Pharmacology

Drugs that Affect the Gastrointestinal System
Topics

- Peptic Ulcer Disease
- Constipation
- Diarrhea
- Emesis
- Digestion
Peptic Ulcer Disease

Factors that Increase Acidity

Factors that Protect Against Acidity
# Peptic Ulcer Disease

## Factors Increasing
- *H. pylori*
- NSAIDs
- Acidic agents
- Pepsin
- Smoking

## Factors Decreasing
- Mucus production
- Buffers
- Blood flow
- Prostaglandins
Regulation of Gastric Acid Secretion

Regulated by:
- Ach (Blocked by Pirenzepine)
- Hist (Blocked by cimetidine)
- PG (Blocked by misoprostol)
- Gastrin

Parietal Cell

H^+K^-ATPase

Blood Vessels
Stomach Lumen
**H₂ Receptor Antagonists**

- Inhibits gastric acid secretion
- No effect on H₁ receptors
- cimetidine (Tagamet®)
- ranitidine (Zantac®)
- famotidine (Pepcid®)
- nizatidine (Axid®)
H$_2$ Receptor Antagonists

- Indications:
  - PUD
  - GERD
  - Prevention of aspiration pneumonia
Proton Pump Inhibitors

- $\text{K}^+\text{H}^+\text{ATPase}$ (Proton Pump)
- Irreversible inhibition
  - Must synthesize new enzyme
  - Long duration
- omeprazole (Prilosec®)
- lansoprazole (Prevacid®)
Anticholinergics

- pirenzepine (Gastrozepine®)
- Other anticholinergics have too many side effects and are not used
Prostaglandin Analog

• misoprostol (Cytotec®)
  – Approved for treating PUD due to long term NSAID use
Antacids

- Increase pH of gastric environment
- Hydroxides
  - Aluminum
  - Magnesium
- Carbonates
  - Calcium
Antacids

- Most OTC drugs are combinations
  - DiGel®
  - Amphojel®
  - Maalox®
  - Milk of Magnesia®
  - Mylanta®
Antibiotics

- Aimed at eliminating *H. pylori*
- bismuth (Pepto-Bismol®)
- metronidazole (Flagyl®)
- amoxicillin (Amoxil®)
- tetracycline (Achromycin V®)
Stool Formation

Water absorbed in colon (~90%)

- Excessive absorption
  - Constipation: hard, dehydrated stool
  - Increases strain on defecation
  - Harmful for subset of patients
    - Recent episiotomy, colostomy, hemorrhoids, cardiovascular disease

- Inadequate absorption
  - Diarrhea: soft, non-formed, liquid stool
Terms

Laxative
Production of soft, formed stool over 1 or more days

Cathartic
Rapid, intense fluid evacuation of bowel.
Laxatives

- Bulk forming
- Surfactants
- Stimulants
- Osmotics
Bulk Forming Laxatives

- Absorb water
- Soften and enlarge stool
- Fecal swelling promotes peristalsis

- methylcellulose (Citrucel®)
- psyllium (Metamucil®)
- Polycarbophil
Surfactant Laxatives

- Lowers surface tension
  - Facilitates water penetration

- Docusate salts
  - Colace®
  - Modane Soft®
Stimulant Laxatives

- Stimulate peristalsis
- Increases water and electrolytes secretion into intestinal lumen
- Decreases water and electrolyte reabsorption

- Phenylolphthalein
  - (Ex-Lax®, Feen-a-Mint®, Correctol®)
- bisacodyl (Ducolax®)
Osmotic Laxatives

- Poorly absorbed salts remain in fecal matter
- Pull water into lumen

- Magnesium hydroxide (Milk of Magnesia®)
Antidiarrheal

- Diarrhea is usually a compensatory action…
  - Treatment aimed at cause, no symptom
- Opioid receptors in GI tract decrease motility
  - Increase time for water reabsorbtion
Antidiarrheal Agents

- paregoric/opium tincture
- diphenoxylate (Lomotil®)
- defenoxin (Motofen®)
- loperamide (Imodium®)
Vomiting Stimulus

- Blood Borne: chemotherapy, opioids, ipecac
- Stomach, small intestines via 5HT, DA
- Chemoreceptor Trigger Zone
- Vomiting Center
- H1 Musc
- 5HT DA Musc
- Sight, smell, pain
- Vestibular apparatus
- Anticipation Fear Memory
- Vomiting Stimulus to stomach, diaphragm, abdominal muscles
Antiemetics

- Serotonin (5HT) Antagonists
- Dopamine (DA) Antagonists
- Anticholinergics (muscarinic blockers)
- Cannabinoids
Serotonin Antagonists

• Used to treat side effects of chemotherapy-induced emesis
• condansetron (Zofran®)
• Doesn’t affect dopamine receptors
  – ∴ no extrapyramidal effects
• Granisetron (Kytril®)
Dopamine Antagonists

- Phenothiazines
  - prochlorperazine (Compazine®)
  - promethazine (Phenergan®)
- Butyrophenones
  - haloperidol (Haldol®)
  - droperidol (Inapsine®)
- metoclopramide (Reglan®)
Cannabinoids

- Tetrahydrocannabinol (THC)
  - Active ingredient in marijuana
  - Dronabinol (Marinol®)
  - Nabilone (Cesamet®)
Digestion Aids

- Useful for inactive vagal stimulus/bypassed duodenum
- Pancreatin (Entozyme®)
- Pancrelipase (Viokase®)
Thank You!

- To Temple College EMS Professions for permission to use their materials