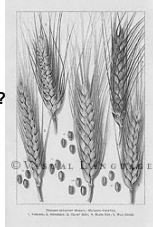


## Natural Grocers by Vitamin Cottage

### Gluten Intolerance a Growing Epidemic

How did the staff of life become toxic?  
Karen Falbo, CN



## What is Gluten?

- A mixture of proteins found in specific grains
  - A **protein** is a long chain of amino acids joined together by peptide bonds, sometimes referred to as a “polypeptide.”
    - Amino acids are the building blocks of the body.
- Gliadin and glutenin are the most common proteins in the gluten-containing grains.

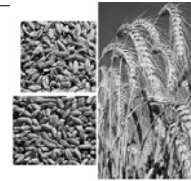
## Gluten

- The gluten proteins are unique in structure.
  - Lend an elastic consistency to dough's
  - Ideal for baking and food processing
    - breads, muffins, bagels, tortillas, cereals, cookies, cakes, crackers, pasta, etc.



## The Gluten-Containing Grains

- Wheat
- Rye
- Barley
- Kamut
- Spelt
- Triticale (a hybridized form of wheat and rye)



## Oats

- Oats do not contain gluten.
- Contamination is a concern.
  - Growing, harvesting, and processing
- Gluten-free oats are available.
  - Manufacture guarantee (labeled as such)
- May still pose a problem for some individuals
  - contain a protein called avenin, which is similar to gluten
  - “Avenin antibodies follow the same pattern as gliadin antibodies, but with slightly lower magnitude.”
    - Recognizing Celiac Disease, by Cleo J. Libonati, RN, BSN (Copyright 2007)



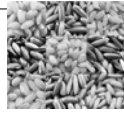
## Possible Sources of Gluten in Packaged Foods

- Barley, caramel color (rarely contains gluten in the US), colorings, dextrin, enriched flour, flour, wheat flour, hydrolyzed wheat protein, malt or malt syrup, modified food starch, mono/diglycerides, MSG (foreign sources may contain gluten), natural flavorings, oats, rice syrups (contains barley enzymes), rye, spices, soy sauce, stabilizers, starch, vanilla, and vanilla extract (may be grain alcohol-based, but most are made from corn; distillation removes any gluten).
- Under new labeling policy, natural flavorings will say “(contains barley)”

## Gluten-Free Grains



- Rice
- Corn
- Millet
- Quinoa
- Buckwheat
- Amaranth
- Teff



❖ Ask for the NGVC Customer Literature File titled “Gluten-Free Grains”

## Theories On Why We Cannot Handle Gluten

- Gluten-containing grains we eat today are domesticated and genetically hybridized
  - Originally they were wild grasses
- Cultivation of these and other plants:
  - Alleviated the pressures of the hunting/gathering lifestyle
    - Food more abundant and readily available
    - Allowed for stability and populated Agrarian societies

## Cordain’s Theory

Dr. Loren Cordain, PhD, author, “The Paleo Diet”

- Agricultural Revolution 10,000 years ago
  - introduction of cereal grains
- Prior
  - 2 million years - hunter gatherers



## Industrial Revolution

- 200 years ago
  - biggest health problem of our history
- Steam powered mills
  - refined white flours and sugars
    - availability and cheap to the masses
- We began to eat these processed foods in a larger quantities than ever before.
- New food
  - cereals, pasteurized dairy products, fatty meats, salted foods, and refined sugars and oils
  - disastrous for Paleolithic bodies



## Nutrigenomics

- As well stated by Jack Challem, The Nutrition Reporter and Author
- *“Look at it in another way, 100,000 generations of people were hunter-gatherers, 500 generations have depended on agriculture, and only 10 generations have lived since the start of the industrial age, and only two generations have grown up with highly processed fast foods. This short period of time in the course of man’s existence that grains have been around has proven that many of us are not physiologically able to tolerate gluten.”*

## Two Categories of Gluten Sensitivity

1. **Celiac disease (CD)** is also known as celiac sprue and/or gluten intolerant enteropathy
- Celiac Disease has 3 classifications: Symptomatic, Silent, and Latent
2. **Non-celiac gluten sensitivity (NSGS)**
- Both forms can cause serious health consequences and manifest similar expressions.
  - Many poor-health symptoms can improve on a GF diet.

## Celiac Disease: The Most Common Form of Gluten Sensitivity

- An immune-mediated reaction to gliadin and other polypeptides found in the gluten grains.
- The immune reaction occurs in the gastrointestinal tract. The gliadin portion of the gluten protein does the following:
  - Binds to intestinal mucosa (intestinal lining)
  - Acts as an antigen (foreign invader)
- Lymphocytes (white blood cells) attack the intestinal lining (i.e., autoimmune process).

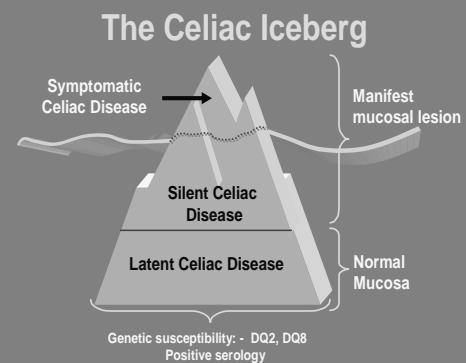
## Definitions

- An *antigen* is any foreign substance, usually a protein, that stimulates the body's immune system to produce antibodies.
- *Antibodies* are molecules in the blood or secretory fluids that tag, destroy or neutralize bacteria, viruses or other harmful toxins (e.g., food antigens).

## Celiac Disease

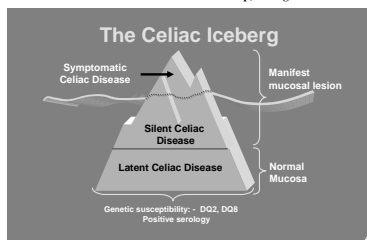
### Three Types of CD

- Symptomatic
  - GI symptoms: abdominal cramping, intestinal gas, distention and bloating
  - Mucosal damage (small intestine microvillus atrophy)
- Silent
  - Little or no GI symptoms
  - Mucosal damage (small intestine microvillus atrophy)
- Latent
  - Normal mucosa (negative biopsy)
  - Few or no GI symptoms



- As many as 2 million Americans have actual CD
- 97% of them are undiagnosed

Kenneth Fine, M.D. Enterolabs.com.  
Celiac Disease A Hidden Epidemic, Peter H.R. Green, M.D.  
Gluten Intolerance Group, www.gluten.net



## Non-Celiac Gluten Sensitivity

- An immune reaction to gluten in the diet
- Detected as antibodies against a gliadin
  - Blood testing for antibodies can have a high percentage of false negatives and may not be accurate for detecting NCGS.
  - Research has revealed stool testing to have a higher accuracy for NCGS, and it's useful for early detection.
    - The immune reaction begins in the gut, not the blood.
    - Stool testing can be done at home without a Dr.'s prescription.
  - For more information on stool testing see the Customer Literature File, "Celiac Disease and Gluten Sensitivity."

## Non-Celiac Gluten Sensitivity

- Currently estimated to affect 81% of the American population.  
» Dr. Kenneth Fine, [www.enterolab.com](http://www.enterolab.com)
- Health Complications
  - Various autoimmune associations
  - Malabsorption of nutrients (minerals, vitamins, especially fat soluble vitamins)
  - A multitude of manifestations/expressions
    - Depression, fatigue, GI symptoms (bloat, flatulence, etc.), neurological disorders, autoimmune disease, etc.

## Gluten Sensitivity and Genetics

- Immune reactions to gluten, as a toxic-foreign protein, occur in certain genetically susceptible individuals.
- The genes human leukocyte antigens, or HLA
  - There are several types of HLA genes within every person.
  - HLA-DQ is associated with gluten sensitivity (both CD and NCGS)
  - HLA-DQ2 and HLA-DQ8 are found in individuals who develop CD.
- **Immune reactions to gluten are not rare, and may be present in up to 60% of Americans** (based on research).  
» Dr. Kenneth Fine, [www.enterolab.com](http://www.enterolab.com)
- Genetic testing is a non-invasive and effective method for early detection of both forms of GS.

## Populations With The Highest Rates of Gluten Sensitivity

- Irish
- English
- Scottish
- Scandinavian
- Other Northern and Eastern European ethnicities

## Classic Symptoms of Gluten Sensitivity

- GI symptoms - abdominal cramping, intestinal gas, distention and bloating
- Chronic diarrhea or constipation (or both)
- Steatorrhea (fatty stools)
- Anemia – iron deficiency or folic acid and B12 deficiency (pernicious anemia), and/or both
- Weight loss with large appetite, or weight gain
- Dental enamel defects
- Osteopenia, osteoporosis
- Bone or joint pain
- Fatigue, weakness and lack of energy
- Infertility - male/female
- Depression
- Aphthous ulcers (mouth ulcers)

## Over 150 medical conditions and symptoms have now been linked to gluten sensitivity.

- Dr James Braly, author of *Dangerous Grains*, states, “Undiagnosed sensitivities to gluten and other grain proteins may contribute to many autoimmune and neurological conditions, bone loss, chronic pain, learning problems, fatigue, intestinal complaints and more.”

## Behavioral and Neurological Disorders

- Gliadin (gluten grains) and Casein (milk products) peptides, are 4 or 5 or 6 amino acids long; these sequences match those of opioid peptides (casomorphin and gliadomorphin).
- In the 1960s and 70s, clinical observation studies showed that gluten and dairy foods worsen individuals with neurological and behavioral disorders.
- In many cases, a restricted diet could lead to significant improvement or recovery from these disorders.

## How does gluten sensitivity (GS) affect the digestive system?

- In individuals with celiac disease (CD), gluten causes damage to the small-intestine microvilli.
  - Leads to serious mal-digestion and malabsorption of nutrients
  - Nutrient malabsorption also occurs in individuals with non-celiac gluten sensitivity.
- Intestinal hyperpermeability, or leaky gut, is common in individuals with gluten sensitivity (both CD and non-celiac).
  - May lead to the development of additional food sensitivities and other serious health problems
    - Serum IgG food sensitivity testing provides evidence of foods penetrating the intestinal wall.

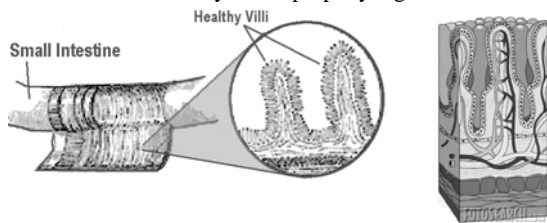
## How does gluten sensitivity (GS) affect the digestive system?

There is evidence that high-gluten diets alter the normal lining of the small intestine in *healthy* people, which opens up the possibility that gluten, particularly in large amounts, is not suited for many of us.

Lancet, 1981;7:517-520.

## The Lining of the Small Intestine

- Contains microvilli
  - Innumerable, tiny, hair-like projections
  - Produce enzymes to properly digest food



## Small-Intestine Microvilli

- Microvilli absorb nutrients from properly digested food.
  - Allow for nutrient distribution via the blood and lymphatic systems, to the rest of the body



## BRUSH BORDER ENZYMES PRODUCED BY MICROVILLI

ENZYMES	SUBSTRATE	PRODUCT
• Alpha-dextrinase	Alpha-dextrins	Glucose
• Glucoamylase (Maltase)	Maltose	Glucose
• Sucrase-Isomaltase	Sucrose	Glucose & fructose
• Lactase	Lactose	Glucose & galactose
• Enterokinase	Trypsinogen	Trypsin
• Peptidases		
– Aminopeptidase	Terminal amino acids	Peptides & amino acids
– Dipeptidase		
• Nucleosidases & Phosphatases	Nucleotides	Nitrogenous bases Pentoses

## Enzyme Insufficiency May Occur from Damage to the Intestinal Lining

- From antibiotics, chlorine, food additives, etc.
- From chemicals (pesticides, alcohol and drugs [Prescription and recreational], etc.)
- From infection (bacterial, viral, fungal)
  - Dysbiosis (unhealthy pathogenic organisms produce mixed-acid waste, which may damage the mucosal lining and interfere with enzyme production)
- From nutrient insufficiency (vitamin A, GLA, amino acids, etc.)
- Over-production of stress hormones
  - Cortisol's catabolic activity impedes the cellular rebuilding process in the GI tract.
- Food intolerance (gluten, casein, etc.)

## A Vicious Cycle

- A lack of enzymes to properly digest food leads to the development of “food-immune-complexes.”
  - Immune system reacts to food-immune complex as an antigen
- Undigested food substances may cause further damage the intestinal lining.

## Chronic Malabsorption—A Product of Both Enzyme Insufficiency and Leaky Gut

“Malabsorption is a general term for poor digestion, microbial contamination, and abnormalities in gut mucosa.”

-Marcia Zimmerman, CN, and Jayson Kroner, CSN, *7-Syndrome Healing*

## The Second Issue: When the Intestinal Lining Loses Its Integrity

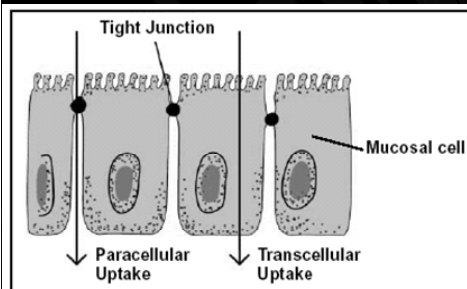
- Intestinal hyperpermeability (leaky gut syndrome) [can't regulate what enters the blood stream]
- A multitude of expressions
  - Migraine headaches
  - Malabsorption - nutrient deficiencies
  - Dermatological problems
  - Serum IgG food sensitivities
  - Fatigue
  - Muscle and joint pain
  - Neurological and/or cognitive problems
  - Mood disorders
  - Bowel problems (IBS and IBDs)
  - Urticaria (chronic hives)
  - Autoimmune disease
  - And more.....



## FACTORS ASSOCIATED WITH INTESTINAL PERMEABILITY

- Alcohol
- Cancer radiation therapy
- Corticosteroids
- Excess stress
- Excessive simple sugar consumption
- Fasting
- Food allergies
- Gastrointestinal infections
- NSAIDS
- Nutrients insufficiencies
- Premature birth
- Whole food exposure before the age of 4 months

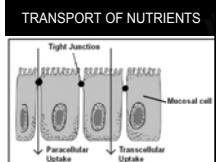
## TRANSPORT OF NUTRIENTS



## Gliadin Disrupts Tight Junctions

- Gliadin induces zonulin release in enterocytes, opening tight junctions.
  - Zonulin is an intestinal protein that functions as a mediator of gut permeability.

Zonulin release leads to a rapid increase in intestinal permeability that then allows gliadin and other food-immune-complexes to cross the intestinal barrier.



## Toxins Leak into the Blood Stream

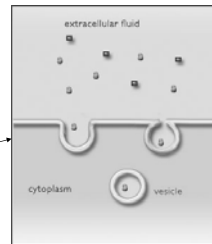
- Any crossing of the barrier by what is considered foreign by the immune system will result in activation of the system and the defense forces will rally.

- The mucosal inflammation caused by gluten is not only generated by gliadin and tTG antibodies, but is also established and maintained by the interaction of cytokines
  - Cytokines Defined:** Extracellular hormones or messengers, secreted mainly by macrophages and T cells, that interact with the immune, nervous, and endocrine systems.
- The induction of cytokines occurs as gluten peptides are continually absorbed by endocytosis and by the transport of proteins through damaged tight junctions.
  - » *Celiac Disease and Gluten-Associated Diseases*, Steve Helms, ND, Alternative Medicine Review, Volume 10 Number 3, 2005.

## Defining Endocytosis

- Cells absorb large proteins and other molecules

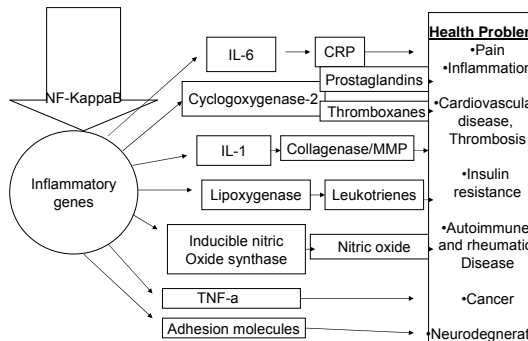
The cell membrane can pucker into a mouth-like opening that engulfs external molecules and closes off into a spherical chamber called a "vesicle" that's absorbed into the cell.



## Gluten Can Prompt a Sequence of Activity Leading to Serious Health Consequences

- Dependant upon
  - Immunity
    - Endocrine health (Hypothalamus-adrenal-pituitary axis)
    - GI health
  - Genetics
  - Cytokines
    - viral, fungal and bacterial infections
  - Environmental triggers
    - Chemicals, heavy metals, molds, etc.
- Gliadin exposure, in gluten intolerant individuals, may increase DNA binding activity of NF-κB

## The Inflammation Cascade



## Research from Holland Links CD with Candida

- Dr. Nieuwenhuizen,
  - discovered the same proteins that trigger celiac disease existed in other places
- Identical sequence of proteins occur in the cell walls of *Candida albicans*.
  - » Published in the *Lancet*, June 2003

## Candida, Gluten-Like Proteins

- Yeast's "hypha-specific surface protein" nicknamed Hwp1
  - Yeast's version of Velcro-allows it to attach and hang onto the endomysium in the wall of the intestine.
- It is also targeted by tTG, the enzyme which acts on the gluten protein and serves as a target for immune antibodies.

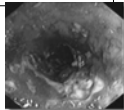
## Viral & Fungal Infections Share a Common Theme

- Similar amino acid sequences between gliadin and microbe incite cross-reactivity
  - The initial antibody production (viral, fungal, or pathogenic bacteria or microbes) is due to a normal immune reaction to an invading pathogen.
  - Future gluten ingestion generates a peptide sequence bound to HLA-DQ that is misinterpreted as being the virus/fungus, with resultant antibody production to gluten.

» *Celiac Disease and Gluten-Associated Diseases*, Steve Helms, ND, Alternative Medicine Review, Volume 10 Number 3, 2005.

## Diseases Associated with Gluten Intolerance and CD

- Chronic diarrhea
- Microscopic colitis
- Hepatitis C
- Autoimmune liver disease
- Other chronic liver disease
- Dermatitis Herpetiformis
- Type 1 diabetes
- Down's Syndrome
- Mothers of children with neural tube defect
- Williams Syndrome
- Turner Syndrome



Colitis

## Diseases Associated with Gluten Intolerance and CD

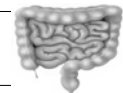
- Peripheral Neuropathy
- Multiple Sclerosis
  - Asthma
- Idiopathic seizure disorder
- Short stature in children
  - Psoriasis
  - Female Infertility
- Irritable Bowel Syndrome
  - GERD
- Inflammatory Bowel disease (crohn's and colitis)

## Diseases Associated with Gluten Intolerance and CD

- Autism
- ADD/ADHD
- Rheumatoid arthritis
- Hypothyroidism
- Lupus
- Alopecia
- Sjogren's syndrome
- Polymyositis/Dermatomyositis
- vitiligo
- Other autoimmune disorder



## GI Health



- In addition to following a GF diet, investigate and treat GI health problems (candidiasis infections, bacterial or pathogenic infections)
- Take a complex plant-enzyme formula with all meals
  - Formulated to assist digestion of proteins, fats, carbohydrates and fiber
  - Prevents food-immune-complexes from damaging mucosal tissue
- DPP IV (peptidase) enzymes
  - Can prevent issues with gluten contamination and can be used to aid in the digestion of egg protein, dairy protein (casein), and soy protein



### Comprehensive Digestive Stool Analysis (CDSA)

- Offered through an ND or Integrative MD (out-of pocket expense)
- Evaluate digestion and absorption
  - bacterial balance and metabolism
  - parasite infection
  - yeast and immune status
- Another option, ask your ND about a non-invasive breath tests
  - detects bacterial overgrowth in the small intestine
    - Leads to maldigestion and malabsorption
    - Symptoms - bloating, gas, diarrhea, irregularity of bowel movements, and abdominal pain

### Because of Malabsorption, Nutrients Absorbed in the Duodenum May be Lacking

- Calcium
- Phosphorus
- Magnesium
- Iron
- Copper
- Selenium
- Thiamin
- Riboflavin
- Niacin
- Biotin
- Folate
- Vitamin A, D, E and K

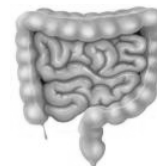


### Nutrients Absorbed in the Jejunum May Also be Lacking

- Upper & Lower
  - Lipids, monosaccharides, amino acids, and small peptides
- Middle
  - Thiamin, riboflavin, niacin, and pantothenate
  - Biotin, folate, vitamins B6, C, A, D, E, and K
  - Calcium, phosphorus, magnesium, and zinc
  - Iron, chromium, manganese, and molybdenum

### Finally, Nutrient Absorption in the Ileum is Also Inadequate

- Vitamin C
- Folate
- Vitamin B12
- Vitamins D & K
- Magnesium
- Bile salts and acids



### The Integrity of the Mucosal Lining is Necessary for Optimal Enzyme Production and Reducing the Risk of Intestinal Hyperpermeability

- Nutrients supporting cell growth and protection:
  - Zinc
    - Essential to cells lining the GI tract because of rapid turnover
  - Vitamin A
  - Vitamin C

### More Nutrients Supporting Optimal Mucosal Integrity

- Vitamin E
- Folic acid
- Pantothenic acid
- Free form amino acids
- L-Glutamine
- Soluble and insoluble fiber
- Butyric acid (for the large intestine)
  - Organic butter or ghee

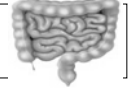


## Nutrients Especially Important for Individuals with Leaky Gut and Gluten Sensitivity

- N-Acetylglucosamine (NAG)
  - Aids the formation of connective tissues lining the intestinal tract and aids synthesis of the viscous top layer of the gut mucosa, which protects the underlying tissues from acid, enzymes and pathogenic organisms
- Gamma-oryzanol
  - Helps maintain mucosal integrity and supports normal glandular activity (gastrin secretion) of the stomach and intestinal wall



## GI Health



- Evaluate stomach health and supplement HCL if necessary
  - Bitter herbs may also be helpful.
- Probiotic nutrients
  - Healthy Intestinal flora is necessary
    - improves digestion and assimilation of nutrients
    - Normal immune function
  - See Natures Way™ Reuteri probiotic supplement (starting point)
- Consider testing for serum IgG food sensitivities
  - Delayed sensitivities to food indicate intestinal hyperpermeability
  - Follow a rotational diet – avoid all foods you are reactive to
- While healing avoid foods that irritate the mucosal lining; alcohol, coffee, chocolate, spicy foods (black pepper, cayenne pepper)

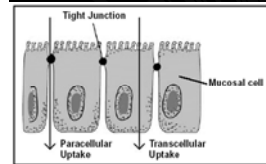
## Additional GI Health Nutrients

- Fish Oils (EPA/DHA)
  - Have anti-inflammatory actions in the GI tract
  - Help strengthen the immune system
  - Often deficient in people with malabsorption issues
- Vitamin D
  - Deficient in the majority of people today
  - Malabsorption issues increase the risk for deficiency
  - Optimal levels are necessary to normalize immune system and prevent autoimmune disease

## Tight Junction Regulation

- Calcium in the GI is necessary to close tight junctions (500 mg-1,000 mg per day)
- Oxalic acid disrupts tight junctions (some individuals may require a low oxalate diet)
- Avoid gluten
- Build optimal GI health (follow previous suggestions)

### TRANSPORT OF NUTRIENTS



## Principles of an Optimal Diet

- *Eat whole, unrefined foods high in nutrient density and as close to their natural state as possible.*
- *Eat as wide variety of foods as possible.* This will ensure that you consume a wide variety of nutrients and minimize the potential for food sensitivities with overconsumption of the same foods.

## Natural Foods

- Natural foods are foods in their natural, whole form, or as close to how they occur in nature as possible.
- A natural foods diet means limiting over-processed foods, which are often found in bags, boxes, or cans.
- Choose (preferably organic) whole non-gluten grains, fruits and vegetables, nuts and seeds, wild cold-water fish, legumes, unrefined oils, organic eggs, grass-fed meats, game meats, free-range and chemical-free poultry, and fermented dairy products.

**Natural Grocers by Vitamin  
Cottage “Customer Literature  
File” Resources**

- “GF Product List” (foods and supplements)
- “Probiotics”
- “Glutamine”
- “Enzymes”
- “Laboratory Testing Resources”
- “Whole Foods for Optimal Health”
- Additionally, we offer free nutritional coaching and ask for the Practitioner referral lists.

**Additional Book Resources**

- *Enzymes for Autism and Other Neurological Conditions* by Karen DeFelice
- *Enzymes for Digestive Health and Nutritional Wealth* by Karen DeFelice
- *Optimal Digestive Health, A Complete Guide* by Trent W. Nichols, MD, and Nancy Faass, MSW, MPH
- *Digestive Wellness* by Elizabeth Lipski, M.S., C.C.N.
- *Restoring Your Digestive Health* by Jordan Rubin
- *Leaky Gut Syndrome* by Elizabeth Lipski, M.S., C.C.N