Probiotics in Adult GI Problems: In with the Good, Out with the Bad

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REVIEW ARTICLE

Elizabeth G. Phimister, Ph.D., Editor

The Human Intestinal Microbiome in Health and Disease

Susan V. Lynch, Ph.D., and Oluf Pedersen, M.D., D.M.Sc.

Some terms you need to know

**Biomarker sequencing:** The process of cataloguing microbes in a mixed-species community through analysis of sequence variation in a single ubiquitous gene.

**Holobiont:** The totality of organisms in a given ecosystem (e.g., the shared human and microbial ecosystem); also called a superorganism.

**Metabolome:** The complete set of small-molecule chemicals found in a biologic sample.

**Metagenome:** All the genetic material present in an environmental sample, consisting of the genomes of many individual organisms.

**Methanogenic archaea:** Methane-producing microbes of the ancient Archaea kingdom.

**Microbiome:** The collection of all genomes of microbes in an ecosystem.

**Microbiota:** The microbes that collectively inhabit a given ecosystem.

**Pathobionts:** Typically benign endogenous microbes with the capacity, under altered ecosystem conditions, to elicit pathogenesis.

**Prebiotics:** Nutritional substrates that promote the growth of microbes that confer health benefits in the host.

**Probiotics:** Live microbes that confer health benefits when administered in adequate amounts in the host.

**Synbiotics:** Formulations consisting of a combination of prebiotics and probiotics.
Tools for Analyzing Microbiota

- Biomarker sequencing → Community composition
- Metagenomics → Generation of draft genomes, functional capacity, growth dynamics
- Metastranscriptomics (RNA sequencing) → Gene expression
- Metaproteomics → Protein expression
- Metabolomics → Metabolic productivity
**Gut Microbiota Functions**

- Influences
  - Immune maturation and homeostasis
  - Host cell proliferation
  - Vascularization
  - Neurologic signaling
  - Pathogen burden
  - Intestinal endocrine functions
  - Bone density
  - Energy biogenesis

- Biosynthesis
  - Vitamins
  - Steroid hormones
  - Neurotransmitters

- Metabolism
  - Branched-chain and aromatic amino acids
  - Dietary components
  - Bile salts
  - Drugs
  - Xenobiotics

**Disease Indications**

- Neurologic
- Psychiatric
- Respiratory
- Cardiovascular
- Gastrointestinal
- Hepatic
- Autoimmune
- Metabolic
- Oncologic

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**Figure 1. Some Functions of the Gut Microbiota and Disease Associations.**
Intractable Diarrhea

- A 68 y/o woman was treated for an exacerbation of COPD with a round of antibiotics. Following recovery from her respiratory infection, she developed diarrhea. This was cultured and found to be positive for Clostridium difficile. She was treated with metronidazole and the C dif toxin was cleared from her system.
Intractable Diarrhea (cont’d)

- Nonetheless, she continued with intractable diarrhea leading eventually in three months to hospitalization for dehydration. All stool, urine and blood cultures were negative. Endoscopy suggested microscopic colitis. Despite negative cultures, she was placed on IV quinolones, based on a WBC of 15,000. She was also on 250 million units of Lactobacillus acidophilus orally. Despite IV fluids, and clear liquid diet, she continued to have significant symptoms of diarrhea.

- Can you suggest appropriate next steps for this patient?
Treatment

- High dose probiotics, 10-20 Billion units
  
  She responded within two days to taking 10 capsules (Only 2.5 BU) of hospital formulary L. acidophilus and left without diarrhea.

Other options could also include:

- Glutamine 10-30 g daily
- Asacol
- Steroids
- Saccharomyces boulardii—helpful in C. Dif
- Look at her diet and make recommendations: Gluten free/Casein Free, Comprehensive Elimination Diet, FODMAP diet, Specific Carbohydrate diet.
- Use of anti-inflammatory herbs such as curcumin, boswellia, Zyflamend® which might be helpful for her COPD as well as the diarrhea
Probiotics and Antibiotic Associated Diarrhea

- Saccharomyces boulardii shows best evidence for effectiveness
  - McFaraland, Am J Gastroenterol 2006; Hempel, JAMA 2012)
- Lactobacillus species studies also showed effectiveness, though less than S boulardii (NNT=13)
  - Hempel, Systematic review and meta-analysis, JAMA, 2012)
- **Saccharomyces boulardii**
  (250 mg three times daily) for CD diarrhea

- Large, well-conducted studies needed before routine prescribing
- Individualization may be important in pt selection
WISCONSIN FOOD PYRAMID
Sugar + Yeast =
Roles and indications of probiotics

- Dysbiosis
- Diarrhea (antibx, *e.g.* *H. Pylori* tx, viral, traveler’s, infantile, AIDS related, *C difficile*)
- Lactose intolerance
- Immunomodulatory effects
- Altered gut permeability (leaky gut)
- Inflammatory disorders (IBD-UC, pouchitis)
- Colon cancer prevention
- Atopy/food allergy
- IBS
Mechanisms of Action of Probiotics

- Colonization resistance
- Production of antibacterial substances
- Competition for nutrients
- Competitive inhibition at bacterial adhesion sites
- Enhancement of the immune defense system
- Modulation of pain perception/receptors (micro-opiod, cannabinoid)
BACTERIA FOR BREAKFAST
Probiotics for Good Health

Dr. Kelly Dowhower Karpa
Commonly available probiotic products

- VSL #3 (8 species, ~500 BU dose)
- Align (B infantis)
- Culturelle (L rhamnosus GG)
- DanActive (L casei)
- Mutaflor (E Coli Nissle 1917)
- Florastor (Saccharomyces boulardi)
- Jarro-Dophilus (6 species-3.4 BU)
Biofilms

- Estimated weight of 6# placing it among the body’s largest “organs.”
- Components of probiotic biofilm have anti-infective, anti-adherent qualities, and possibly anti-tumor activity
- Probiotics can inhibit formation of invasive and dysbiotic biofilms
The Good, The Bad, the Ugly

Underused in GI Health
- Probiotics
- Fiber
- Fish oil
- Glutamine
- Vit D
- Magnesium
- Aloe

Overused in GI Health
- NSAID's
- PPI’s
- Steroids
- Antibiotics
5R’s of Functional Medicine for Gut Health

• **R**emove—offending toxins, allergens, microbials

• **R**eplace—enzymes, digestive factors,

• **R**einoculate—the reintroduction of probiotics

• **R**epair—foods and supplements, e.g., glutamine, fish oil, to reduce inflammation, repair mucosal injury

• **R**ebalance—support the patient to prevent the problem from recurring

Gastritis and ulcers
Lifestyle Options

• Avoiding milk products except yogurt/kefir
• Eating breakfast and regular meals
• Avoiding large meals
• Getting adequate sleep

(aspirin, steroids, and NSAIDs, like ibuprofen, naproxen)

• Getting regular exercise
Conventional Approaches

- **Antacid therapy**
  Maalox, Mylanta, Gaviscon, TUMS

- **H2 blockers**
  ranitidine/Zantac (150 mg twice daily or 300 mg at bedtime, maintenance therapy 150 mg at bedtime); famotidine/Pepcid (20 mg twice daily, 40 mg at bedtime, maintenance 20 mg at bedtime); cimetidine/Tagamet (400 mg twice daily or 800 mg at bedtime, maintenance 400 mg at bedtime); nizatidine/Axid (150 mg twice daily, 300 mg at bedtime, maintenance 150 mg at bedtime)

- **Proton pump inhibitors**
  omeprazole/Prilosec (20 to 40 mg daily); pantoprazole/Protonix (15 to 30 mg daily); esomeprazole/Nexium (20 to 80 mg daily) rabeprazole/Aciphex (20 mg daily)

- **Testing for H. Pylori**
  and treating when positive with PPI and antibiotics. Dosages of PPIs are adjusted when used with antibiotics.

- **Endoscopy**
  of esophagus and stomach (EGD)

- **Surgery**
  for bleeding, scarring
Botanical and Nutritional Supplements

- **Deglycyrrhizinated Licorice (DGL)**
  (two to four tablets 380 mg before meals for acute ulcer or gastritis, one to two tablets for chronic condition)

- **Mastic gum**
  (500 mg three times daily)

- **Slippery elm**
  (500 mg three times daily)

- **Aloe vera juice**
  (half cup three times daily)

- **Cabbage juice**
  (one glass twice daily)

- **Chamomile tea**
  (three cups daily)

- **Turmeric**
  (600 mg five times daily)

- **Vitamin C**
  (1200 to 5000 mg a day to suppress H. pylori (no more than 500 mg a dose, up to four weeks total)

- **Zinc**
  (30 to 50 mg daily as arginate or hydrate form for three to six weeks, supplement with at least 1 to 2 mg copper daily)

- **Glutamine**
  (1600 to 3000 mg in three to four divided doses for four weeks)

- **Fish oil and black currant oil**
  (1 g of each daily for eight weeks for suppression of H. pylori)
Other Integrative, Functional, Holistic Solutions

- Stress reduction measures
- Whole grains
- Fiber
- Pumpkin seeds (zinc source)

- Probiotics
  (5 to 20 billion units twice a day during and following antibiotic use for at least two weeks)
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Diarrhea
Probiotics and Infectious Diarrhea

- Lactobacillus GG and VSL#3 both reduced duration of diarrhea by about a day.
  - Allen, Cochrane Database, 2010
Lifestyle Options

- Pushing fluids
- BRAT diet (bananas, rice, applesauce, toast)
- Eating yogurt
- Reviewing medications as causative factors, e.g., antacids, antibiotics
- Hand-washing to prevent transmission of infection
Conventional Medical/Surgical Approaches

- **World Health Organization’s rehydration formula**
  3.5 g sodium chloride, 2.9 g trisodium citrate or 2.5 g sodium bicarbonate, 1.5 g potassium chloride, 20 g glucose or 40 g sucrose (prepare at home using one-half teaspoon of salt, one-half teaspoon of baking soda, for tablespoons of sugar, one liter of water)

- **Anti-motility agents**
  Loperamide/Imodium (4 mg to start and 2 mg after each unformed stool to a maximum of 16 mg daily no more than two days).
  Diphenoxylate/Lomotil (4 mg up to four times daily for no more than two days). Caution: use either sparingly and avoid if fever or bloody diarrhea.

- Likely infectious diarrheas will need **physician consultation** (may need lab studies of stool).

- **Prescriptions**
  which may include antibiotics (ciprofloxacin, levofloxacin, trimethoprim/sulfamethoxazole, doxycycline, azithromycin, erythromycin, vancomycin); antiparasitics (metronidazole).
Botanical and Nutritional Supplements

- **Bilberry**
capsules (240 to 600 mg per day) or tincture (1 to 2 ml two times per day); fruit (20 to 60 g); juice (one-half cup two to three times daily)
- **Ginger**
(500 mg twice daily or one to two cups ginger tea daily)
- **Glutamine**
(1000 to 3000 mg three times daily)
- **Red raspberry, blackberry, or blueberry leaf tea**
(one to two teaspoons dried leaves in cup of boiling water) or capsule form (5 to 10 mg daily)
- **Slippery elm tea**
(three cups daily, or 500 mg capsule daily for three days)
- **Zinc**
can improve response to triple antibiotic therapy for H. pylori.
- **Avoid magnesium and vitamin C during diarrhea.**
Other Integrative, Functional, Holistic Solutions

• **Probiotics**
  to reestablish bacterial balance (two to six capsules *Lactobacillus* and *Bifidobacteria* at least 4 billion units daily); consider especially in antibiotic-induced diarrhea.
  10-30 BU or higher used by experienced clinicians

• Bulk-forming agents (kapectate, Metamucil, psyllium)
• Anti-inflammatory agents (Pepto-Bismol)
• Use lactase (Lactaid) if dairy/lactose intolerance suspected (chronic diarrhea).
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Constipation
Probiotics and Constipation

- Small studies and a systematic review suggestive of benefit with *B lactis*, *Lactobacillus casei*, *E coli Nissle*

- Insufficient data to recommend for severe constipation
- Trial of therapy may be worthwhile along with other measures
Lifestyle Options

• Drinking fluids (ten to twelve glasses daily)

• Consuming fiber (30 g daily) from fruits, vegetables, legumes, whole grains in diet

• Considering lactose intolerance

• Exercising regularly

• Reviewing medications that may be constipating

• Keeping a weeklong bowel habit diary
Conventional Medical/Surgical Approaches

• Excluding significant medical or surgical conditions through careful history, physical examinations, and if needed X-rays, endoscopy, or other tests
• Education about the condition
  normal vs. abnormal stool patterns, stooling after meals; avoiding excessive use of laxatives; increasing fiber and fluids, physical activity
• Dietary changes
  generally adding fiber and other bulk-forming agents, such as psyllium, methylcellulose, or calcium polycarbophil, though though these may not be as useful in slow-transit-time type constipation
• Careful use of laxatives and enemas when needed
  docusate, milk of magnesia, magnesium citrate, polyethylene glycol, sorbitol, lactulose, bisacodyl, senna; saline or mineral oil enemas
• Manual disimpaction
• Surgery (rarely) primarily for neurological causes
Botanical and Nutritional Supplements

- **Aloe vera juice**
  (half cup up to three times daily or 40 to 170 mg dehydrated juice in capsule to create soft stool; short-term use only, less than one week)
- **Cascara**
  (250 mg two to three times daily; short term use only, less than one week)
- **Magnesium**
  (350 to 500 mg a day in chelated form)
- **Milk of magnesia**
  (one to two tablespoons daily)
- **Senna**
  (tea with one-half teaspoon of senna in cup of water once or twice daily; may double if needed to obtain soft stool)
- **Vitamin C**
  (500 to 2000 mg a day or more to achieve soft stools)
Other Integrative, Functional, Holistic Solutions

• Biofeedback in chronic cases, especially in children and in cases with dyssynergy as cause of constipation
• **Maintaining regular probiotic intake (Bifidobacteria two to three times daily)**
• Soluble fiber such as psyllium, ground flaxseed (one to three tablespoons daily)
• Wheat or corn bran (one tablespoon daily)
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Irritable bowel syndrome
Probiotics and IBS

- One systematic review found important methodological issues in 16 RCT’s evaluated—dosing, time of treatment, species, outcome measures
  - Brenner, Am J Gastroenterol 2009
- Another systematic review and a meta-analysis suggested benefit
  - Moayyedi, Gut 2010; McFarland, World J Gastroenterol 2008
- Therapeutic trial may be optimal for now varying dose, species, length of tx and other factors
Lifestyle Options

- High-fiber foods
- Treating food allergy if present
- Identifying lactose and/or fructose intolerance
- Getting regular light to moderate exercise
- Paleolithic (cave man) diet with less grains or processed foods
Conventional Medical/Surgical Approaches

• Develop a positive therapeutic relationship
• Patient education
• Psychological therapies
  (see other integrative, functional, holistic solutions)
• Dietary modification
  lactose, gluten, carbohydrates, food allergy, gas-producing foods
• Fiber (insoluble vs. soluble)
  psyllium, wheat bran or polycarbophil, methylcellulose (trial of one-half to one tablespoon daily to start)
• Antispasmodics (as needed)
  dicyclomine/Bentyl™ (20 mg up to four times daily); hyoscyamine/Levsin™ (0.125 to 0.25 mg three or four times daily); sustained release hyoscyamine/Levsin™ (0.375 to 0.75 mg every twelve hours)
• Antidepressants
  amitriptyline, desimpramine, imipramine, nortriptyline (dosing is variable based on response and side effects, such as constipation; paroxetine (20 mg daily), fluoxetine (20 mg daily), sertraline (100 mg PO daily).
Conventional Medical/Surgical Approaches

► **Anti-diarrheals**

Loperamide/Imodium™ (2 to 4 mg as needed, not to exceed 16 mg/day)

► **Anxiolytics**

for short term use only for acute anxiety:
lorazepam/Ativan™ (0.5 to 1 mg up to three times daily);
diazepam/Valium™ (1 to 10 mg up to three times daily);
oxazepam/Serax™ (10-30 mg three times daily).

► **Serotonin antagonists for relief of abdominal pain and discomfort**

ondansetron/Zofran™ (4 to 8 mg one to two times daily);
granisetron/Granisol™ (2 mg daily)

► **Other: lubiprostone/Amitiza™**

(8 mcg twice daily for women over eighteen with constipation variety IBS)
Botanical and Nutritional Supplements

- **Peppermint oil**
  (1 to 2 enteric coated capsules three times daily)

- **Caraway oil**
  enteric-coated volatile oil (0.05 to 0.2 ml can be taken three times daily); can be taken in combination with Peppermint oil

- **Fennel**
  (1 teaspoon with food), also available as tea, oil capsule, alcohol extract

- **Ginger**
  (250 to 500 mg three to four times daily, or as tea, 1 cup before meals)

- **Chamomile**
  (1 cup of tea three times daily)
Other Integrative and Holistic Solutions

- Relaxation exercises
- Management of stress and anxiety
- Cognitive behavioral therapy
- Hypnotherapy
- Biofeedback
- Psychotherapy
- Mindful eating
- Avoid or limit antibiotics to prevent dysbiosis
- Consider acupuncture

- **Probiotics** (up to 25 billion units of Bifidobacteria and 25 billion units of Lactobacillus for 4 to 6 weeks then 10 BU daily, mixed species). Some clinicians use up to 100 BU/d

- Soluble fiber such as psyllium, ground flaxseed 2 to 3 tablespoons daily
- Iberogast™ (20 drops 3 times a day for 4 weeks
- Rifamixin (400 mg three times daily) for small intestinal bacterial overgrowth
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<tr>
<td>High-fiber foods</td>
</tr>
<tr>
<td>Treating food allergy if present</td>
</tr>
<tr>
<td>Identifying lactose and/or fructose intolerance</td>
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<tr>
<td>Getting regular light to moderate exercise</td>
</tr>
<tr>
<td>Paleolithic (cave man) diet with less grains or processed foods</td>
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<tr>
<td>Develop a positive therapeutic relationship</td>
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<tr>
<td>Patient education</td>
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<tr>
<td>Psychological therapies (see other integrative, functional, holistic solutions)</td>
</tr>
<tr>
<td>Dietary modification: lactose, gluten, carbohydrates, food allergy, gas-producing foods</td>
</tr>
<tr>
<td>Fiber (insoluble vs. soluble): psyllium, wheat bran or polycarbophil, methylcellulose (trial of one-half to one tablespoon daily to start)</td>
</tr>
<tr>
<td>Antispasmodics (as needed): dicyclomine/Bentyl™ (20 mg up to four times daily); hyoscynamine/Levsin™ (0.125 to 0.25 mg three or four times daily); sustained release hyoscynamine/Levsin™ (0.375 to 0.75 mg every twelve hours)</td>
</tr>
<tr>
<td>Antidepressants (any of these may be considered particularly with coexisting depression): amitriptyline, desipramine, imipramine, nortriptyline (dosing is variable based on response and side effects, such as constipation; paroxetine (20 mg daily), fluoxetine (20 mg daily), sertraline (100 mg PO daily).</td>
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<tr>
<td>Anti-diarrheals: Loperamide/Imodium™ (2 to 4 mg as needed, not to exceed 16 mg/day)</td>
</tr>
<tr>
<td>Anxiolytics: for short term use only for acute anxiety: lorazepam/Ativan™ (0.5 to 1 mg up to three times daily); diazepam/Valium™ (1 to 10 mg up to three times daily); oxazepam/Serax™ (10-30 mg three times daily). Serotonin antagonists for relief of abdominal pain and discomfort: ondansetron/Zofran™ (4 to 8 mg one to two times daily); granisetron/Granisol™ (2 mg daily)</td>
</tr>
<tr>
<td>Other: lubiprostone/Amitiza™ (8 mcg twice daily for women over eighteen with constipation variety IBS)</td>
</tr>
</tbody>
</table>

| Peppermint oil (1 to 2 enteric coated capsules three times daily) |
| Caraway oil: enteric-coated volatile oil (0.05 to 0.2 ml can be taken three times daily); can be taken in combination with Peppermint oil |
| Fennel (1 teaspoon with food), also available as tea, oil capsule, alcohol extract |
| Ginger (250 to 500 mg three to four times daily, or as tea, 1 cup before meals) |
| Chamomile (1 cup of tea three times daily) |
Inflammatory bowel disease: Crohn’s disease and ulcerative colitis
Crohn’s disease and probiotics

- Mixed results from studies
- Aggregate data do **NOT** support clinical effectiveness for induction or maintenance of remission
  - Bourreille, Clin Gastroenterol Hepatol 2013; Steed, Aliment Pharmacol Ther 2010)
A word on Pouchitis and UC

- Ileal pouch-anal anastomosis (post-colectomy for UC)
- Recurrent inflammation of ileal reservoir=pouchitis
- VSL#3 for maintenance of remission—3-6g/d
- Studies on probiotics for UC are promising but not proven for remission
  - Naidoo, Cochrane Review, 2011_
Stool Transplant!?  
Human Probiotic Infusion (HPI)

Retention enema of fecal bacterial therapy for UC

Before

After

Lifestyle Options

- Maintaining an anti-inflammatory diet
- Identifying food allergy
- Minimizing alcohol intake
Conventional Medical/Surgical Approaches

Crohn’s disease:
- **Mesalamine/Pentasa or Asacol**
  (2 g a day with an increase to a maximum of 4.8 g a day)
- **Sulfasalazine/Asacol (2 to 4 g daily)**
- **Prednisone**
  (40 to 60 mg daily for ten to fourteen days, then decrease)
- **Budesonide/Entocort EC**
  (8 mg daily for eight weeks then decrease to 6 mg for up to three months)
- **Immunosuppressant therapy**, such as infliximab, adalimumab, certolizumab pegol
- **Azathioprine or 6-mercaptopurine**
- **Antibiotics, such as metronidazole, quinolones**
- **Surgery**
  multiple types including removal of sections of bowel, ileostomy, treatment of infection, strictures, fistulas

Ulcerative colitis:
- **Sulfasalazine/Azulfidine, mesalamine/Pentasa, Asacol, Lialda, Apriso, Olsalazine/Dipentum, or balsalazide/Colazal**:
  local application as enemas and suppositories for rectal or left-sided colon problems; systemic dosing for nonresponsive or more extensive disease to maximum tolerated and then lowered to maintenance (dosages vary per drug)
- **Steroids**
  prednisone and budesonide as above in CD
- **Immunosuppressive therapy**
  cyclosporine, infliximab, methotrexate, azathioprine, mercaptopurine
- **Surgery**
  colectomy (removal of part or all of colon), multiple variations with and without colostomy
Botanical and Nutritional Supplements

- **Aloe**
  (half cup three times daily)

- **Rice bran oil**
  (100 mg three times daily for three to six weeks)

- **Boswellia**
  (550 mg three times daily)

- **Curcumin**
  (1 g twice daily)

- **Fish oil**
  (6 g daily at least 3.2 g EPA and 2.2 g DHA)

- **Glutamine**
  (1600 to 3000 mg daily in three to four divided doses)

- **Wheat grass juice**
  (three and a half ounces daily for a month)

**Supplements to replace malabsorbed nutrients, i.e.,**

- Calcium (1200 mg/day),
- magnesium (350 mg/day),
- iron (300 mg/day),
- selenium (200 mcg/day),
- zinc (30 mg/day),
- vitamins A (5000 IU/day),
- B1 (50 mg/day),
- B6 (50 mg/day),
- folic acid (400 mcg/day),
- B12 (50 mcg/day),
- Vitamin D (2000 IU daily)

**Antioxidants such as:**

- beta carotenoids (10000 IU daily),
- vitamin C (250 to 500 mg daily),
- CoQ10 (50 to 100 mg daily)
Other Integrative, Functional, Holistic Solutions

- **Stress management**
- **Probiotics**

mixed species (start with low dose of 1 BU three times daily and gradually increase over a month to 20 to 30 BU daily; UC patients have safely taken as much as 200 to 500 BU daily, some dosing over a Trillion Units daily). **VSL# 3 has best evidence to date**

- **Nicotine patches (UC)**
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• Identifying food allergy  
• Minimizing alcohol intake | Crohn’s disease:  
• Mesalamine/Pentasa or Asacol (2 g a day with an increase to a maximum of 4.8 g a day)  
• Sulfasalazine/Asacol (2 to 4 g daily)  
• Prednisone (40 to 60 mg daily for ten to fourteen days, then decrease)  
• Budesonide/Entocort EC (8 mg daily for eight weeks then decrease to 6 mg for up to three months)  
• Immunosuppressant therapy, such as infliximab, adalimumab, certolizumab pegol  
• Azathioprine or 6-mercaptopurine  
• Antibiotics, such as metronidazole, quinolones  
• Surgery: multiple types including removal of sections of bowel, ileostomy, treatment of infection, strictures, fistulas | Aloe (half cup three times daily)  
• Rice bran oil (100 mg three times daily for three to six weeks)  
• Boswellia (550 mg three times daily)  
• Curcumin (1 g twice daily)  
• Fish oil (6 g daily at least 3.2 g EPA and 2.2 g DHA)  
• Glutamine (1600 to 3000 mg daily in three to four divided doses)  
• Wheat grass juice (three and a half ounces daily for a month)  
• Supplements to replace malabsorbed nutrients, i.e., calcium (1200 mg/day), magnesium (350 mg/day), iron (300 mg/day), selenium (200 mcg/day), zinc (30 mg/day), vitamins A (5000 IU/day), B1 (50 mg/day), B6 (50 mg/day), folic acid (400 mcg/day), B12 (50 mcg/day), Vitamin D (2000 IU daily)  
• Antioxidants such as beta carotenoids (10000 IU daily), vitamin C (250 to 500 mg daily), CoQ10 (50 to 100 mg daily) | Stress management  
• Probiotics: mixed species (start with low dose of 1 BU three times daily and gradually increase over a month to 20 to 30 BU daily; some UC patients have safely taken as much as 200 to 500 BU daily)  
• Saccharomyces boulardi (250 mg three times daily) for CD diarrhea  
• Nicotine patches (UC) |
| Ulcerative colitis:  
• Sulfasalazine/Azulfidine, mesalamine/ 
Pentasa, Asacol, Lialda, Apriso, 
Olsalazine/Dipentum, or balsalazide/ 
Colazal: local application as enemas and suppositories for rectal or left-sided colon problems; systemic dosing for nonresponsive or more extensive disease to maximum tolerated and then lowered to maintenance (dosages vary per drug)  
• Steroids: prednisone and budesonide as above in CD  
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• Saccharomyces boulardi (250 mg three times daily) for CD diarrhea  
• Nicotine patches (UC) |
Diverticulosis
Lifestyle Options

- Preventing with high-fiber, low-fat diet
- Avoiding constipation using fiber, stool softeners
- Getting regular physical activity such as running
- It is no longer universally recommended to avoid small seeds and nuts
Conventional Medical/Surgical Approaches

**Uncomplicated**

(abdominal pain, fever):
- **Outpatient therapy**
- **Clear liquids** for three days
- **Antibiotics** ciprofloxacin/Cipro (500 mg twice daily); metronidazole/Flagyl (500 mg three times daily). Other options for those intolerant of these medications are amoxicillin-clavulanate, clindamycin, or moxifloxacin
- Restart **high-fiber diet** when acute conditions subsides.
- **Colonoscopy** two to six weeks after acute episode to exclude cancer or other disease
- Up to 30 percent of uncomplicated cases require **surgery**.

**Complicated**

(high fever, severe abdominal pain, bleeding, obstruction, perforation, abscess, fistula formation):
- **Admit to hospital** for IV fluids and antibiotics (multiple possible combinations)
- **CT scan**
- Consider **surgery** emergently or after initial treatment
- **Colonoscopy** two to six weeks after acute episode to exclude cancer or other disease
Botanical and Nutritional Supplements

- **Rice bran oil**
  (100 mg three times daily for three to six weeks)

- **Glutamine**
  (up to 8 g daily in three to four divided doses, adjusted according to response)

- **Slippery elm bark**
  (one to two capsules three times daily, or make a tea with one teaspoon in two cups of water and use freely)
Other Integrative, Functional, Holistic Solutions

- Soluble fiber such as psyllium, ground flaxseed (two to three tablespoons daily)

- **Probiotics to prevent infection:**
  - L. acidophilus/Bifidobacteria (one capsule twice daily for prevention, two capsules three times daily during flare-ups)
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| Diverticulosis | - Preventing with high-fiber, low-fat diet  
- Avoiding constipation using fiber, stool softeners  
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- It is no longer universally recommended to avoid small seeds and nuts | Uncomplicated (abdominal pain, fever):  
- Outpatient therapy  
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*Note: The table is based on the information provided in the image. The text has been formatted to improve readability and coherence.*
Digestive Wellness
4th Edition
Strengthen the Immune System and Prevent Disease Through Healthy Digestion

Elizabeth Lipski, Ph.D., CCN, CHN
Foreword by Mark Hyman, M.D.

The Healthy Gut Workbook
Whole-Body Healing for Heartburn, Ulcers, Constipation, IBS, Diverticulosis & More

Victor S. Sierpina, MD
Foreword by David S. Jones, MD
Preface by Steven G. Pratt, MD, FACS, author of SuperFoods Rx
Thanks to Dr. Dave Rakel for some of his great slides used with his permission in this presentation