

# **Despicable Diarrhea**

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# **Conflict of Interest Statement**

**Commercial Interests**

**None**

**Off Label Usage**

**None**

# Learning Objectives

At the end of this session the participant will be able to:

- List potential causes of diarrhea in typical consumers of HPEN
- Identify the science of these diarrheal illnesses
- Identify ways to avoid diarrhea by altering dietary habits
- Discuss potential treatments for diarrhea

# Normal Absorption

## • Duodenum & Jejunum

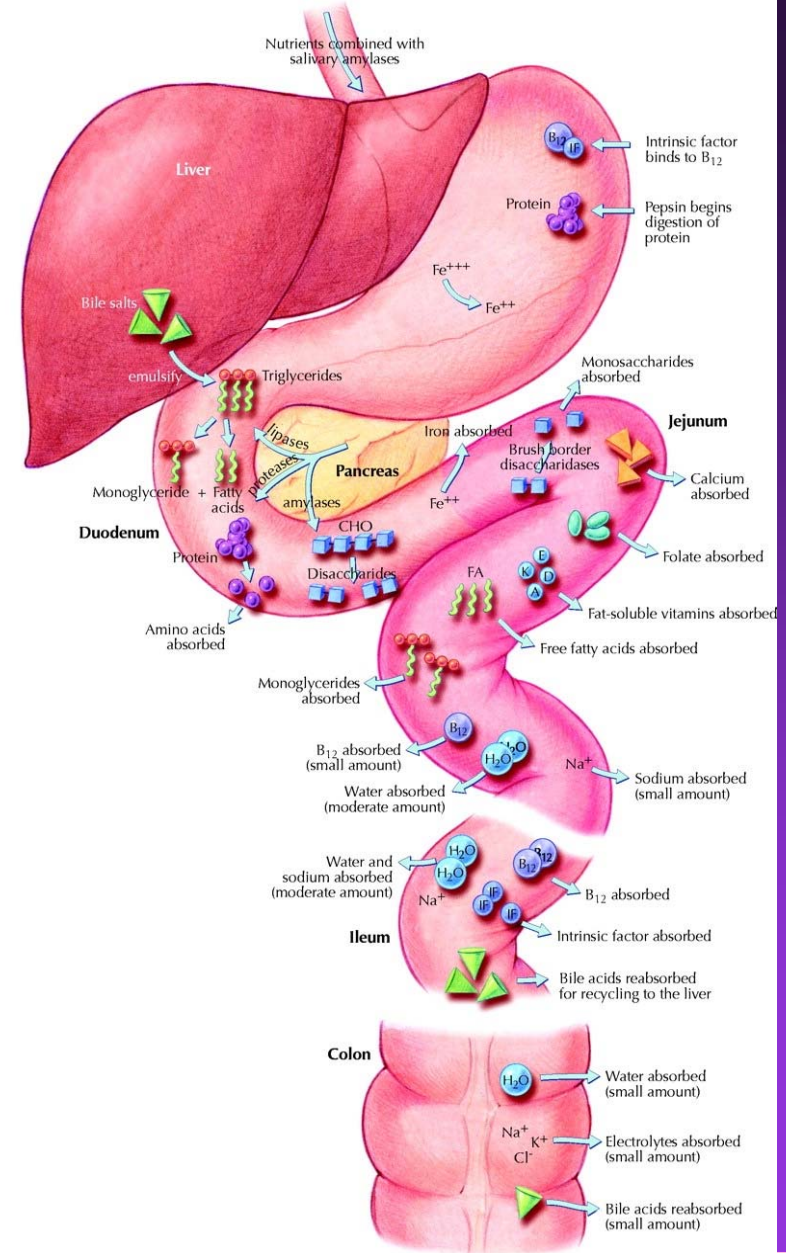
- Carbs, protein, fat
- Vitamins
- Minerals

## • Ileum

- Vitamin B12
- Bile acids

## • Colon

- Fluids



# **Know Your Altered Anatomy!**

- **What, if anything, has been removed?**
  - **Duodenum / Jejunum vs. Ileum**
    - **Ileum only capable of actively absorbing bile salts and vitamin B12; Duodenal / Jejunal resection better as ileum takes over**
  - **Colon - aggressively absorbs water**
- **How much remains?**
  - **More than 100 cm (1 meter = 39.37 inches) best**
- **How does the rest work? Stomach intact helps; Colon helpful with absorption as well**

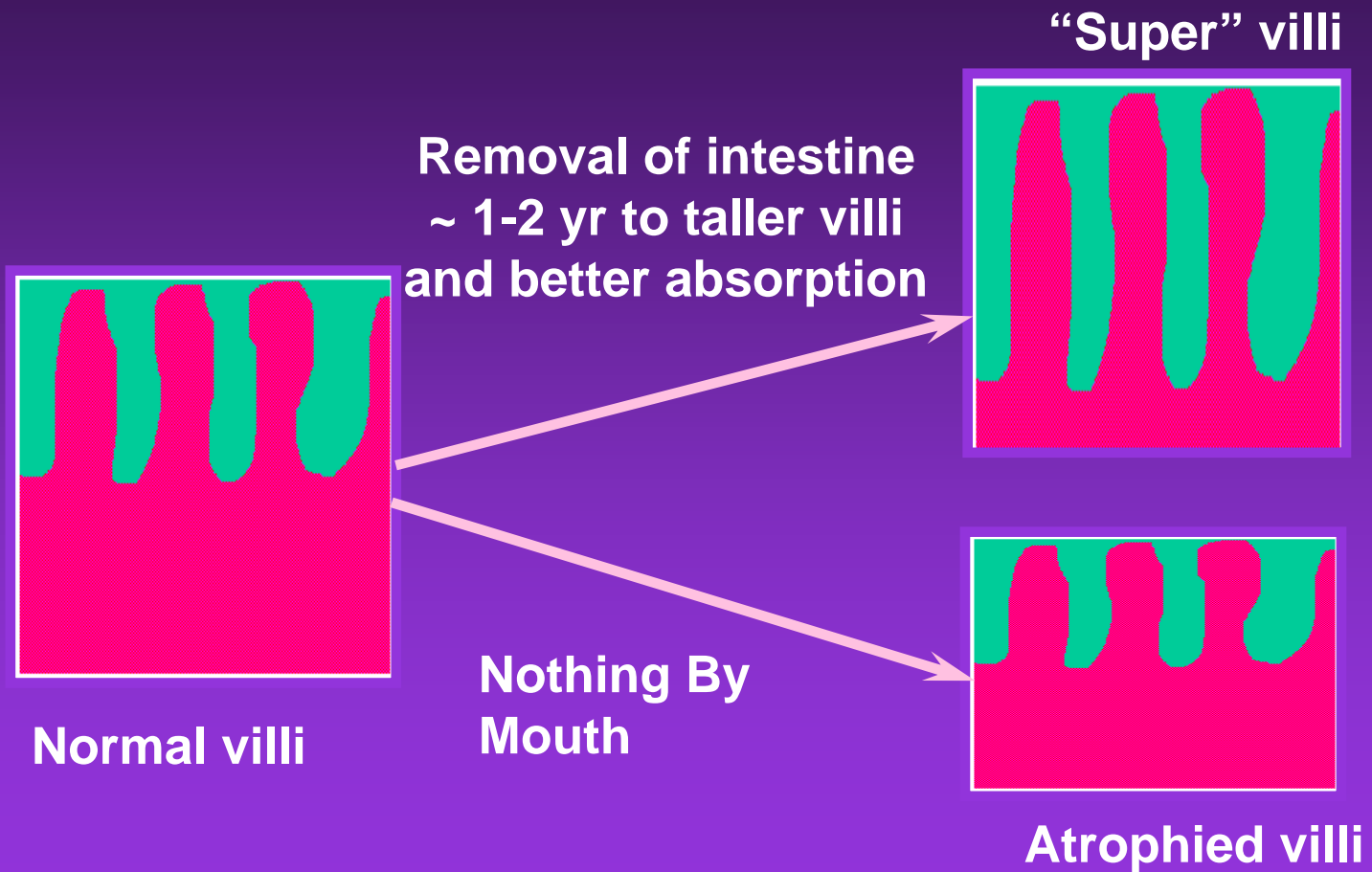
# Short Bowel Syndrome (Adults)

- Medicare definition >5 feet remaining
- Practically: if 100 cm healthy small bowel remains and no colon in place, often able to do well without TPN
- If >60 cm healthy small bowel & colon in place, often able to do well without TPN
- If shortened small bowel but active disease, virtually any length may require TPN or possibly IV fluids

# Intestinal Adaptation

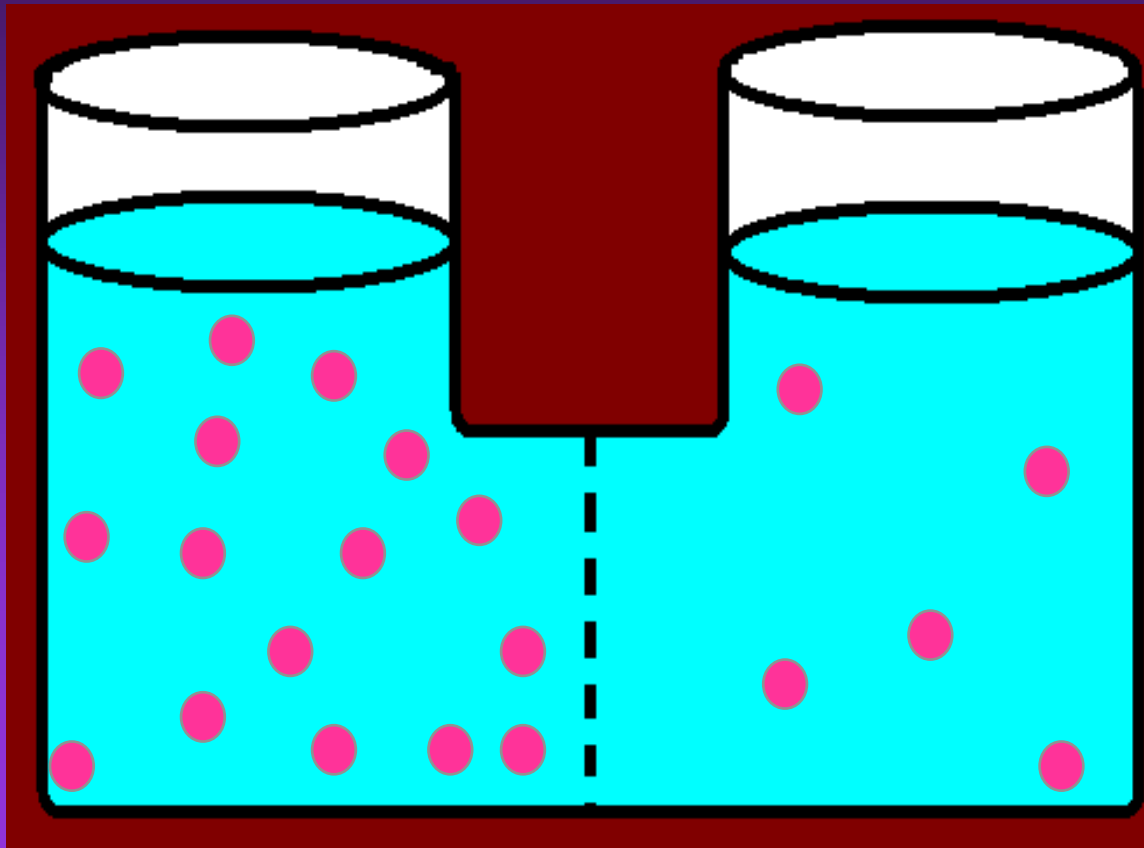
- **Increased length, diameter and villous height**
- **Increasing ability to absorb starting right after resection, most rapid at about 3 months post-op, continues ~2 years**
- **Frequently after adaptation has occurred maximally, TPN may be able to be weaned or at least decreased.**

# Intestinal Adaptation





# Osmosis

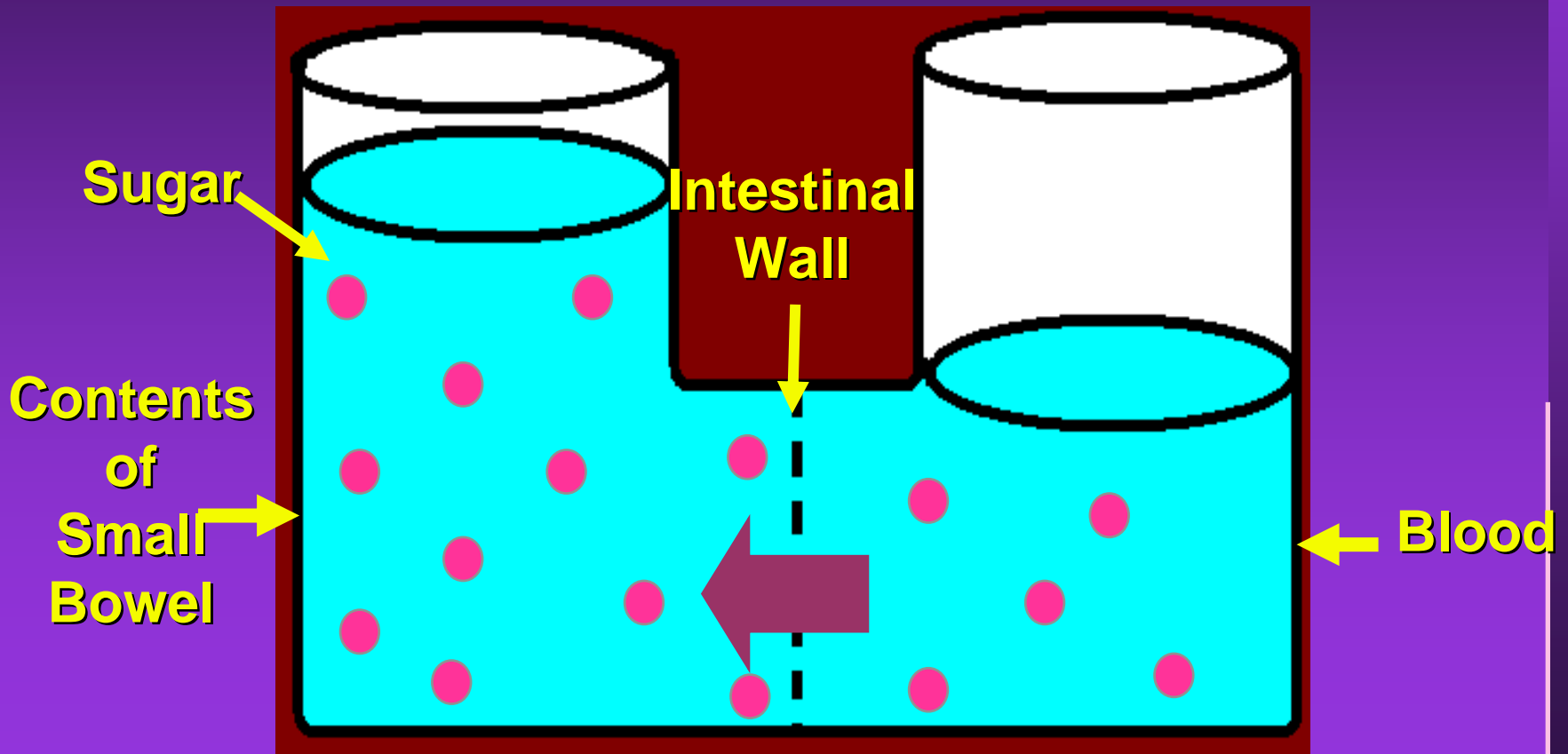


Q: Will water flow left to right or right to left?

# Osmosis and Fluid Balance

= Diarrhea

= Dehydration



**Osmolality of Blood ~300 mOsm**

**Keep fluids ingested below 300 to  
favor absorption**

# Osmolality of Various Beverages

	mOsm/liter
Prune juice	1265
Hi-C orange	809
Orange juice	614
Kool-aid + 1 cup sugar	448
Carbonated beverages	>700

# Using Concentrated Fluids

- **Very concentrated (such as prune juice) causes intestine to secrete fluids**
- **Avoid this effect by diluting with water or other fluid (for example with a flavored sugar free fluid – such as CrystaLite)**
- **When osmolality of fluid is less than blood the fluid will be absorbed**

## On the Flip Side: What about Water?

Osmolality is close to zero.....intestine must absorb it like a sponge.....right?

**WRONG!!!** In short bowel (esp. without colon) water is a poor hydrator. More fluid is lost than is drunk!

**WHY???** No sodium in water, high sodium in blood, sodium moves downhill and takes water with it!

## **Colon Intact... What then?**

- **If a small amount of ileum is removed, some bile is malabsorbed (but replaced by liver) and in the colon, bacterial action on bile causes water secretion. Rx – bind bile**
- **If a large amount of ileum is removed, bile is depleted (liver can't keep up) so bile pool is decreased resulting in poor fat absorption. Bacterial action in the colon changes this fat to castor oil-like substance!**

# Maximizing Anti-diarrheal Effects

- **Timing is critical: use anti-diarrheal meds about 20-30 minutes before meals and at bedtime**
- **Crush tablets or open capsules and add to sugar free applesauce to improve absorption**
- **Important to use enough to decrease diarrhea**



# Bacterial Overgrowth in Short Bowel

- **When the ileocecal valve is removed**
  - **Bacteria from colon move backward to small bowel**
  - **Number and type of bacteria**
    - **Favor fluid secretion into small intestine**
    - **Decrease carb absorption**
    - **Result in gas and bloating**

# Intestinal Dysmotility

- **Bacterial overgrowth syndrome, but for a different reason!**
  - **In situations where intestinal contents move slowly through the gut, bacteria increase in numbers**
    - **Analogous to back waters of a river!!**

# Treating Bacterial Overgrowth

- Rotating antibiotics
  - Using 2 or 3 different antibiotics, using one at a time
  - 1-3 weeks between antibiotics
  - Prevents resistance of bacteria
  - Allows good bacteria to be replaced when no antibiotics are used

# Summary

**Controlling despicable diarrhea may require:**

**Limiting sweets, high osmolality drinks**

**Avoiding free water, coffee, tea, diet pop**

**Limiting fats**

**Treating bacterial overgrowth syndrome**

**It all depends on your anatomy and  
intestinal function**

**Soooooooooooo**

- **Just like the little orphans that wrapped Despicable Gru around their little fingers, you can deal with Despicable Diarrhea by applying your knowledge of causes of the diarrhea!!!**