Managing Malabsorption Related Diarrhea in Cancer

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Objectives

- GI anatomy changes → diarrhea
- Managing typical diarrhea
- Signs/symptoms of malabsorption
- Causes of malabsorption
- Review of pancreatic function
- Treatment Options
- Significance of cancer weight loss
- Benefits of nutrition intervention


The Human Digestive System

- Duodenum: Intestinal fluids, bile, and pepsin
- Jejunum/Ileum: H2O soluble vitamins, amino acids, fatty acids, glucose, and short and medium chain fatty acids
- Colon: Bile salts, amino acids, short chain fatty acids, and sodium chloride

Vitamin B₁₂, iron, magnesium, calcium, potassium, short chain fatty acids, sodium chloride, water, glucose, and amino acids.
Digestion of Fats

Healthy mucosa allows nutrients to pass the barrier, while blocking the entry of toxins. Injured mucosa blocks nutrients at the damaged villi while permitting toxins into the blood stream.

Adapted from: http://www.biblelife.org/leakygut.htm
Management of Typical Diarrhea

- Drink lots of fluid, <64oz/day
  - One cup after each BM replaces losses
  - Caffeine increases urine output, aggravates diarrhea
- Complex carbohydrates are tolerated best
  - Rice congee (www.cancernutritioninfo.com)
  - B-R-A-T diet
- Limit high fiber, gas-forming foods
- Small, frequent meals/snacks
  - "Irritable bowels" have excessive response to signals
- "De-stress" before eating
  - The fight or flight response affects enzyme secretion

Management of Typical Diarrhea . . .

- Include sources of sodium and potassium; such as bananas, potatoes, tomatoes, avocado, melon; gatorade®/sports drinks, broth; oral rehydration solutions
- Avoid extreme hot and cold foods; can increase contractions
- Avoid lactose containing foods; yogurt is OK
- Limit fatty foods... may aggravate diarrhea
- Limit simple sugars and sugar substitutes (-ol)
  - Post esophagectomy, gastrectomy, leads to dumping
  - Sugar free gums and other food with non-absorbable carbs
- Limit caffeine containing beverages and avoid magnesium dietary supplements
- Anti-diarrheal medications... take before meals

Complementary Treatments for Diarrhea

- Probiotics/Friendly bacteria
  - 6 – 10 billion+ live organisms daily
- Psyllium fiber
- Lactaid® products
- Glutamine for GI repair
  - 8 - 30 grams/day in 2 – 4 divided doses
- Cholestyramine, binds excess bile
  - Can be issue with gallbladder problems/surgery
- Pancreatic Enzymes
  - Pancrecarb®, Creon®, Ultrace®, Pancreas®, generic
- Antacid therapy (PPI, Ranitidine, Tums®)
  - Less acid from stomach improves enzyme action
How is Malabsorption Different than Diarrhea?

Food is not being broken down into small enough pieces and/or cannot be absorbed across the gastrointestinal wall

1. A picnic for the bacteria of the lower GI tract
2. Foul smelling stools, oily fat droplets, undigested food

Diarrhea +
Craping, bloating, gas, and weight loss

Possible Causes for Malabsorption

- Some medications: HIV treatment medications, antibiotics
- Pancreatic dysfunction
  - GI Cancer: pancreas, gastric, esophageal
  - Cystic Fibrosis
  - Pancreatitis: ETOH, high TG's, infection
- Short gut (Surgery)
- Damaged gut (Radiation, HIV, GVHD)
- Excess serotonin (ex: Carcinoid tumors)
- Intestinal pathogens
- Malabsorption syndromes

Signs and/or Symptoms of Malabsorption

- Diarrhea
- Foul smelling, oily stools (Statorrhea)
- Bloating/Gas
- Stools that float
- Passage of undigested food
- Abdominal pain
- Weight loss
- Anemia
- Fatigue

Malabsorption of food can also reflect:

**Malabsorption of oral medications even possibly oral chemotherapies**

**Compromised immune function**
Nutrition Challenges in Pancreatic/GI Cancers

- Taking in enough calories and protein to maintain weight...anorexia/cachexia
- Absorbing what they take in (Exocrine)
  - Lack of enough digestive enzymes → Malabsorption of fat, protein and carbohydrates
  - Lack of buffer agents in the gut that help bring up pH to a zone where enzymes are active
- Utilizing what they absorb (Endocrine)
  - Diabetes (pancreatic dysfunction)
  - Altered glucose, protein and fat metabolism (Cachexia)

Tests for Malabsorption

- Fecal fat test
- Fecal elastase
- Sudan III
- Serum immunoreactive trypsin
- Triolein breath test
- Schilling test
- D-Xylose Absorption test

Micronutrients Affected by Malabsorption

- Fat soluble vitamins
  - Vitamin A*, D*, E*, K
- Vitamin B12 (post gastrectomy and/or ileal resection)
  - B12 at 1,000 mcg subcutaneous injection monthly
- Calcium, Magnesium
- Selenium*, Iron*, Zinc*
- Bicarbonate

* Dietary and/or serum deficiencies after pancreatic surgeries

Pancreatology 2002; 2(6):528-34
Treating Pancreatic Dysfunction

- Modify diet, if useful
  - Low fat diet
  - MCT oils, elemental formulas
  - Diabetic adjustments, if needed
- Enhance pancreatic function
  - Replacing missing enzymes and buffer
- Control irritation to the pancreas
  - Limit/Discontinue alcohol ingestion
  - Address hyperlipidemia, if needed
  - Initiate enzyme therapy for pain relief

Factors Impacting Enzyme Secretion

- Surgical changes due to inflammation of duct (Pancreatic cancer, disease)
- Changes in signaling in altered GI “geography” can occur with some gastric or esophageal cancers

Maximizing Enzyme Function

- Enteric coating protects in stomach
  - Spheres dissolve at higher pH in duodenum
- Most active at pH 9; requires buffer
  - The duodenum averages pH of 6 – 7 when the pancreas is not producing bicarbonate in normal amounts
- Surface area counts!
  - T = tabs; S = spheres (2.5 – 3x area)
Enzymes work through direct contact
Pancreatic Enzyme Replacement

![Graph showing Stearic Fat Degradation](image)

Naming Enzymes

- **Numbers** = Lipase units (thousands) per capsule
  - Base level typically provides 4,000 to 4,500 units lipase per capsule
- **MS** = Microspheres
  - Creon® 10, 20 (MS)
  - Pancrecarb® MS 4, 8, 16
- **MT** = Microtabs
  - Pancrease® MT 10, 20
  - Ultrase® 12, 18 (MT)

Lipase Activity of Pancreatic Enzyme-Containing Products

<table>
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<tr>
<th>PRODUCT</th>
<th>pH</th>
<th>Label Activity</th>
<th>Assayed Activity</th>
<th>Label Buffering at pH 9.0</th>
<th>Assayed Activity</th>
<th>% Activity in the Stomach at Various pH**</th>
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<tr>
<td>Pancrease®</td>
<td>5.6</td>
<td>4,500</td>
<td>8,803</td>
<td>0</td>
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<td>&lt;1%</td>
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<td>CREON® 10</td>
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<td>Cozymzym-S</td>
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<td>Ultrase® MT-20</td>
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<td>21,375</td>
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<td>9,000</td>
<td>2.5 mEq</td>
<td>47%</td>
<td>&gt;7%</td>
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*Note: pH values and activities are approximate and subject to variation.*
Dosing Enzymes

**Standard Recommendation**

500 - 4,000 lipase units/gram dietary fat for the meal
e.g. 4,000 units x 20 gm fat = 80,000 units ÷ lipase 16 = 5 capsules/meal

**Practical Guidelines: Weight Based**

♦ Start with 1,000+ units of lipase/kg of body weight/day

Starting Enzymes/Doses

60 kg x 1,000 u/kg = 60,000 units lipase ÷ 4 (for 3 meals and snacks)
♦ 15,000 units per meal
  – Example: 2 Pancrecarb® MS 8/meal
  ♦ 8,000 units per snack; ex: 1 MS 8

THIS IS A DOSE-FINDING MISSION

♦ Provide enzyme therapy handout
♦ Encourage titration up to effective dose
♦ Minimize pills once dose is determined

_Dose requirements can change over time!

Dosing Maximums

**CF Foundation Clinical Guidelines for Enzyme Replacement**

Not to exceed 2,500 units lipase/kg of body weight/meal

e.g. 2,500 x 55kg (120lb) = 137,500 units ÷ lipase 16 = 8.5 capsules per meal maximum

_Cancer patients never approach max_
Common Enzyme Errors

- Doses are not monitored and readjusted
  - Suboptimal...like taking baby aspirin for a migraine
- Rationale, symptoms are not explained
  so patients can't tell if they are working
- Enzymes are not taken consistently
  - Must be consumed with/around meals so they travel the gut together
  - Missed doses lead to continued problems

Take them with anything with fat or protein you want absorbed...including oral nutritional supplements

Stool Frequency / Day

Rate of Urgency of Bowel Movement Before / During PANCRECARB® Therapy
Weight Loss in Cancer: What Does it Mean?

Critical Questions regarding weight loss:

♦ Is it an early marker of cancer resistant to therapy? 
  Or.....

♦ Does it independently reduce patient response?

What do we know is that unplanned weight loss of 5% affects prognosis


Weight Loss in GI Cancers

Patients with weight loss received less therapy

♦ Lower doses initially
♦ More dose limiting toxicity, treatment breaks

♦ Shorter overall survival, DFS (p <0.0001)
♦ Decreased quality of life (QOL) (p <0.0001)
♦ Decreased performance status (p <0.0001)
♦ Better over all survival if weight loss stopped (p<0.0004)

Effect of Weight Loss on Overall Survival


Nutritional Intervention

60 patients receiving 20 RT treatments for GI or H&N Cancer

- Regular & intensive nutrition counseling (NI) + oral supplements PRN OR booklet, prn referrals given as usual care (UC)
- Nutrition intervention (NI) group had smaller deteriorations in:
  - Weight (p <0.001)
  - Nutrition status (p = 0.02)
  - Global QOL (p = 0.009)


Nutrition Intervention Meant Weight Stabilization

Strategies for Managing Nutrition Problems

- **Encourage communication** (patient/staff)
  - Identify challenges early
    (Know/teach the signs of malabsorption)

- **Take prompt action** to manage problems
  - Waiting rarely solves anything
    (Consider trial of enzymes... free sample program)

- **Continually reevaluate** existing plan
  - Each recommendation is also one of many options
    (Adjust enzymes as needed)
Conclusions

- Diet modification and revised strategies can decrease typical diarrhea episodes
- Malabsorption should be addressed
  - With initial symptoms to prevent wasting
  - To prevent nutrient deficiencies
- Enzymes often work when malabsorption is related to pancreatic dysfunction, and can improve QOL
  - Adjusting enzyme doses make a difference
- Nutrition intervention can limit weight loss and has been demonstrated to improve quality of life

Thank you…..

Questions?