

# GI Tract - OTC

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University of Hawai'i Hilo Pre-Nursing Program

NURS 203 – General Pharmacology

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# Learning Objectives

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- 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

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- Fiber
- Saline Laxatives
- Non-digestible Sugars & Alcohols
- Stool Softeners
- Stimulant Laxatives

# Fiber - MOA

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- Metamucil ®
- Citrucel ®
- Fibercon ®

Absorbs water in the intestines to produce a viscous liquid that increases peristalsis & decreases transit time

# Fiber

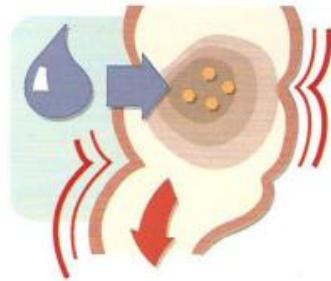
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- Uses
  - Fiber supplementation
  - Constipation
  - Diarrhea/IBS – off label
  - Prevention of CAD
- Kinetics
  - Absorption – none
  - Onset – 12-72 hours
- Dosing
  - Varies depending on product and indication
- ADRs
  - Abdominal cramps, diarrhea, 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)



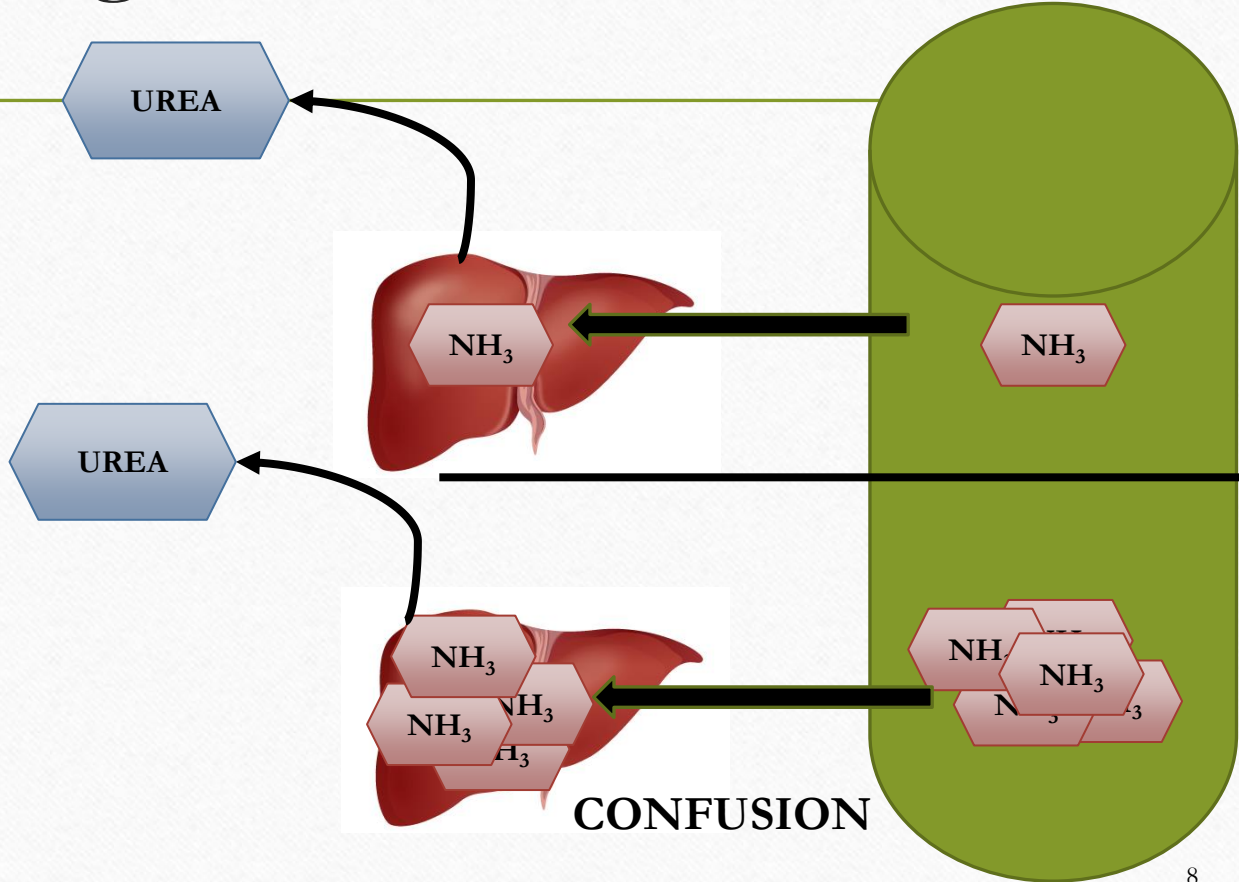
# Saline Laxatives

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- 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

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- 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)

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

# Polyethylene Glycol (PEG)

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- 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

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- 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

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- Diphenylmethane Derivatives

- Bisacodyl

- (Ducolax ® & Correctol ®)

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

- Anthraquinones

- Sennosides

- (Sennakote ® & Ex-Lax ®)

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



# Stimulant Laxatives

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- 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

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- Bismuth Subsalicylate
- Opioids



# Bismuth Subsalicylates - MOA

- Pepto-Bismol®
- Kaopectate®



Salicylic acid (systemic effect)

- Anti-secretory
- Anti-inflammatory

Bismuth (local effect)

- Antimicrobial

# Bismuth Salicylates

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- 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®)

Opioid +  
anti-cholinergic

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

Mu opioid receptor agonist  
Poor CNS penetration  
Decrease GI tract motility

# Opioids

## 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)

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## Calcium Carbonates

- Tums®
- Maalox ®
- Rolaids ®
- Gaviscon ®

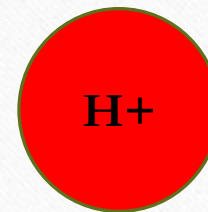
## Hydroxides

- Gaviscon ®
- Phillips MOM ®
- Mylanta ®

# Calcium Carbonates - MOA

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

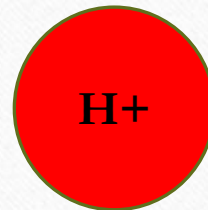
Breakdown in the stomach and bind to protons (H<sup>+</sup>), protons for carbonic acid instead of HCl



# Hydroxides - MOA

- Gaviscon ®
- Phillips MOM ®
- Mylanta ®

Magnesium hydroxide  
• Fast dissolving  
Aluminum hydroxide  
• Slow dissolving



Drug or Test	Interaction	Comments
Bisphosphonates, oral (e.g., <b>alendronate</b> , etidronate, ibandronate, risedronate)	Concomitant administration may result in reduced bisphosphonate absorption <sup>Ref</sup>	Administer calcium salts $\geq 30$ minutes after alendronate or risedronate, $\geq 60$ minutes after ibandronate, and not within 2 hours of etidronate administration <sup>Ref</sup>
Digoxin	Inotropic and toxic effects are synergistic and arrhythmias may occur (particularly when calcium is given IV) <sup>Ref</sup>	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 <sup>Ref</sup>
Iron preparations, oral	Concomitant administration may result in reduced iron absorption <sup>Ref</sup>	Advise patients to take the drugs at different times, whenever possible <sup>Ref</sup>
<b>Levothyroxine</b>	Calcium carbonate may form insoluble chelate with levothyroxine, resulting in decreased levothyroxine absorption and increased serum thyrotropin concentrations <sup>Ref</sup>	Administer oral levothyroxine and calcium carbonate $\geq 4$ hours apart <sup>Ref</sup>
Quinolones	Concomitant administration of calcium salts and some fluoroquinolones (e.g., <b>ciprofloxacin</b> ) may reduce oral bioavailability of the fluoroquinolone <sup>Ref</sup>	Recommended timing of fluoroquinolone administration relative to the calcium dose may vary depending on the specific fluoroquinolone preparation used <sup>Ref</sup>
Test, corticosteroids (Glenn-Nelson technique)	Transient elevations of plasma 11-hydroxycorticosteroid concentrations with IV calcium, but concentrations return to control values after 1 hour <sup>Ref</sup>	
Test, magnesium (serum and urine)	False-negative values as measured by the Titan yellow method <sup>Ref</sup>	
Tetracyclines	Calcium complexes tetracycline antibiotics rendering them inactive <sup>Ref</sup>	Do not give the 2 drugs together orally nor should they be mixed for parenteral administration <sup>Ref</sup>
<b>Thiazide diuretics</b>	Risk of hypercalcemia <sup>Ref</sup>	Avoid concomitant use <sup>Ref</sup>



# Drugs to Treat Gas

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- Simethicone
  - Gas X

# Simethicone - MOA

- Gas X

Decrease the surface tension of gas bubbles



# Simethicone

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- 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)

