

## Gastrointestinal Drugs

### Subcommittee:

Galligan, Jim Chair	galliga1@msu.edu
Escher, Emanuel	emanuel.escher@usherbrooke.ca
Garrison, James C.	jcg8w@virginia.edu
Weber, Donna R	drwebe2@email.uky.edu

<b>Drugs used for the treatment of Peptic Ulcer Disease</b>		
<b>Recommended Curriculum Equivalent: 1.5 h</b>		
Endogenous Substance	H <sub>2</sub> Receptor Antagonists	
	First Generation	Second Generation
Histamine	CIMETIDINE	RANITIDINE FAMODTINE NIZATIDINE
Learning Objectives		
<b>Physiology and pathophysiology</b> Describe the neurohumoral control of H <sup>+</sup> secretion by gastric parietal cells. Describe the role of histamine in the different phases H <sup>+</sup> secretion. Describe the causes of H <sup>+</sup> hypersecretion.		
<b>Mechanism of action</b> Explain the molecular mechanism of action H <sub>2</sub> receptor antagonists.		
<b>Actions on organ systems</b> Describe the pharmacological effects of the drugs on the stomach. Do these anatagonists have effects on other organ systems?		
<b>Pharmacokinetics</b> Describe the pharmacokinetics of the H <sub>2</sub> receptor antagonists.		
<b>Adverse effects, drug interactions and contraindications</b> Describe the principal adverse effects of each t H <sub>2</sub> receptor antagonist. Describe the clinically important drug interactions of H <sub>2</sub> receptor antagonists. Describe the principal contraindications of H <sub>2</sub> receptor antagonists.		
<b>Therapeutic uses</b> Identify the disorders treated with H <sub>2</sub> receptor antagonists.		
<b>Notes</b>		

<b>Drugs used for the treatment of Peptic Ulcer Disease</b>	
Proton pump inhibitors	
First generation	Second generation
OMEPRAZOLE	ESOMEPRAZOLE LANSOPRAZOLE RABEPRAZOLE PANTOPRAZOLE
Learning Objectives	
<b>Physiology and pathophysiology</b> Describe the synthesis mechanism of H <sup>+</sup> secretion by the parietal cell H <sup>+</sup> /K <sup>+</sup> ATPase.	
<b>Mechanism of action</b> Describe the mechanism of action of proton pump inhibitors and why they are selective for the parietal cell proton pump.	
<b>Actions on organ systems</b> Describe the pharmacological effects of the drugs on gastric function. Are there effects on other organ systems?	
<b>Pharmacokinetics</b> Describe the pharmacokinetics of proton pump inhibitors? Are there significant differences among the different drugs in this class?	
<b>Adverse effects, drug interactions and contraindications</b> Describe the principal adverse effects of proton pump inhibitors. Describe the clinically important drug interactions of proton pump inhibitors. Describe the principal contraindications of proton pump inhibitors.	
<b>Therapeutic uses</b> Describe the principal disorders treated using proton pump inhibitors.	

## Drugs used for the treatment of Peptic Ulcer Disease

### Antacid preparations

Endogenous substance	Single agent	Mixed preparations
H <sup>+</sup>	CALCIUM CARBONATE MAGNESIUM HYDROXIDE ALUMINUM HYDROXIDE Sodium Bicarbonate	MAGNESIUM HYDROXIDE/ ALUMINUM HYDROXIDE

### Learning Objectives

#### **Physiology and Pathophysiology**

Describe the mechanisms of H<sup>+</sup> secretion in the stomach

#### **Mechanism of action**

Describe the mechanism of action of antacid medications.

Describe the differences in onset and duration of action of each antacid preparation.

#### **Actions on organ systems**

Describe the pharmacological effects of the drugs in each class on the stomach.

#### **Pharmacokinetics**

Describe the absorption and systemic actions of antacid preparations

#### **Adverse effects, drug interactions and contraindications**

Describe the principal adverse effects of each antacid preparation.

Describe the clinically important drug interactions with antacids.

Describe the principal contraindications of antacids.

#### **Therapeutic uses**

Describe the primary indication of antacid use.

#### **Notes**

## Drugs used for the treatment of Peptic Ulcer Disease

### Cytoprotectant agents

Endogenous substance	Analog	Surface protectant
PGE <sub>2</sub>	MISOPROSTOL	SUCRALFATE

### Learning Objectives

#### **Physiology and Pathophysiology**

Describe the mechanisms for production of the gastric cytoprotective barrier.  
Describe causes for disruption of the cytoprotective barrier.

#### **Mechanism of action**

Explain the mechanism of action of each drug.

#### **Actions on organ systems**

Describe the pharmacological effect of the each drug on the cytoprotective barrier.

#### **Pharmacokinetics**

Describe the absorption, distribution metabolism and excretion of each drug.

#### **Adverse effects, drug interactions and contraindications**

Describe the principal adverse effects of each drug.  
Describe clinically important drug interactions of the drugs in each class.

#### **Therapeutic uses**

Describe the primary indication for use of each drug.

#### **Notes**

## Drugs used for the treatment of Peptic Ulcer Disease

### Helicobacter pylori eradication

Triple therapy		Quadruple therapy		
Antibiotics	Acid suppression	Antibiotics	Acid suppression	other
CLARITHROMYCIN METRONIDAZOLE AMOXICILLIN Tetracycline	PPI	CLARITHROMYCIN TETRACYLCINE	PPI H2 BLOCKER	BISMUTH SUBSALICYLATE

**Physiology and Pathophysiology:**

Describe the role of H. pylori in peptic ulcer disease.  
 Describe tests for evaluating H. pylori infection.

**Therapeutic uses:**

Describe the use of triple and quadruple therapy regimens used for H. pylori eradication.

**Mechanism of action:**

Describe the contribution of each agent in triple or quadruple therapy regimens in H. pylori eradication.

**Drug interactions**

Describe potential drug interactions.  
 Describe potential for antibiotic resistant strains of H. pylori.

<b>Prokinetic drugs</b>		
<b>Recommended Curriculum Equivalent: 1 hr</b>		
<b>Drug Classes and Drugs to consider</b>		
Drugs used to treat upper GI motility disorders (Gastroparesis, dyspepsia, GERD)	Drugs used to treat lower GI motility disorders (Constipation)	
ERYTHROMYCIN METOCLOPRAMIDE Cisapride Domperidone Tegaserod Renzapride	Receptor mediated	Laxatives
	LUBIPROSTONE ALVIMOPAN Tegaserod Renzapride Neostigmine Bethanechol	PSYLIUM METHYLCELLULOSE SODIUM PHOSPATE SODIUM CITRATE LACTULOSE Castor oil, Phenolphthalein, Bisacodyl, Senna, Cascara, Mineral oil
<b>Learning Objectives</b>		
<b>Physiology and Pathophysiology</b> Describe the neural and hormonal mechanisms controlling stomach and intestinal motility Describe the changes in neural and hormonal control of stomach and intestinal motility that lead to delayed gastric emptying or accommodation.		
<b>Mechanisms of action</b> Explain the molecular mechanism of action of each drug in each drug class.		
<b>Actions on organ systems</b> Describe why some drugs are selective for upper GI motility disorders and why others are selective for lower GI motility disorders.		
<b>Pharmacokinetics</b> Describe the relevant pharmacokinetic features of each drug in each drug class		
<b>Adverse effects, drug interactions and contraindications</b> Describe the principal adverse effects of the drugs of each class. Describe the clinically important drug interactions of the drugs of each class Describe the principal contraindications of the drugs of each class		
<b>Therapeutic uses</b> Outline the main therapeutic uses of the drugs of each class		
<b>Notes</b> Cisapride is available in the U.S. only in special cases. Tegaserod has recently been removed from the U.S. market and is now available only in emergency cases requiring special FDA approval. Domperidone is available in Europe and Canada but not the U.S. However, patients in the U.S. have access to this drugs via the internet or by travel to Europe and Canada.		

## Anti-diarrheal drugs

Recommended Curriculum Equivalent: 0.5 hr

### Drug Classes and Drugs to consider

Opioid-compounds	Serotonergic-compounds	Adrenergic compounds	Probiotics	Other
LOPERAMIDE Diphenoxylate	Alosetron Cilansetron	CLONIDINE	Bifidobacterium infantis	BISMUTH SUBSALICYLATE

### Learning Objectives

#### Physiology and Pathophysiology:

Describe the neural mechanisms controlling colonic motility and water and electrolyte absorption and secretion.

Describe the conditions under which neural mechanisms controlling colonic motility and water and electrolyte absorption and secretion are impaired.

Describe the neural mechanisms of visceral sensation and visceral pain.

Describe the importance of maintaining normal gut flora and how disruption can lead to altered motility and absorption and secretion in the colon.

#### Mechanisms of action:

Explain the molecular mechanism of action of each drug in each drug class.

#### Actions on organ systems:

Describe the effects of each drug on the colon and also on other organ systems.

#### Pharmacokinetics:

Describe the absorption distribution metabolism and secretion of each drug.

#### Adverse effects, drug interactions and contraindications:

Describe the principal adverse effects of the drugs of each class.

Describe the clinically important drug interactions of the drugs of each class

Describe the principal contraindications of the drugs of each class

#### Therapeutic uses

Differentiate the specific therapeutic applications of each class of drug.

#### Notes:

## Drugs used for the treatment of inflammatory bowel disease

**Recommended Curriculum Equivalent: 0.5 hr**

### Drug Classes and Drugs to consider

Salicylates	Steroids	Anti-mitotic agents	Monoclonal antibodies
SULFAPYRIDINE SULFASALAZINE 5-AMINO SALICYLIC ACID Balsalazide	HYDROCORTICONE PREDISONE PREDNISOLONE BUDESONIDE	Methotrexate 6-mercaptopurine Azathioprine Cyclosporine	INFLIXIMAB
Antibiotics		Probiotics	
Metronidazole, ciprofloxacin clarithromycin		VSL #2 Lactobacillus	

### Learning Objectives

#### Pathophysiology:

Describe the differences between ulcerative colitis and Crohn's disease.  
Describe the mechanisms responsible of intestinal and extraintestinal symptoms of inflammatory bowel disease.  
Describe the contribution of intestinal bacteria to the pathophysiology of inflammatory bowel disease.

#### Mechanism of action

Describe the mechanism of action of each of the major classes of drugs.

#### Pharmacokinetics

List the routes of administration of drugs in each class.  
Describe the absorption and distribution of each class of drug and how this impacts on the choice of the route of administration.  
Describe the mechanisms for bioactivation of the salicylates and how this impacts on their use for the treatment of inflammatory bowel disease.

#### Adverse effects, drug interactions and contraindications

Describe the main adverse effects of the drugs of each class.  
Describe the clinically important drug interactions of the drugs of each class.  
Describe the principal contraindications or precautions of the drugs of each class.

#### Therapeutic uses

Know the selective use of each class of drug for the treatment of ulcerative colitis vs. Crohn's disease.

#### Notes

Objectives for salicylates and steroids are covered under Analgesic, Antipyretic, Antiinflammatory Drugs  
Objectives for mitotic inhibitors are covered under Chemotherapy Drugs(?)

<b>Drugs use to treat nausea and vomiting</b>			
<b>Recommended Curriculum Equivalent: 1 hr</b>			
<b>Drug Classes and Drugs to consider</b>			
<b>Emetic drugs</b>			
Dopamine receptor agonists		Non-selective emetics	
Apomorphine		SYRUP OF IPECAC	
<b>Anti-Emetic Drugs</b>			
Dopamine receptor antagonists	5-HT <sub>3</sub> receptor antagonists	Cannabinoid receptor antagonists	Histamine receptor antagonists
METOCLOPRAMIDE Chlorpromazine Haloperidol	ONDANSETRON GRANISETRON PALONOSETRON DOLASETRON RAMOSETRON	DRONABINOL	DIPHENHYDRAMINE Cyclizine Hydroxyzine Promethazine
Neurokinin receptor antagonists	Corticosteroids	Benzodiazepines	Muscarinic receptor antagonists
Aprepitant	Dexamethasone	LORAZEPAM ALPRAZOLAM	SCOPOLAMINE
<b>Learning Objectives</b>			
<b>Physiology and Pathophysiology</b> Describe the central and peripheral nervous system mechanisms responsible for nausea and vomiting.			
<b>Mechanisms of action</b> Describe the mechanism of action of emetic drugs. Explain the cellular and molecular mechanisms of action of each drug class. Describe the use of multi-drug treatment of nausea and vomiting.			
<b>Actions on organ systems</b> Describe the pharmacological effects of each drug in each class.			
<b>Pharmacokinetics</b> Know the absorption, distribution, metabolism and excretion of each drug class.			
<b>Adverse effects, drug interactions and contraindications</b> Describe the principal adverse effects of the drugs of each class. Describe the clinically important drug interactions of the drugs of each class Describe the principal contraindications of the drugs of each class			
<b>Therapeutic uses</b> Know the appropriate uses of emetic drugs. Differentiate the effects of the drugs in the treatment chemotherapy-induced nausea and vomiting vs. motion sickness.			
<b>Notes</b>			