GI Tract - OTC

University of Hawai‘i Hilo Pre-Nursing Program
NURS 203 – General Pharmacology
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Learning Objectives

• Know what each medication is indicated to treat
• Know drug mechanisms of action
• Know major adverse drug effects (will be discussed)
Drugs to Treat Constipation

- Fiber
- Saline Laxatives
- Non-digestible Sugars & Alcohols
- Stool Softeners
- Stimulant Laxatives
Absorbs water in the intestines to produce a viscous liquid that increases peristalsis & decreases transit time
Fiber

- **Uses**
  - Fiber supplementation
  - Constipation
  - Diarrhea/IBS – off label
  - Prevention of CAD
- **Kinetics**
  - Absorption – none
  - Onset – 12-72 hours
- **Dosing**
  - Varies depending on product and indication
- **ADRs**
  - Abdominal cramps, diarrhea, constipation, esophageal or bowel obstruction
  - Brochospasm
- **Interactions**
  - None known
  - Pregnancy safe
Saline Laxatives - MOA

- Magnesium sulfide (Epsom salt)
- Magnesium hydroxide (Milk of magnesia)
- Magnesium citrate (Citroma®)
- OsmoPrep®
- Visicol®
- Fleet Phospho-soda®

Work by drawing water into the intestines to soften the stool & increase the number of bowel movements (osmotic fluid retention)
Saline Laxatives

- **Dosage forms**
  - Oral or enema

- **Contraindications**
  - Renal insufficiency
  - Severe cardiac disease
  - Electrolyte abnormalities
  - Diuretic therapy

- **ADRs**
  - Abdominal cramping, diarrhea, flatulence
  - Dehydration
  - Electrolyte disturbances

- **Interactions**
  - Diuretics
  - Medications that cause electrolyte disturbances
Non-Digestible Sugars & Alcohols - MOA

- Lactulose
- Sorbitol
- Mannitol
Non-Digestible Sugars & Alcohols

- **Kinetics**
  - Onset – 24-48 hours (constipation)
  - Absorption – not significant
  - Metabolism – gut flora (must be present)
  - Excretion – primarily in feces

- **Dosing**
  - 10-20 mg daily (may increase to 40 if needed)
  - Other indications have different dosing

- **ADRs**
  - Dehydration, hypernatremia, hypokalemia
  - Abd discomfort, belching, cramping, diarrhea, flatulence, nausea, vomiting

- **Interactions**
  - Glutamine
  - Pregnancy category B
Polyethylene Glycol (PEG)

- Polyethylene Glycol (PEG)
  - PEG 3350
    - Miralax ®
  - PEG Electrolyte Solution
    - CoLyte® & GoLYTELY ®
Polyethylene Glycol (PEG)

- Low dose (Miralax)
  - Occasional constipation
  - 17 g dissolved in 120-240 mls
- High dose
  - Bowel prep
- ADRs
  - Abd bloating, cramping, diarrhea, nausea, vomiting, flatulence
- Interactions
  - May decrease concentrations of digoxin
- Pregnancy
  - Not likely to cause damage but other agents should first be used for constipation with pregnancy
  - Bowel prep ok
Stool Softeners - MOA

• Docusate (Colace®)
• Mineral Oil – Heavy, not baby oil
Stool Softeners

- **Docusate**
  - Kinetics
    - Onset – oral 12-72 hrs, rectal 2-15 minutes
    - Excretion – feces
  - ADRs
    - Throat irritation
  - Interactions
    - No known interactions
    - Pregnancy safe for short term use

- **Mineral oil**
  - Kinetics
    - Onset – oral 6-8 hours, rectal 2-15 minutes
    - Not distributed, work locally in colon
    - Excreted in the feces
  - ADRs
    - Diarrhea, nausea, vomiting, abd cramps
    - Can cause pneumonitis if aspirated
  - Interactions
    - Fat soluble vitamins
    - Not recommended in pregnancy
    - CI with docusate sodium
Stimulant Laxatives - MOA

• Diphenylmethane Derivatives
  • Bisacodyl
    • (Ducolax ® & Correctol ®)

• Anthraquinones
  • Sennosides
    • (Sennakote ® & Ex-Lax ®)

Works as an irritant to increase peristalsis through stimulation of the nerves of the enteric nervous system.

Also works as an irritant to increase peristalsis through stimulation of the nerves of the enteric nervous system. From natural plant sources.
Stimulant Laxatives

- **Bisacodyl**
  - **Dose**
    - oral 5-15 mg, suppository 10 mg
  - **Kinetics**
    - Onset – 6-10 hrs, rectal 0.25-1 hr
    - Absorption - <5% oral or rectal
    - Metabolism - into active metabolite
    - Half life - ~8 hrs (active metabolite)
    - Excretion – urine
  - **ADRs**
    - Abd cramps, electrolyte imbalance, nausea, rectal irritation, vertigo, vomiting
  - **Interactions**
    - Antacids
    - Pregnancy – considered safe for short term use

- **Senna**
  - **Dose**
    - Oral 15 mg daily
  - **ADRs**
    - Abd cramps, nausea, vomiting, diarrhea
  - **Interactions**
    - No known interactions
    - Pregnancy – considered safe short term use
Drugs to Treat Diarrhea

- Bismuth Subsalicylate
- Opioids
Bismuth Subsalicylates - MOA

- Pepto-Bismol®
- Kapectate®

Salicylic acid (systemic effect)
- Anti-secretory
- Anti-inflammatory

Bismuth (local effect)
- Antimicrobial
Bismuth Salicylates

- **Kinetics**
  - Absorption – bismuth <1%, subsalicylate >80%
  - Protein binding - >90% (both)
  - Metabolism – converted to individual components in the GI tract
  - Half life – bismuth 21-72 days, salicylic acid 2-5 hours
  - Excretion – bismuth = urine & biliary, salicylic acid = urine

- **Dosing**
  - 525 mg every 30-60 minutes PRN (max 4200 mg daily)

- **ADRs**
  - Anxiety, confusion, headache
  - Fecal & tongue discoloration (black)
  - Hearing loss/tinnitus

- **Interactions**
  - Medications active in kidney & anti-coagulants
  - Pregnancy – not recommended
Opioids - MOA

- Loperamide (Immodium A-D®)
- Diphenoxylate + Atropine (Lomotil® & Motofen®)

Inhibits peristalsis/increases transit time. Reduces stool volume & reduces fluid and electrolyte loss:

Mu opioid receptor agonist
Poor CNS penetration
Decrease GI tract motility

Opioid + anti-cholinergic
Opioids

- Kinetics
  - Absorption – poor
  - Distribution – poor penetration to brain
  - Metabolism – hepatic
  - Half life – 10-14 hrs
  - Time to peak – 2.5 hrs (liquid), 5 hrs (capsule)
- ADRs
  - Dizziness
  - Constipation, abd cramping, nausea
- Interactions
  - Well tolerated
  - Pregnancy category C

Opioids + anti-cholinergic

- Kinetics
  - Absorption – rapid & well absorbed
  - Metabolism – hepatic to inactive metabolites
  - Time to peak – 40-60 minutes
  - Excretion- urine & feces
- ADRs
  - Anti-cholinergic
  - Similar to opioids
- Interactions
  - Anti-cholinergic medications & CNS depressants
  - Pregnancy category C
Drugs to Treat Upset Stomach (Acid)

Calcium Carbonates
- Tums®
- Maalox ®
- Rolaids ®
- Gaviscon ®

Hydroxides
- Gaviscon ®
- Phillips MOM ®
- Mylanta ®
Calcium Carbonates - MOA

- Tums®
- Maalox ®
- Rolaids ®
- Sodium Bicarbonate
- Gaviscon ®

Breakdown in the stomach and bind to protons (H+), protons for carbonic acid instead of HCl
Hydroxides - MOA

- Gaviscon ®
- Phillips MOM ®
- Mylanta ®

Magnesium hydroxide
- Fast dissolving
Aluminum hydroxide
- Slow dissolving
<table>
<thead>
<tr>
<th>Drug or Test</th>
<th>Interaction</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphosphonates, oral (e.g., alendronate, etidronate, ibandronate, risendronate)</td>
<td>Concomitant administration may result in reduced bisphosphonate absorption&lt;ref&gt;</td>
<td>Administer calcium salts ≥30 minutes after alendronate or risendronate, ≥60 minutes after ibandronate, and not within 2 hours of etidronate administration&lt;ref&gt;</td>
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<tr>
<td>Digoxin</td>
<td>Inotropic and toxic effects are synergistic and arrhythmias may occur (particularly when calcium is given IV)&lt;ref&gt;</td>
<td>Avoid IV administration of calcium in patients receiving digoxin, particularly if digoxin toxicity is suspected; if necessary, calcium should be given slowly in small amounts&lt;ref&gt;</td>
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<tr>
<td>Iron preparations, oral</td>
<td>Concomitant administration may result in reduced iron absorption&lt;ref&gt;</td>
<td>Advise patients to take the drugs at different times, whenever possible&lt;ref&gt;</td>
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<tr>
<td>Levothyroxine</td>
<td>Calcium carbonate may form insoluble chelate with levothyroxine, resulting in decreased levothyroxine absorption and increased serum thyrotropin concentrations&lt;ref&gt;</td>
<td>Administer oral levothyroxine and calcium carbonate ≥4 hours apart&lt;ref&gt;</td>
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<tr>
<td>Quinolones</td>
<td>Concomitant administration of calcium salts and some fluoroquinolones (e.g., ciprofloxacin) may reduce oral bioavailability of the fluoroquinolone&lt;ref&gt;</td>
<td>Recommended timing of fluoroquinolone administration relative to the calcium dose may vary depending on the specific fluoroquinolone preparation used&lt;ref&gt;</td>
</tr>
<tr>
<td>Test, corticosteroids (Glenn-Nelson technique)</td>
<td>Transient elevations of plasma 11-hydroxycorticosteroid concentrations with IV calcium, but concentrations return to control values after 1 hour&lt;ref&gt;</td>
<td></td>
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<tr>
<td>Test, magnesium (serum and urine)</td>
<td>False-negative values as measured by the Titan yellow method&lt;ref&gt;</td>
<td></td>
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<tr>
<td>Tetracyclines</td>
<td>Calcium complexes tetracycline antibiotics rendering them inactive&lt;ref&gt;</td>
<td>Do not give the 2 drugs together orally nor should they be mixed for parenteral administration&lt;ref&gt;</td>
</tr>
<tr>
<td>Thiazide diuretics</td>
<td>Risk of hypercalcemia&lt;ref&gt;</td>
<td>Avoid concomitant use&lt;ref&gt;</td>
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Drugs to Treat Gas

- Simethicone
  - Gas X
Simethicone - MOA

• Gas X

Decrease the surface tension of gas bubbles
Simethicone

- Avoid carbonated beverages or foods that may cause gas
- Can use in infants and children
  - Dosing – 20 mg 4 times per day (meals and bedtime – max 240 mg/day)
- Dosing
  - Adults – 40 -360 mg 4 times per day (meals and bedtime – max 500 mg/day)