Functional Medicine University's Functional Diagnostic Medicine Training Program

Module 2

The Functional Diagnostic Medicine Approach in the Treatment of Gastrointestinal Dysfunction & Disease

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The goal of the functional medicine approach to treatment is to identify dysfunctions and disease processes, and restore biochemical, physiological, and metabolic aberrations. While dysfunctions are aberrations of physiology, disease is the expression of the dysfunction; shown through the signs and symptoms.

The foundation and basic tenets of treating the gastrointestinal system include the following:

- **Identify**
  - Offending foods
  - Dysbiosis
    - Bacterial overgrowth
    - Yeast infection
    - Parasitic infection
    - Pathogenic/opportunistic bacteria
  - Medications damaging the GI lining
  - Poor diet
  - Stress

Solution: Treat the dysbiosis, remove the offending substance, and stress management.

- **Evaluate** for inadequate digestive and absorption functions such as:
  - Hypochlorhydria
  - Biliary insufficiency
  - Pancreatic insufficiency
  - Nutritional deficiency
  - Intestinal inflammation

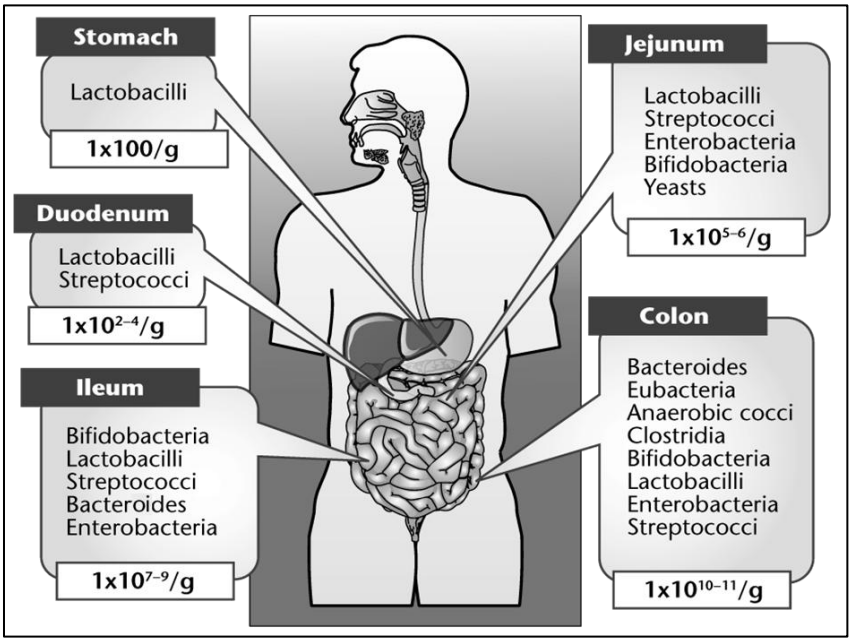
Solution: Treat and prescribe supplementation as indicated. For example:

  - Betaine HCl
  - Pancreatic enzymes
  - Bile Salts
  - DGL
  - Marshmallow Root
  - Fiber
  - Water

- **Restore** normal gut ecology with appropriate proportions of probiotics and prebiotics. Some examples are:

  - Probiotics
    - Lactobacillus
    - Bifidobacter
    - Saccharomyces boulardi
    - Others

  - Prebiotic (food for Probiotics)
    - Inulin
    - FOS
    - Fiber
    - Larch



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Type and Amounts of Bacteria in Regions of the Gut

For a typical healthy individual, bacterial populations change greatly moving from stomach to stool. The genus or class of predominant organism is shown inside each box and the total number of microbes per gram of intestinal content is shown at the bottom of the box.

- **Healing** the Intestinal Lining

The goal in this phase of treatment is to restore the integrity of the intestinal mucosa lining which includes the goblet cells and the immune system.

Regeneration of the intestinal lining can be aided by the following supplements.

- L-glutamine
- Essential fatty acids
- Butyrate
- Pantothenic acid
- Zinc
- Vitamin C
- DGL-Licorice (stimulates goblet cells formation)

TABLE 7.11 — INTESTINAL WELLNESS OPTIONS

Focus	Category		Agents
Digestive function	Stomach		Betaine hydrochloride, L-Histidine
	Pancreas		Pancreatic enzymes
	Hepaticobiliary		Ox bile, Taurine, Olive oil
	Avoid		Antacids, H2 blockers, Proton pump inhibitors
			Cholecystectomy
			Large, rushed meals high in protein and fat
Mucosal integrity	Nutrients supporting cell growth and protection		Zinc, Vitamins A, C, E, Folic acid, Pantothenic acid, Oligopeptide mixtures, Free-form amino acids
	Energy substrate		Small intestine: Glutamine
			Large intestine: Soluble and insoluble fiber
			Butyrate retention enemas
	Cell membrane		Essential fatty acids
	Avoid		NSAIDs
Intestinal dysbiosis	Prebiotics	Bacteria	*L. acidophilus, L. salivarius, L. plantarum* and *L. casei, Bifidobacterium*
		Yeasts	*Saccharomyces boulardii*
		Probiotics	Soluble and insoluble dietary fiber, Fructo-oligosaccharides, Inulin
	Bacteriostatic agents	Bacteria – Severe	Amoxicillin + clavulinic acid or other, as indicated
		Bacteria – Moderate	Berberine-containing herbals such as goldenseal, Citrus seed extract, Olive leaf extract, Aloe vera, Garlic, Glycyrrhiza (licorice)
		Yeast – Severe	Nystatin
		Yeast – Moderate	Capric and undecylenic acids Avoid simple sugars

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TABLE 7.1 — SUMMARY OF LABORATORY EVALUATIONS FOR GASTROINTESTINAL FUNCTION

GI Aspect	Function	Testing	Abnormal	Intervention
Stomach	Gastric acid, Pepsin	Heidelberg capsule Direct pH readings	↓ pH	– Mucosal building protocol – Betaine HCl – Free-form amino acids (see Chapter 4, "Amino Acids") – B-vitamins – Trace elements (see Chapter 3, "Nutrient and Toxic Elements")
		Indirect indicators	Multiple ↓ trace elements or amino acids	
Pancreas	Protease	Fecal chymotrypsin	↓ Activity	Pancreatic replacement enzymes (proteolytic, lipolytic and amylytic) and essential fatty acids
		PABA index	↓ Index	
	Lipase	Plasma fatty acids	↓ PUFA	
		Fecal fats	↑ Fat	
Liver/ Gallbladder	Bile acid secretion	Fecal fatty acids	↑ Fatty acids	Ox bile, choleretic herbs (milk thistle) and essential fatty acids
Small intestine	Absorption	Schilling test	↓ Urinary B_{12}	B_{12} by injection or ≥ 1,000 µg/d sublingual
		Lactulose-Mannitol challenge	↓ Urinary mannitol	Mucosal restoration
		Fasting plasma amino acids	Multiple low values	Essential amino acid mixtures
		Food-specific IgG	Multiple elevations	Food elimination/Rotation diets
Colon	Water resorption, Microbial containment	Fecal butyrate or other SCFA	↓ Butyrate	Increase dietary fiber
			↑ Isobutyrate	Butyrate enemas
Immune barrier	Glycocalyx antigen binding Allergy-antigen elimination	Serum, urinary or fecal IgA	↑ Food-specific IgA	Eliminate offending antigens
		Serum IgE	↑ Total IgE	Immune-support nutrients such as *Glycerrhiza glabra* (licorice) root or L-glutamine 3,000–6,000 mg daily
Physical barrier	Regulate nutrient admission and restrict toxicant and microbial access	Serum IgG	Many + foods	Eliminate + foods by group (Rotation Diet) Add free-form amino acids and glutamine Zinc 50–100 mg/d, B_5 100–200 mg/d
		Lactulose-Mannitol challenge	↑ Urinary Lactulose	Eliminate + foods
			↓ Mannitol	Mucosal restoration
Microbial populations	Normal: nutrient delivery	Urinary metabolic markers	↑ Bacterial markers	Herbal or pharmaceutical antibioitics (e.g., berberine alkaloids, etc.)
	Pathogen: toxin production	Hydrogen-Methane breath test	↑ Protozoal markers	Prebiotics and probiotics with antiprotozoals
			↑ Yeast markers	Restrict simple sugars with antifungals
			↑ Expired gases	Herbal or pharmaceutical bacteriostatic agents
		Stool microbial DNA quantititation or culture & sensitivity	↑ Growth	Specific antibiotics

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Overview of non-prescription and prescription agents

Always check indications and contraindications of all agents before use. PDR's for botanicals, drugs, and supplements should be referenced. A stool analysis can provide information about sensitive agents and resistant agents.

Yeast Infections

- Non-Prescription
  - Garlic
  - Caprylic acid
  - Undecylenic/acid
  - Berberine
  - Tannins
  - Grape seed extract
  - Oregano
  - Cat's claw

- Prescription
  - Nystatin
  - Fluconazole

Bacterial Infection/Overgrowth

- Non-prescription
  - Oregano
  - Citrus seed extract
  - Berberine

- Prescription
  - Rifaximin
  - Tetracycline
  - Ciprofloxacin
  - Metronidazole

Parasitic Infections

- Non-prescription
  - Golden seal
  - Artemesia (Worm Wood)
  - Oregano
  - Black walnut
  - Grapefruit seed extract
  - Garlic
  - Quassia

Note: When treating parasites with botanicals, it is recommended to use a blend of several to lengthen treatment time and to rotate anti-parasitic agents. Retesting is important and it will help ensure treatment efficiency. I recommend retesting in 8 to 12 weeks.

Parasitic Infections (con't)

- Prescription

Parasite	Drug
– Amebiasis (Entamoeba histolytica)	Metronidazole
– Ascariasis (Round worm)	Albendazole
– Babesiosis	Atovaquone & Azithromycin
– Cryptosporidiosis	Nitrozoxanide
– Giardiasis	Tinidazole & Metronidiazole
– Hookworm	Abendazole
– Schistosomiasis	Priziquantel
– Tapeworm	Priziquantel
– Toxoplasmosis	Selfadiazine & Pyrimethamine

Gastric Inflammation/ Gastritis

Gastric inflammation is strongly associated with hypochlorhydria because many of the causes of hypochlorhydria actually cause atrophy of the gastric lining. An untreated gastric inflammation can lead to frank gastritis which is strongly associated with burning of the stomach and potentially even vomiting blood.

Causes:

- *Helicobacter pylori and other bacteria*
  - People infected with Helicobacter pylori (H.pylori) can experience gastritis. H.pylori may break down the stomach's protective coating, causing changes in the stomach's lining leading to inflammation.
  - Helicobacter pylori infection is strongly associated with hypochlorhydria. If a patient has persistent hypochlorhydria, presents with ulcer symptoms, or complains of chronic stomach burning, H.pylori infection should be ruled out.
  - Signs and symptoms
    - Discomfort in the upper GI, especially upper left quadrant
    - Bloating
    - Nausea
    - Maybe vomiting
    - Burning or pain in the upper abdomen, usually occurring about an hour or so after meals or during the night.

Gastric Inflammation Gastritis (con't)

Causes:

- *Nonsteriodal anti-inflammatory drugs* (NSAIDs), such as aspirin, ibuprofen (Advil, Motrin, others) and naproxen (Aleve) can cause damage to the protective lining of the stomach.
- *Alcohol use*: Alcohol can irritate and erode the stomach lining
- *Stress*
- *Bile reflux disease*

Complications of chronic gastritis:

Long-term effects of gastritis include poor vitamin B-12 status in all people. Signs of B12 deficiency often mimic those of senility. Many people have B12 deficiencies with normal serum B12 levels. More sophisticated tests of B12 status are available, such as homocysteine and methylmalonic acid.

Signs and symptoms of chronic gastritis

- Frequent stools or normal stool frequency
- Weak appetite
- Epigastric pain that becomes worse or better with eating
- Unexplained nausea
- Unexplained vomiting
- Fever
- Blood in the stool (end stage)
- Vomiting blood (end stage)
- Bloating
- Belching
- Hiccups
- Low tolerance to spicy foods
- Weight loss
- A feeling of fullness after a meal

Helicobacter pylori Infection

H.pylori is the bacterium that causes peptic ulcer disease. It can be detected in approximately 90% of individuals with peptic ulcers. There is a strong association between H.pylori infection and gastric cancer. It is estimated that 50% of the world's population is infected with H.pylori.

- Mode of transmission
  - Oral to oral
  - Fecal to oral
  - Family inter-infection (Note: Asymptomatic family members may need to be treated to stop transmission)
- Laboratory testing
  - *H.pylori serology*
    - 90% specificity and sensitivity (IgG)
  - *Urea breath test (carbon 13)*
    - Based on products created when urea is split by the H.pylori
    - Drink with urea labeled with a carbon 13 isotope is ingested by the patient
    - The breath is measured for the carbon 13
    - If the concentration is high, possible H.pylori infection is suspected
  - *H.pylori fecal antigen test*
    - Based on monoclonal antibody immunochromatography
    - Specificity 98% Sensitivity 94%
- Biopsy
  - *Histology*
  - *Culture*
  - *Rapid urease test*
- Treatment options
  - American College of Gastroenterology Guidelines
    - *PPI (proton-pump inhibitor)* clarithromycin and amoxicillin or metronidazole for 10-14 days

      or
    - *PPI or* histamine-2 receptor antagonist, bismuth subsalicylate, metronidazole and tetracycline for 10-14 days.

H.pylori stains are showing increasing resistance to clarithromycin.

Refer to www.acg.gi.org for a detailed explanation.

Helicobacter pylori Infection (con't)

- Treatment options
  - *Natural treatment*
    - Bismuth subcitrate 240 mg 2x per day for 2 weeks
    - Mastic gum (Pistacea lenticus)
      - Dosage: 1 gram per day for 2-3 weeks
    - Goldenseal (berberine)
      - Dosage: 250 mg standardized extract 2-4x/per day
    - Pyloricil: 1 capsule 4 times/day for 3-4 weeks, then retest. Available at www.orthomolecular.com
  - *Additional treatment for H.pylori and gastritis/ulcers*
    - DGL Licorice wafers
      - Helps to heal the mucous lining and promotes mucous secretions
        - Dosage: chew 2 -4 wafers 3x/per day (may be obtained through Douglas Laboratories)
    - Sano-Gastril
      - Is obtained by fermenting an extract of soybean (Glycine max) with special Probiotic bacteria, Lactobacillus bulgaricus LB51. It is designed to support digestion in the stomach and neutralize excess hydrochloric acid to a physiologically more appropriate level without the use of alkalinizing agents.
      - Is available in 1.5 g tablets to be either chewed or sucked, and is generally well tolerated. Sano-Gastril may be taken as desired, either before or after meals.
      - www.AllergyResearchGroup.com
    - Gastrozyme (cabbage leaf extract)
      - Dosage: 2 -4 tablets per meal or may be taken prn for gastric upset
      - Available through Biotics Research

Yeast Infections (Candida sp.)

Candida are normal inhabitants of the gastrointestinal tract and are present in 40 -65 % of the human population with no harmful effects. However, in conditions of overgrowth, various Candida sp. are most commonly found as the causal agents of opportunistic fungal infections.

Causes

- Antibiotic use (main cause)
- High intake of sugar, milk, other dairy products and foods containing a high concentration of yeast or mold
- Hypochlorhydria
- Food allergies
- Depressed immune system
- Altered bowel flora

Symptoms/conditions

- Gastric pain
- Nausea and vomiting
- Gas and bloating
- Altered fecal transit time
- Intestinal permeability
- Imbalance in gut microflora
- Opportunistic bacterial infection
- Esophagus is most common site of infection, followed by stomach, then small and large bowel
- 15% develop systemic candidiasis
- May be associated with autistic spectrum disorders

Extra-intestinal symptoms/conditions

- Chronic fatigue
- Vaginal yeast infections
- Depression
- Irritability
- Chemical sensitivity
- Eczema, psoriasis

Treatment

- Reduce intake of refined carbohydrates and sugars
- May need to use pharmaceutical or botanical anti-fungal agents – refer to sensitivity testing on stool profile
- *S.boulardii* aids in the growth of beneficial bacteria, crowds out yeast, and helps with immune support.
- Avoid fructooligosaccharide (FOS) as it may feed the yeast.

Most organic fatty acids are fungicidal and have been used for centuries as antimicrobial agents. Undecylenic acid has been shown to be approximately six times more effective as an antifungal than caprylic acid, and is effective in maintaining a healthy balance of intestinal and vaginal flora.
Dosage: usually given in an oil-based gelcap or as a powder (in the case of its salts) in a two-part capsule. Adult dosage is usually 450-750 mg Undecylenic acid daily in three divided doses.
Ref: Alternative Medicine Review; Vol 7, No.1, 2002

Opportunistic Bacterial Infections

- Causes
  - Low predominant bacteria
  - Pathogen or parasite infection
  - Poor diet
  - Antibiotic use
  - Lowered gut immunity

- Symptoms/conditions

  - Asymptomatic
  - Diarrhea
  - Constipation
  - Bloating/gas
  - Myalgia
  - Fatigue
  - Headaches
  - Autoimmunity:
    - Reactive arthritis: *Salmonella* sp.; *Yersinia* sp; *Klebsiella* sp.
    - General molecular mimicry mechanism: *Morganella*, *Proteus* and possibly *Pseudomonas*
    - Hashimoto Thyroiditis and Grave disease: *Yersinia enterocolitica*

- Treatment:
  - Probiotics 10 -450 billion CFUs 1 -5 x/day depending on condition
  - Modulate lactobacillus or bifidobactor dosage as tested
  - Prebiotics as directed, including: psyllium, oat bran, oliofructose, xylooligosaccharide, inullin, betaglucan, and/or arabinogalactan
  - Do not use fructooligosaccharide (FOS) if *Klebsiella* sp. or *Citrobacter* sp. are present
  - Increase intake of fresh vegetables and fibers
  - Identify and treat food sensitivities
  - May need to use pharmaceutical or botanical anti-microbial agents – refer to sensitivity testing on stool profile

Pathogenic Bacteria

Clostridum difficile

- Causes:
  - Suspect recent antibiotic use, especially the cephalosporin's, ampicillin/amoxicillin, and clindamycin
  - Nosocomial
  - Advanced age
  - Fecal-oral colonization

- Symptoms/conditions
  - Asymptomatic carrier
  - Cramping, lower abdominal pain, fever and diarrhea usually decreased once antibiotics are stopped, though can continue for up to 4 weeks
  - Pseydomembranous colitis

- Treatment
  - Do not treat if patient is asymptomatic
  - Stop use of causative antibiotics
  - In severe cases: prescription antibiotics
  - Herbal antibiotics such as berberine or oregano oil
  - Replete beneficial micro-organisms, esp. S. boulardii and Bifidobacteria

Campylobacter sp

- Causes
  - Contaminated animal food sources
  - Hydrochloric acid insufficiency
  - Secretary IgA deficiency

- Symptoms/conditions
  - Abrupt influenza-like symptoms are common, including headache and malaise
  - GI symptoms include abdominal pain, nausea and vomiting, diarrhea
  - Associated with reactive arthritis

- Treatment
  - Generally self-limiting infection

Pathogenic Bacteria (con't)

Entero hemorrhagic Escherichia coli (EHEC)

- Causes
  - Contaminated food (undercooked meat, raw milk, unpasteurized apple juice, water, and lettuce)

- Symptoms
  - Severe abdominal cramping, watery or bloody diarrhea and vomiting
  - Hemorrhagic colitis (up to 10 of cases)

- Treatment
  - Generally self-limiting
  - Rehydrate if diarrhea
  - Probiotic/prebiotic therapy

Parasitic Infections

Common Parasitic Infections	Signs and Symptoms	Preventive Measures
• Cryptosporidium species • Entamoeba histolytica • Giardia lamblia • Entamoeba coli and Endolimax nana • Entamoeba hartmani • Dientamoeba fragilis	• IBS • Abdominal pain and cramping • Excessive flatulence • Foul smelling stools • Greasy stools • Malabsorption • Weight loss • Poor appetite • Indigestion • Headaches • Fatigue • Fever • Increased intestinal permeability • Food allergies • Hives • Gastritis	• *Please refer to non-prescription and prescription treatments mentioned earlier in this lesson* • Wash hands thoroughly with soap and water before eating • Avoid salad bars and food that has been sitting out or reheated or microwaved. • If eating raw, wash and peel non-organic fruits and vegetables. Soaking them in a solution of 3% hydrogen peroxide and 2 quarts of water then rinsing thoroughly before eating is recommended. • Wash all cutting boards and food prep areas thoroughly. Do not mix utensils and cutting boards used for raw meats with other foods.

Low (Good) Bacteria

- Usually discovered on stool analysis

- Causes
  - Antibiotic
  - Diarrhea
  - Imbalanced diet

- Symptoms/conditions
  - Irritable bowel syndrome
  - Food intolerance
  - Increased likelihood of acquiring opportunistic and pathogenic organisms

- Treatment
  - Probiotics 10-450 billion CFUs 1 -5 x/day depending on condition. Modulate *lactobacillus* or *Bifidobacter* dosage according to need based on stool analysis results
  - Prebiotics as directed, including: psyllium, oat bran, oligofructose, xylooligosaccharide, inulin, beta-glucan, and/or arabinogalactan
  - Increase intake of fresh vegetables and fibers

Hypochlorhydria

- Test for H.pylori

- Signs and symptoms
  - Bloating, belching, burning, and flatulence immediately after meals
  - A sense of fullness after eating
  - Indigestion, diarrhea, or constipation
  - Multiple food allergies
  - Nausea after taking supplements
  - Itching around the rectum
  - Weak, peeling, and cracked fingernails
  - Dilated blood vessels in the cheeks and nose (in non-alcoholics)
  - Acne
  - Iron deficiency
  - Chronic intestinal parasites or abnormal flora
  - Undigested food in stool
  - Chronic candida infections
  - Upper digestive tract gassiness

Hypochlorhydria (cont')

- The following is associated with low gastric acidity:
  - Addison's disease
  - Asthma
  - Celiac disease
  - Chronic autoimmune disorders
  - Chronic hives
  - Dermatitis herpetiformis (herpes)
  - Diabetes
  - Eczema
  - Gallbladder disease
  - Graves disease
  - Hepatitis
  - Hyper and Hypothyroidism
  - Lupus erythematosus
  - Myasthenia gravis
  - Osteoporosis
  - Pernicious anemia
  - Psoriasis
  - Rheumatoid arthritis
  - Rosacea
  - Sjogren's syndrome
  - Thyrotoxicosis
  - Vitiligo

- Treatment
  - *Betaine HCl*
    - Dosage: begin with one 150 milligram tablet of betaine HCl with meals. If the patient does not respond, build slowly to a maximum of 10 capsules with each meal. If the patient experiences burning, immediately neutralize the acid with 1 tsp baking soda in water or milk. That indicates that the patient now has too much HCl and is irritating the stomach lining. Cut the dosage back to a comfortable level.
  - *Vinegar*
    - Stomach acidity can be increased with vinegar. Have the patient dilute 1 teaspoon of vinegar in water and drink with each meal. Gradually have the patient increase the amount of vinegar to up to 10 teaspoons. If burning is experienced, the acid can be immediately neutralized with one teaspoon of baking soda mixed in a glass of water or milk.

Hypochlorhydria (cont')

- *Test for vitamin B12 deficiency*
  - Patients with hypochlorhydria are more often than not deficient in B12 because a decrease in HCl output from the parietal cell is accompanied by a decrease in the output of intrinsic factor, which is essential for B12 absorption.
    - Serum B12
    - Nutritional homocysteine
    - Methylmalonic acid

- *Multivitamin with minerals*
  - Adequate HCl is necessary for absorption of vitamins and minerals. Look for a supplement which contains the following: 1,000 milligrams calcium, 500 milligrams magnesium, no more than 400 IU vitamin D, 100-200 micrograms chromium, 100-200 micrograms selenium, 5-10 milligrams manganese, at least 15 milligrams zinc, and at least 25 milligrams of each B-vitamin.

- *Digestive enzymes*
  - Plant-derived enzymes are recommended because they are able to work in the low pH of the stomach and in the neutral environment of the intestines. They provide protease and lipase for the stomach and serve your enzyme needs throughout the digestive tract. Dosage: 1 -2 tablets with meals for a trial period of 4 weeks.

- *Swedish Bitters*
  - Bitters are a long-standing remedy for poor digestion in Europe. They stimulate production of hydrochloric acid. Bitters should be taken in either tablet or liquid form as needed.

- Botanical Treatment

  - Gentian Bitter Herb digestive stimulant
    - Is primarily used to support the digestive system, but also used to treat indigestion, gas, and a lack of appetite. It also causes the liver and gall bladder to have improved function.
    - The ideal dose of the tincture is to dissolve about twenty drops in a small glass of water and sipped at least fifteen minutes prior to eating.

- Dietary Advise
  - Chew food thoroughly
  - Eat small meals frequently
  - Avoid drinking liquids with meals. Fluids dilute stomach acid.

Acid Indigestion/GERD

Acid indigestion may also occur from too much stomach acid. However, this is rare is most likely a regulatory issue in the physiology of digestion. Under normal conditions, the parietal cells of the stomach make HCl at a pH of 0.8. this extreme acidity is normal physiology. A hyperacidic condition usually indicates that the gastric mucosa has lost the ability to handle normal amounts of gastric acid and therefore, compromising the protective function.

- Clinical considerations
  - Gastric or duodenal ulcers and gastritis may result over time from too little stomach acid.
  - Hypochlorhydria leads to poor protein absorption and metabolism.

- Recommendations
  - Reduce or eliminate sugar, starchy carbohydrates, processed foods, alcohol, and coffee.
  - Follow food-combination rules. It is particularly important to avoid mixing starch and sugar with protein foods. Sugar and starch reduce hydrochloric acid production, while protein requires it. When these foods are combined, undigested protein in the GI tract putrefies.
  - Eat slowly and chew food thoroughly.
  - Limit liquids at mealtime. Drink only 8 to 12 ounces of water at room temperature to avoid diluting the gastric juices.
  - Eat at least three to four hours before bedtime. The last meal of the day should be light.

  - *Hydro-Zyme (Betaine HCl, Pepsin and Pancreatin)**
    - Hydro-zyme is used for acid replacement to recover normal stomach pH and to support the gastric environment. **For sensitive individuals or where gastritis or ulcer is a possibility, start with healing the stomach lining first before instituting HCl replacement**. Start with one tablet at mid-meal (protein). If no discomfort occurs, increase by one tablet daily per meal until digestion improves. Hydrochloric acid can be taken before, during, or after a meal. One or two tablets taken 10 to 15 minutes before a meal will stimulate hunger for those with sluggish appetite. It is common to require 8, 10, or even 15 Hydro-Zyme to achieve successful digestion. In this case, use Betaine Plus HP (high potency), which contains 700 mg of HCl, as compared to 235 mg of acid. However, start therapy with Hydro-Zyme because the dose can be managed more carefully, which is important for patients that are more sensitive.
    - <u>In cases where burning or abdominal discomfort is reported with hydrochloric acid supplementation, gastritis or ulceration of the gastric mucosa should be considered. In such cases, it is necessary to heal the gut lining before additional hydrochloric acid is used. Consider one or more of the following for one to two weeks:</u>

      - *Gastrozyme (Gut healing nutrients and vitamin U)**
        - Gastrozyme heals and cools gastric and intestinal tissues. Vitamin A is critical in healing epithelial tissue, gamma-oryzanol increases tissue healing and repair by increasing growth hormone production, and chlorophyllins support tissue healing and pain reduction. Vitamin U, originally from cabbage leaf extract, is a powerful tissue-healing agent for the GI tract. <u>Recommendation</u>: 2 to 4 tablets per meal; may take an additional 2 to 4 tablets as needed for gastric upset

Acid Indigestion/GERD (con't)

- *Chlorocaps (chlorophyllins)**
  - Chlorocaps is a healing salve that reduces pain and promotes healing. Useful both internally and externally. Recommendations: 1 to 3 capsules per meal, plus 1 to 3 as needed for abdominal discomfort.

- *L-Glutamine**
  - L-Glutamine is the preferred fuel for intestinal tissues and promotes tissue healing. Recommendations: 1 to 2 capsules per meal.

*Available at Biotics Research

Pancreatic Insufficiency

The signs of pancreatic insufficiency include gas, indigestion, bloating, discomfort, undigested food in our stools, undigested fat in our stools, and food sensitivities. It is common in people with candidiasis or parasite infections and is an underlying cause of hypoglycemia. Pancreatic insufficiency also increases with age. People with pancreatitis and cystic fibrosis have pancreatic insufficiency.

Stool testing with the comprehensive digestive stool analysis provides an indirect measure of pancreatic function by measuring chymotrypsin, or pancreatic Elastase, and by measuring how well meats and vegetables are digested.

Causes of pancreatic insufficiency are stress, (mental and physical), nutritional deficiencies poor diet, eating only cooked foods, exposure to radiation or toxins, hereditary weaknesses, drugs, and infections.

- Natural treatment
  - Improve eating habits. Chew food thoroughly
  - Pancreatic enzymes (recommended supplementation: Wobenzym N)

Hyperpermeability/Dysbiosis

The small intestine has the paradoxical dual function of being a digestive/absorptive organ as well as a barrier to permeation of toxic compounds and macromolecules. Either one of these functions may be disrupted by various mechanisms, resulting in local as well as systemic problems.

Increased permeability of the intestinal mucosal barrier appears to correlate with a number of frequently seen clinical disorders, while decreased permeability appears as a fundamental cause of malnutrition, Malabsorption and failure to thrive.

Increases in permeability have consistently been reported with small bowl inflammation. Permeability studies show Crohn's disease to be more extensive than sometimes apparent using macroscopic approaches. When patients with Crohn's disease were placed on an elemental diet, their permeability improved significantly, coinciding with marked clinical improvement.

Hyperpermeability/Dysbiosis (con't)

- *Inflammatory Joint Disease*
  - The concept that the underlying etiology of inflammatory arthritides (including rheumatoid arthritis) is related to pathology in the gut has become more accepted by researchers. All material that traverses the mucosa is inspected by the immune system, and it is here that the immune system may have its greatest antigenic exposure. Increased gut permeability can permit exogenous antigens to enter the systemic circulation. If the antibodies generated towards gut antigens cross-react with the body's own immunologically similar tissues, the resulting process may manifest itself as an autoimmune disease.

Factors, Symptoms and Diseases Associated with Dysbiosis and Intestinal Hyperpermeability

Contributing Factors	Diseases
Alcohol abuse	Inflammatory bowel disease
Corticosteroid use	Irritable bowel syndrome
NSAIDs use	Celiac disease
Excessive stress	Infectious enterocolitis
Nutrient insufficiencies	Cystic fibrosis
Gastrointestinal infections	Chronic fatigue immune deficiency syndrome
Food reactions	Acne
Improper fasting	Eczema
Symptoms	Psoriasis
Abdominal distention	Urticaria
Diarrhea	Dermatitis herpetiformis
Constipation	Autism
Abdominal pain	Childhood hyperactivity
Food intolerances	Spondyloarthropathies
Skin rashes	Pancreatic insufficiency
Poor exercise tolerance	HIV infection
Shortness of breath	Neoplasia treated with cytotoxic drugs
Cognitive deficits	Hepatic dysfunction
Fatigue and malaise	Alcoholism
Arthralgia	Environmental illness
Myalgia	
Fevers of unknown origin	

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IBS/IBD

- Recommend advanced functional laboratory testing
  - Stool analysis
  - Allergy testing - food/environmental
  - Organic acid
  - Intestinal Hyperpermeability test
  - Heidelberg capsule
  - Gastro test
  - Nutritional blood test
    - Methylmalonic acid
    - Nutritional homocysteine
    - Serum B12
    - Vitamin D 25-OH

Irritable Bowel Syndrome (IBS)

IBS is the one most common gastrointestinal disease seen in clinical practice. It has been characterized as a functional bowel disorder.

Rome II Criteria for Diagnosis of IBS:

- Presence of abdominal pain or discomfort for at least 12 weeks, which need not be consecutive, in the preceding 12 months, with at least two of three features:

  1. Relief of symptoms with defecation and/or
  2. Onset associated with a change in frequency of stool and/or
  3. Onset associated with a change in form (appearance) of stool

- Natural therapy
  - Primary testing
  - Advanced testing
  - Foundations of GI treatment
  - Botanical Medicine
    - Use of these agents is best directed by the nature and location of the patient's symptoms.
    - *Carminatives*
      - Used to reduce flatulence and colic
      - Smooth muscle tone and reduce the incidence of spasms
      - Peppermint
        - Promotion of digestive function
        - Relieves nausea
        - Relaxes smooth muscle spasticity, thereby relieving spasm
        - Dosage: one or two enteric-coated capsules (containing 0.2 ml of oil per capsule) three times daily between meals.

Irritable Bowel Syndrome (IBS) (con't)

- Natural therapy *(Carminatives con't)*
    - Ginger
        - Enhances gastrointestinal motility
        - Dosage: the dose of dried ginger rhizome is 0.25 to 1g three times per day.
    - Fennel
        - Dosage seeds (1/2 to 1 teaspoonful) can be consumed after meals or as needed; the recommended dose for the oil is 0.03 to 0.2 mL per day, and for the alcoholic extract, 0.5 to 2 mL per day, or 250 mg 3 times/day as needed.
    - German Chamomile
        - Inhibits ulcer formation by serving as a mucosal restorative
        - Recommended for relieving upper abdominal complaints
        - Dosage: chamomile tea is best known for its calming effect. 1:5 tincture, the dose is 1 to 4 mL three times a day between meals
    - Caraway
        - Dosage: alcoholic extracts of the dried ripe fruits are used, or a tea is made by infusing 1 to 2 teaspoons of the seeds for 10 minutes.

    - *Bitter Tonics*
        - Promotes digestion
        - Increases deficient appetites and improves the acidity of stomach secretions and protein digestion
        - Is contraindicated in peptic ulcer disease and gastritis
    - Gentian Root

    - *Bulking Agents*
    - *Demulcents*
        - Demulcent herbs serve to coat mucosal surfaces, thereby decreasing inflammation. Marsh mallow root (Althaea officinalis) is an example. A common dose is 1000 mg three times per day before meals.

Inflammatory Bowel Disease

The term inflammatory bowel disease (IBD) is used to describe two chronic relapsing and remitting disease, ulcerative colitis (UC) and Crohn's disease (CD).

A precipitating infectious source has been sought without success. Animal models, supported by a growing body of clinical research, suggest that comensal gastrointestinal flora may, in part, be responsible.

- Natural therapy
  - Primary testing
  - Foundation of GI treatment
  - Adequate protein intake
    - General nutritional guidelines should begin with replacement of nutritional deficiencies of both micronutrients and macronutrients. Protein requirements are increased in IBD as a result of the catabolic effects of inflammation.
    - Powder rice protein
  - Fiber
    - Regular use of dietary fiber should be encouraged. Although some fiber may be too 'rough' for sensitive mucosa and gluten sensitivities may exist in many individuals with IBD.
  - Use of an elimination diet

  - *Anti-inflammatory herbs*
    - Ginger
      - Dosages: common dosing for this herb is 1 to 2 g/day of powdered ginger extract, taken in individual doses.
    - Turmeric
      - Dosages: studies of inflammation have used doses of 1200 mg/day, divided three times a day.
    - Boswellia
      - Dosage: 350 mg orally three times a day

  - *Demulcents (coat and soothe inflamed mucosal surfaces)*
    - Marsh Mallow Root
    - Robert's Formula
      - Naturopathic physicians have historically recommended Modified Robert's Formula. It contains a number of herbs (e.g., Echinacea, goldenseal, slippery elm) that have various beneficial properties. Capsules of this formulation may be obtained from Phytopharmica and dosed 2 capsules three times per day.

Cholelithiasis

The combination of a 'Western Diet' high in saturated fats and a sedentary lifestyle in a population that is generally overweight creates an environment prone to gallstone formation. Formation of gallstones is the result of three factors: (1) supersaturation of bile with cholesterol, (2) a decrease in bile salts that act to dissolve the cholesterol vesicles, and (3) stasis of bile flow.

- Conditions that may increase the risk
  - Estrogen
  - Obesity
  - Cholesterol rich diet
  -
- Natural therapy
  - Weight management
  - Exercise
  - Low saturated fat diet
    - Recommend a diet low in saturated fats while increasing EFAs
  - Supplementation
    - Vitamin C
      - Evidence shows that a diet deficient in vitamin C results in gallstone formation.
      - Dosage: vitamin C, 200 mg twice a day. An 8 oz glass of orange juice has about 60 mg of vitamin C
    - Vitamin E
      - Animal studies have shown that those who were given a Vitamin E deficient diet developed cholesterol gallstones even when they were on a cholesterol-free diet.
      - Dosage: vitamin E (mixed tocopherols), 400 IU daily.
    - Lecithin (Phosphatidylcholine)
      - Lecithin is a phospholipid composed of phosphatidyl esters, one of which is phosphatidylcholine. Similar to bile salts, a low lecithin level in the body may be a causative factor in gallstone formation. Lecithin and bile salts reduce the saturation of cholesterol in the bile, which leads to stone formation.
      - Dosage: Lecithin, 500 to 1000 mg daily.
    - Choleretic herbs (stimulate bile production and flow)
    - Milk Thistle
      - Dosage: start at 150 mg twice a day, increasing to three times a day if needed.
      - May have a laxative effect
    - Dandelion
    - Artichoke

The following chart from Klaire Laboratories provides a reference guide on the appropriate Probiotic support for specific disorders.

Probiotic Support Cross-Reference Guide	Support During Antibiotic Therapy	Antagonizes Rotavirus	Antagonizes Clostridium difficile	Adjunctive Support in Ulcerative Colitis	Adjunctive Support in Crohn's Disease	Urinary Tract Support	Vaginal Microflora Support	Adjunctive Support in Irritable Bowel Syndrome	Bowel Regularity	Cholesterol Metabolism	Immune Response in Allergy
Ther-Biotic® Detox Support	●●●	●●●				●●	●●				●●●
Ther-Biotic® Factor 1	●●●	●●●	●			●●●	●				●●●
Ther-Biotic® Factor 4		●		●					●		●
Ther-Biotic® Complete	●●●	●●●	●●●	●●●	●	●●●	●●●	●●●	●●●	●●	●●
Ther-Biotic® Infant Formula	●●●	●●●		●		●●●			●		●●●
Ther-Biotic® Women's Formula	●●●	●●●	●●●	●●		●●●	●●●	●●●	●●	●	●●
Pro-5™	●●	●●●	●			●●	●●		●	●●	●●●
Vital-Immune Biotic™	●	●				●	●		●	●	●
Vital-Dophilus™ Plus	●	●●				●●●	●●●		●	●●	●●
Pro-Biotic Complex™		●	●				●			●●	
Vital-10®	●	●	●	●●		●	●●	●●●	●●		●
Vital-Plex®	●	●	●			●	●		●	●●	●●●
Saccharomyces boulardii	●●●		●●●	●	●●					●	
ABx Support™	●●●	●●	●●●			●●	●●		●		●
Culturelle®	●●●	●●●	●			●●	●●		●●		●●●
L. acidophilus							●			●	

This Reference Guide facilitates evidence-based selection of a Klaire Labs™ probiotic formulation. It incorporates the results of clinical research that show benefit for probiotic formulations in specific clinical conditions. One to three bullets are used to designate the strength of the research support. One bullet indicates that a component of a Klaire formulation has been shown to have benefit. Two bullets indicate moderate and three bullets indicate strong research support for a Klaire formulation. No bullet indicates research has not found a probiotic benefit in the clinical condition.

KEY

Blank = No species in the formulation has been shown effective for the condition.

● = One or more species in the formulation has been shown effective for the condition.

●● = One or more species in the formulation has been shown effective for the condition and the potency of at least one of these species is similar to that demonstrated to be effective in the literature.

●●● = One or more species in the formulation has been shown effective for the condition and the potency of at least one of these species is greater than that demonstrated to be effective in the literature or multiple studies have shown one of the species to be highly effective.

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