"-prazole" Suffix
Pretzel
Proton pump inhibitors share a "prazole" suffix and include drugs such as omeprazole, lansoprazole, esomeprazole, pantoprazole and dexlansoprazole.

Indications

Zollinger-Ellison Syndrome
Zoolander-Elephant
These drugs are used clinically to treat Zollinger-Ellison syndrome, which is caused by a gastrin-secreting tumor of the pancreas that stimulates the acid-secreting cells of the stomach to maximal activity. Often, this syndrome results in gastrointestinal mucosal ulceration.

Gastritis
Stomach-on-fire
Leading to decreased acid production, these drugs are beneficial in treating gastritis, which is characterized by inflammation in the stomach lining. Gastritis has numerous causes, and can have etiologies stemming from acute offenders, chronic issues in gastric tissue, metaplasia, stress, coffee, and H. pylori.

Peptic Ulcer
Pepper Ulcer-volcano
Proton pump inhibitors may be used to treat peptic ulcer disease, which is associated with H. pylori infection, gastrinomas and medications. Peptic ulcer disease occurs most frequently in the lesser curvature of the stomach and first part of the duodenum, though it may occur in any location exposed to gastric acid.

Gastroesophageal Reflux Disease (GERD)
Girdle-girl
Decreased secretion of acid may aid in the treatment of gastroesophageal reflux disease, or GERD. This condition is characterized by reflux of acidic gastric contents into the esophagus, and is one of the most common GI diagnoses in the United States. GERD is most common in adults, and occurs more frequently with obesity, alcohol and tobacco use, and increased gastric volume.

Mechanism

Inhibit H+/K+/ATPase
Inhibiting-chains on H⁺/Banana-ATP-Battery
PPIs act upon the H⁺/K⁺/ATPase located within the gastric parietal cells. These drugs are effective in inhibiting acid secretion, as this is the final stage in the gastric secretion pathway. The enzyme is irreversibly blocked, making it significantly more effective than other drugs that aim to reduce acid production.

Side Effects

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Hip fracture

Hip shattered

Hip fracture is associated with malabsorption of Ca⁺ or low Ca⁺ intake, and is seen commonly in the elderly who have relatively lower PPI clearance. Proton pump inhibitors may promote hypochlorhydria and interfere with absorption of calcium, leading to increased frequency of hip fracture. PPI use has also been associated with lowered serum magnesium.

Pneumonia

Nude-Mona

Decreased gastric acid production may allow for bacterial overgrowth, and is associated with increased risk of respiratory infections, such as pneumonia. PPIs have also been associated with C. diff associated diarrhea.

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