Simple Steps For Improving Pediatric Digestive Health

Kurt N. Woeller, D.O.

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Overview of Digestion

[Diagram of the digestive system, including the mouth, esophagus, stomach, liver, gall bladder, pancreas, small intestine, large intestine, appendix, rectum, and anus.]
## Major Digestive Enzymes

<table>
<thead>
<tr>
<th>Enzyme</th>
<th>Produced In</th>
<th>Site of Release</th>
<th>pH Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbohydrate Digestion:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salivary amylase</td>
<td>Salivary Glands</td>
<td>Mouth</td>
<td>Neutral</td>
</tr>
<tr>
<td>Pancreatic amylase</td>
<td>Pancreas</td>
<td>Small Intestine</td>
<td>Basic</td>
</tr>
<tr>
<td>Maltase</td>
<td>Small intestine</td>
<td>Small intestine</td>
<td>Basic</td>
</tr>
<tr>
<td><strong>Protein Digestion:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pepsin</td>
<td>Gastric glands</td>
<td>Stomach</td>
<td>Acidic</td>
</tr>
<tr>
<td>Trypsin</td>
<td>Pancreas</td>
<td>Small intestine</td>
<td>Basic</td>
</tr>
<tr>
<td>Peptidases</td>
<td>Small Intestine</td>
<td>Small intestine</td>
<td>Basic</td>
</tr>
<tr>
<td><strong>Nucleic Acid Digestion:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclease</td>
<td>Pancreas</td>
<td>Small intestine</td>
<td>Basic</td>
</tr>
<tr>
<td>Nucleosidases</td>
<td>Pancreas</td>
<td>Small intestine</td>
<td>Basic</td>
</tr>
<tr>
<td><strong>Fat Digestion:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipase</td>
<td>Pancreas</td>
<td>Small intestine</td>
<td>Basic</td>
</tr>
</tbody>
</table>
Stomach acid gradually increases during a meal. When the stomach acid amount is elevated, which normally takes about 20-30 minutes after eating, it helps to eliminate/reduce various pathogens that enter with food and protein digestion starts.

**Parietal Cells = HCL**

**Chief Cells = Pepsinogen**
Pepsin works optimally in the acidic environment of the stomach, being most active at low pH, but becoming inactivated with higher pH, e.g. above 5.
Some Causes For Low Stomach Acid Production

Eating When Stressed

Inhibition of gastric acid secretion by stress: A protective reflex mediated by cerebral nitric oxide

J. V. Esplugues, M. D. Barrachina, B. Beltrán, S. Calatayud, B. J. R. Whittle, and S. Moncada

brain, including the dorsal motor nucleus of the vagus. Thus, our results suggest that the inhibition of gastric acid secretion, a defense mechanism during stress, is mediated by a nervous reflex involving a neuronal pathway that includes NO synthesis in the brain, specifically in the dorsal motor nucleus of the vagus.
Some Causes For Low Stomach Acid Production

- Excess carbohydrate consumption.
- Nutritionally deficient diet, e.g. zinc, thiamine.
Steps To Aide Stomach Digestion

• Avoid or limit eating when stressed.
• Chew food thoroughly.
• Multivitamin/multimineral supplement that includes zinc, B-vitamins, etc.
• Whole foods diet.
• Eat protein & fat portions of meal first.
• Don’t overconsume liquids with meals.
• Small amount of cultured veggies with meals, e.g. one to two teaspoons.
Cultured Vegetables

• Sauerkraut, kim chi and pickles are examples of cultured vegetables. Other vegetables can be cultured as well: carrots, cabbage, beets, kale, etc.

• Cultured foods are another good source of probiotics, as well as nutrients and enzymes useful for digestion.

• Cultured vegetables are nutritious and help to maintain the proper acid/alkaline balance in the digestive system.
Digestive Bitters

Dosage = 1 to 2 teaspoons in small amount of water before each meal.
# Zyme-Prime

**Supplement Facts**

<table>
<thead>
<tr>
<th>Serving Size</th>
<th>1 Capsule</th>
<th>%DV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Servings per container</td>
<td>90</td>
<td>*</td>
</tr>
<tr>
<td>Digestive Enzyme Blend</td>
<td>281 mg</td>
<td>*</td>
</tr>
<tr>
<td>Amylase</td>
<td>12,000 DU</td>
<td>*</td>
</tr>
<tr>
<td>Protease 4.5</td>
<td>40,000 HUT</td>
<td>*</td>
</tr>
<tr>
<td>Glucoamylase</td>
<td>25 AGU</td>
<td>*</td>
</tr>
<tr>
<td>Alpha-Galactosidase</td>
<td>200 GalU</td>
<td>*</td>
</tr>
<tr>
<td>CereCalase: Hemicellulase, beta-glucanase, phytase</td>
<td>400 MU</td>
<td>*</td>
</tr>
<tr>
<td>Lactase</td>
<td>1,500 ALU</td>
<td>*</td>
</tr>
<tr>
<td>Lipase</td>
<td>500 HUT</td>
<td>*</td>
</tr>
</tbody>
</table>

* Daily Value not established.

- 1 to 2 capsules with meals.
- 2 to 4 chewable tablets with meals.
- Rule of thumb = 1 capsule per 2 chewable tablets.
<table>
<thead>
<tr>
<th>Pancreatic Juice (from pancreas)</th>
<th>Bile (from liver)</th>
</tr>
</thead>
</table>
| **Proteases** *(digests proteins)*  
Trypsin  
Chymotrypsin  
Carboxypeptidase  
Proteins → Peptides → Amino acids | **Lipase** *(digests fats)*  
Dietary fat Triglycerides  
Bile Salts *(digests fats)*  
Monoglycerides  
Fatty acids |
| **Amylase** *(digests carbohydrates)*  
Starch → Maltose | 

**Liver, Gallbladder, Pancreas and Bile Passage**

- Liver
- Gallbladder
- Cystic duct
- Common hepatic duct
- Bile duct
- Accessory pancreatic duct
- Pancreatic duct
- Minor duodenal papilla
- Major duodenal papilla
- Duodenum
- Tail of pancreas
- Body of pancreas
- Head of pancreas
- Right and left hepatic ducts
Basic Functions of the Liver, GB and Large Intestine

• **Liver/Biliary System:**
  - Production/secretion of bile and bile salts.

• **Gallbladder:**
  - Storage of bile and release of bile in response to stomach contents and fat in foods entering duodenum.
  - Emulsifies fat for absorption and further breakdown by lipase.
  - Absorption of fat-soluble nutrients.

• **Large Intestine:**
  - Absorbs water and eliminates waste.
  - Large bowel has its own motility function.
Bile Flow, Digestion and Motility

- Bile helps to neutralize the acidic contents of the stomach as it enters the small intestine.
- If HCL is low and stomach contents are not very acidic, bile release will be subdued.
- Stomach acid and bile flow stimulate the release of pancreatic enzymes to further digest fats, proteins and carbohydrates.
- Bile stimulates the Migrating Motor Complex (MMC) to move contents through the small intestine.
Migrating Motor Complex (MMC)

- **MMC:**
  - Aka., migrating myoelectric or motor complex.
  - Waves of electrical activity that move through the intestines in a regular cycle, moving bacteria and debris down into the large bowel in between meals and during fasting at nighttime.
  - Approximately, 8 to 12 MMC waves daily (*occurs approximately every 45–180 minutes during the inter-digestive phase*). Lower amounts occur in SIBO.

- **Phase I** = *quiescence*
- **Phase II** = *increased contractility*
- **Phase III** – *postprandial*
The diagram illustrates the digestive system, focusing on the small intestine and large intestine (colon). The large intestine is labeled as the site of bacterial overgrowth and gas distention. The small intestine is also highlighted.
Foods to Support Bile Flow

• Beets
• Apples
• Celery
• Jerusalem artichokes
• Lemon juice
• Bitter herbs (*gentian*, *ginger*, *dandelion*).
• Olive oil and other fats in the diet.
Triggers for Large Bowel Elimination

• The colon is generally quiet between meals.
• Motility in the colon increases after a meal due to signals from the enteric nervous system.
• That signal is stimulated by the presence of fat in the small intestine leading to the release of bile.
• Bitter herbs or foods also stimulate the release of bile.
• Large bowel motility most active in the morning.
Recommendations To Support Motility and Elimination

• Glass of warm water upon rising:
  • *Can add the juice of one lemon, ginger and/or turmeric.*

• Hot tea, e.g. green in morning.

• Herbal bitters in hot water.

• Magnesium Hydroxide, e.g. 200mg to 400 mg before bed.

• Triphala, e.g. 500mg to 1000 mg per day. Indian herb to increase bowel tone.

• Slippery Elm herb – 3 to 4 capsules or 1 to 2 teaspoons of powder daily.

• Increase fluid intake and plant based foods.
Anorectal Angle

Sitting

Squatting

Sphincter

Squatting is the only natural defecation posture
Squat Stool

Yoga Blocks
Most plant-based foods have a combination of soluble and insoluble fibers.

**Soluble Fibers** - dissolve in water to form a gel-like consistency; good for constipation or diarrhea by absorbing liquid:

- *Examples found in fiber supplements:* acacia gum, pectin, psyllium, rice bran, beet fiber, *flax seeds*.

**Insoluble Fibers** – do not dissolve in water; best for constipation, bulks stool:

- *Examples found in fiber supplements:* cellulose, hemicellulose, lignans.
TruFiber

- Prebiotic.
- Soluble fiber.
- Enzymes.
- Support healthy bacteria.
- 1 level scoop mixed in 8 to 12 ounces of water or dilute juice once to twice daily.
Whole Food Diet
What To Eliminate

- Processed Sugar.
- White Flour.
- Processed Grains.
- Artificial Ingredients.
- Chemical Additives.
- Excess Caffeine.

- Hydrogenated Oils/Vegetable Oils.
- Rancid Oils.
- Soft Drinks.
- GMO foods.
- Refined foods.
- Preservatives.
What To Include

• Organic Fruits & Vegetables.
• Whole Grains.
• Nuts & Seeds – *Raw*.
• Cold-Pressed Oils – Olive, Avocado, Sesame.
• Coconut Oil/Raw Butter or Ghee.

• Wild Fish.
• Organic Protein Sources.
• Filtered Water.
• Herbal Teas.
• Fresh Vegetable Juices.
• Increase Raw Foods with each meal.
• Fermented Foods.
Real Food Is More Affordable Than You Think

All 100 recipes in my latest cookbook (#3 in the series!) are $15 or less to make.

AVAILABLE NOW
MALABSORPTION IN CELIAC DISEASE

The main function of the small intestine is digestion and absorption of food. **Malabsorption** may be due to disorders of the small bowel, pancreas and biliary tract.

**COELIAC DISEASE**
This important cause of malabsorption is due to sensitivity to gluten, a component of the wheat protein **gluten**. The clinical features depend on the age at presentation.
- **Infancy** — Failure to thrive, diarrhoea (steatorrhoea)
- **Childhood** — Growth retardation, nutritional deficiencies of e.g. anaemia.
- **Adults** — Anaemia, altered bowel habit, weight loss.

In coeliac disease there is partial or complete villous atrophy.

These changes are seen in biopsies of the jejunum (Crosbie capsule) and distal duodenum (by endoscope). The changes revert to normal if gluten is removed from the diet.

The basic mechanism is as follows:
- Genetic predisposition (e.g. HLA B8, DR3, DQ2 +ve)
- Environmental trigger (unknown)
- **Loss of oral tolerance to gluten**
- Autoimmune attack on S.I.
- Crypt hyperplasia (regeneration)
- ↑ Loss of enterocytes
- **Villus atrophy**
- Malabsorption

Patients with coeliac disease also have increased prevalence of autoimmune diseases e.g. diabetes, autoimmune thyroiditis.

They are at increased risk of developing small bowel lymphoma.
Abstract

Celiac Disease (CD) is an immune-mediated disease dependent on gluten (a protein present in wheat, rye or barley) that occurs in about 1% of the population and is generally characterized by gastrointestinal complaints. More recently the understanding and knowledge of gluten sensitivity (GS), has emerged as an illness distinct from celiac disease with an estimated prevalence 6 times that of CD. Gluten sensitive people do not have villous atrophy or antibodies that are present in celiac disease, but rather they can test positive for antibodies to gliadin. Both CD and GS may present with a variety of neurologic and psychiatric co-morbidities, however, extraintestinal symptoms may be the prime presentation in those with GS. However, gluten sensitivity remains undertreated and underrecognized as a contributing factor to psychiatric and neurologic manifestations. This review focuses on neurologic and psychiatric manifestations implicated with gluten sensitivity, reviews the emergence of gluten sensitivity distinct from celiac disease, and summarizes the potential mechanisms related to this immune reaction.
<table>
<thead>
<tr>
<th><strong>IgE</strong></th>
<th><strong>IgG</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Releases histamine</td>
<td>Does not usually release histamine.</td>
</tr>
<tr>
<td>Tested by skin pricks</td>
<td>No immediate skin prick reaction.</td>
</tr>
<tr>
<td>Anaphylactic shock</td>
<td>No anaphylactic shock</td>
</tr>
<tr>
<td>Symptoms immediate</td>
<td>Symptoms may be delayed</td>
</tr>
<tr>
<td>Most common allergy test.</td>
<td>Most common sensitivity test</td>
</tr>
<tr>
<td>Clinical usefulness mainly with allergic reactions, hives, sneezing, etc.</td>
<td>High clinical usefulness for chronic illnesses, psychiatric diseases.</td>
</tr>
</tbody>
</table>

- Significant difference of IgG antibodies in serum between CD patients and healthy controls.
- In 84% and 83% of the patients, respectively, IgG antibodies against processed cheese and yeast were detected.
- The daily stool frequency significantly decreased by 11% during a specific diet compared with a sham diet.
- Abdominal pain reduced and general well-being improved on specific diet based on IgG testing.
Antibody (IgG, IgA, and IgM) to baker's yeast (Saccharomyces cerevisiae), yeast mannan, gliadin, ovalbumin and beta-lactoglobulin in monozygotic twins with inflammatory bowel disease.

Lindberg E, Magnusson KE, Tysk C, Jarnerot G
Department of Medicine, Orebro Medical Center Hospital, Sweden.

- Twins who had developed Crohn's disease displayed higher antibody titers towards yeast cell wall mannan in particular, but also to whole yeast (Saccharomyces cerevisiae) of all antibody types (IgA, IgG, and IgM).
- Yeast cell wall material, that is, mannan or some antigen rich in mannose and cross reacting with mannan, may play an aetiological role in Crohn's disease, but not in ulcerative colitis.
## IgG Sensitivity

### Food IgG (dried blood spot) Test

Great Plains Laboratory

<table>
<thead>
<tr>
<th>Food Item</th>
<th>IgG Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td></td>
</tr>
<tr>
<td>Cassein</td>
<td>5.65</td>
</tr>
<tr>
<td>Cheese</td>
<td>4.07</td>
</tr>
<tr>
<td>Goat Cheese</td>
<td>1.75</td>
</tr>
<tr>
<td>Milk</td>
<td>3.66</td>
</tr>
<tr>
<td>Mozzarella Cheese</td>
<td>2.96</td>
</tr>
<tr>
<td>Whey</td>
<td>3.33</td>
</tr>
<tr>
<td>Yogurt</td>
<td>3.84</td>
</tr>
<tr>
<td>Legumes - Beans and Peas</td>
<td></td>
</tr>
<tr>
<td>Garbanzo Bean</td>
<td>1.36</td>
</tr>
<tr>
<td>Green Bean</td>
<td>1.47</td>
</tr>
<tr>
<td>Kidney Bean</td>
<td>1.23</td>
</tr>
<tr>
<td>Lentil</td>
<td>1.40</td>
</tr>
<tr>
<td>Lima Bean</td>
<td>1.30</td>
</tr>
<tr>
<td>Pea</td>
<td>1.26</td>
</tr>
<tr>
<td>Pinto Bean</td>
<td>1.27</td>
</tr>
<tr>
<td>Soybean</td>
<td>1.52</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
</tr>
<tr>
<td>Cod/Flax</td>
<td>1.75</td>
</tr>
<tr>
<td>Crab</td>
<td>1.21</td>
</tr>
<tr>
<td>Halibut</td>
<td>1.44</td>
</tr>
<tr>
<td>Lobster</td>
<td>1.13</td>
</tr>
<tr>
<td>Salmon</td>
<td>1.61</td>
</tr>
<tr>
<td>Sardine</td>
<td>1.23</td>
</tr>
<tr>
<td>Shrimp</td>
<td>1.37</td>
</tr>
<tr>
<td>Tuna</td>
<td>1.45</td>
</tr>
<tr>
<td>Nuts and Seeds</td>
<td></td>
</tr>
<tr>
<td>Almond</td>
<td>1.33</td>
</tr>
<tr>
<td>Cashews</td>
<td>1.61</td>
</tr>
<tr>
<td>Egg White</td>
<td>16.21</td>
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<tr>
<td>Egg Yolk</td>
<td>2.84</td>
</tr>
<tr>
<td>Lamb</td>
<td>1.49</td>
</tr>
<tr>
<td>Pork</td>
<td>1.67</td>
</tr>
<tr>
<td>Turkey</td>
<td>1.84</td>
</tr>
<tr>
<td>Nuts and Seeds</td>
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</tr>
<tr>
<td></td>
<td>1.60</td>
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<td>1.22</td>
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<td>1.41</td>
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<td></td>
<td>1.51</td>
</tr>
<tr>
<td></td>
<td>1.18</td>
</tr>
</tbody>
</table>
First Line Immune Defense

- Follicle
- Inductive site
- Intestinal Lumen
- Villi
- M cell
- Lamina propria
- Submucosa
- Primary follicle
- Muscle layer
- Germinal center
- Peyer's Patch
Gastrointestinal Problems Linked To IgA Deficiency

• Autoimmune achlorhydria, pernicious anemia, villous atrophy.
• Infectious Clostridium, Giardia, Cryptosporidium parvum, Helicobacter pylori, Salmonella, etc.
• Inflammatory celiac, Crohn’s disease, ulcerative colitis.
• Neoplastic lymphoma, stomach adenocarcinoma.
Bromelain

• Derived from pineapple, its primary purpose as a digestive remedy is to control GI inflammation.
• Antioxidant.
• Helpful in reducing and eliminating pain, aiding digestion and accelerating healing.
Quercetin

• Is a potent antioxidant.
• Prevents the formation of certain inflammatory mediators helping to reduce inflammation and subsequent pain.
• Spares against vitamin C loss and stabilizes cell membranes.
Tumeric

• Tumeric root has anti-inflammatory properties that inhibit COX-2 activity.

• Curcumin is a component of Tumeric which has antioxidant, anti-inflammatory and antimicrobial activity.

• The low incidence of colorectal cancers observed in Asia is thought, in part, to be linked to high dietary intake of turmeric.
L-Glutamine

• Helps maintain intestinal barrier integrity.
• Preferred fuel source of enterocytes and colonocytes in the digestive system.
• Helps maintain healthy levels of Secretory IgA.
Intesti-Mate

- L-Glutamine.
- Aloe Vera.
- Acetyl-D-Glucosamine.
- Zinc and Vitamin A.
- DGL.

**Dosage =** Children: take ¼ to ½ scoop; Adults: take 1 scoop of Intesti-Mate with water or the beverage of your choice once daily.
Adhesin and Invasin Proteins

• Candida has specialized proteins which allow it to adhere to other microorganisms, abiotic surfaces and host cells. These adhesion proteins are also involved in Biofilm formation.

• Invasin proteins allows for two different ways for Candida to penetrate host cells:
  • **Active penetration** – hyphal driven process with various protease secretions allowing cell penetration.
  • **Induced endocytosis** – expressed proteins on the cell surface induce engulfment of the Candida cell.
Leaky Gut

ADHESION

INVASION
Nystatin:
- **Tablet** (500,000 units) - 1/2 to 2 tablets 3x/day.
- **Oral Suspension** (100,000 units/ml) – ¼ teaspoon to 2 teaspoons 3x/day.

✓ 5ml = 1 teaspoon

**NOTE:** can use for prolonged periods of time, e.g. multiple months.
Botanical Remedies (examples)

• Berberine
• Bilberry extract
• Black walnut
• Garlic
• Oregano
• Pau D’Arco
• Tea tree oil

Great option for kids
Probiotics

1. Competition for nutrients and prebiotics
2. Bioconversions
3. Production of growth substrates
4. Direct antagonism
5. Competitive exclusion
6. Barrier function
7. Reduction of inflammation
8. Immune stimulation

Enhanced innate immunity
Blood

T
B

Th1
Tn
T17
Treg

IL-10
TGFβ
Mold Exposure

Aspergillus in Corn
What are Mycotoxins?  
(*myco = of fungal origin*)

- Mycotoxins are chemicals produced by molds that cause toxic results.
- Hundreds of fungi that can produce toxic compounds.
- Unlike bacterial toxins, these are not proteins and are not usually detected by the immune system.
- Mycotoxins disrupt cellular processes such as protein, DNA and RNA synthesis.
- Cause mitochondrial damage and deplete glutathione.
Aflatoxin M1

- Toxin produced by *Aspergillus*.
- Classified as Class I human carcinogen (*known carcinogen*).
- Selectively targets human p53 protein (*tumor suppressor*).
- Primarily attacks the liver.
- Immune toxic as well, including mucosal immunity.

### MycoTox Profile

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Results (ng/g creatinine)</th>
<th>Common Range of Positive Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aflatoxin M1</td>
<td>4.13</td>
<td>1.3 - 3</td>
</tr>
</tbody>
</table>

(Hsieh, 2009, Iowa)
Aflatoxin M1

- Aflatoxins are some of the most carcinogenic substances in the environment.
- Aflatoxin can be found in beans, corn, rice, tree nuts, wheat, milk, eggs and meat.
- Peanuts and peanut butter are consider high potential sources for Aflatoxin.
- Has been linked to leucocyte inhibition.
- Aflatoxin can cause liver damage, cancer, mental impairment, abdominal pain, hemorrhaging, coma and death.
- Clinical signs of aflatoxicosis are:
  - Non-pruritic macular rash.
  - Headache.
  - Gastrointestinal dysfunction.
  - Lower extremity edema.
  - Anemia and jaundice.
- The toxicity of Aflatoxin is increased in the presence of Ochratoxin.
Ochratoxin

- Species: *P. Verrucosum* and *A. ochraceus*
- Affects kidney function:
  - Inhibits synthesis of proteins.
  - Disrupts DNA and RNA.
  - Inhibits enzymes in the kidney.

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Results (ng/g creatinine)</th>
<th>Common Range of Positive Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ochratoxin A</td>
<td>8.73</td>
<td>1.2 - 5</td>
</tr>
</tbody>
</table>
Ochratoxin

• Ochratoxin A (OTA) is a nephrotoxic, immunotoxic and carcinogenic mycotoxin.
• Produced by Aspergillus and Penicillium.
• Exposure is primarily through contaminated foods such as cereals, grape juices, dairy, spices, wine, dried vine fruit and coffee.

- Can also come from inhalation exposure in water-damaged buildings.
• OTA can lead to kidney disease and adverse neurological effects.
• Studies have shown that OTA can cause significant oxidative damage to multiple brain regions and the kidneys.

• Ochratoxin A is immune suppression and has been linked to Secretory IgA production.
A Brand New Urine Test for Mycotoxin Exposure
Mycotoxins: A Major Cause of Many Chronic Illnesses
Effects of Mycotoxins on Mucosal Microbial Infection and Related Pathogenesis

Seong-Hwan Park 1,2,†, Dongwook Kim 3,†, Juil Kim 1,2 and Yuseok Moon 1,4,*

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Academic Editor: Jiujiang Yu

Received: 4 September 2015 / Accepted: 28 October 2015 / Published: 30 October 2015
What does *C. difficile* do to the gut?

**A**
24 hours after exposure: Cells of colon lining are normal

**B**
30 hours after exposure: *C. difficile* toxin has started to damage cells, triggering inflammation & fluid buildup

**C**
36 hours after exposure: Inflamed cells burst & die. *C. difficile* spores leave colon via diarrhea & await next host.

University of Michigan Medical School
Candida

Clostridia

Percentage

Mycotoxin Positive

Negative Control

Candida

Clostridia
GMO (Genetically Modified Organism) Foods Modified To Tolerate Glyphosate

- Corn
- Soy
- Cotton
- Canola
- Alfalfa
- Wheat

Inhibits an enzyme which is needed by plants to grow.
March 2015 - World Health Organization's International Agency for Research on Cancer published a summary of its forthcoming monograph on glyphosate, and classified it as:

- "probably carcinogenic in humans" (category 2A) based on epidemiological studies, animal studies, and in vitro studies.
Jurors give $289 million to a man they say got cancer from Monsanto's Roundup weedkiller
Genetically engineered crops, glyphosate and the deterioration of health in the United States of America

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Abstract

A huge increase in the incidence and prevalence of chronic diseases has been reported in the United States (US) over the last 20 years. Similar increases have been seen globally. The herbicide glyphosate was introduced in 1974 and its use is accelerating with the advent of herbicide-tolerant genetically engineered (GE) crops. Evidence is mounting that glyphosate interferes with many metabolic processes in plants and animals and glyphosate residues have been detected in both. Glyphosate disrupts the endocrine system and the balance of gut bacteria, it damages DNA and is a driver of mutations that lead to cancer.

Introduced in 1974
Estimated Agricultural Use for Glyphosate, 1994

Estimated use on agricultural land, in pounds per square mile
- < 4.52
- 4.52 - 21.12
- 21.13 - 88.06
- > 88.06
- No estimated use
Table 3. Pearson’s coefficients between disease and glyphosate applications (N=21 encompassing 1990-2010), except autism (N=16; autism data only available for 1995-2010).

<table>
<thead>
<tr>
<th>Disease</th>
<th>Coefficient, $R$</th>
<th>$R^2 \times 100$</th>
<th>Probability, $p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroid cancer (incidence)</td>
<td>0.988</td>
<td>97.6</td>
<td>$\leq 7.6E-9$</td>
</tr>
<tr>
<td>Liver cancer (incidence)</td>
<td>0.960</td>
<td>92.1</td>
<td>$\leq 4.6E-8$</td>
</tr>
<tr>
<td>Bladder cancer (deaths)</td>
<td>0.981</td>
<td>96.2</td>
<td>$\leq 4.7E-9$</td>
</tr>
<tr>
<td>Pancreatic cancer (incidence)</td>
<td>0.918</td>
<td>84.2</td>
<td>$\leq 4.6E-7$</td>
</tr>
<tr>
<td>Kidney cancer (incidence)</td>
<td>0.973</td>
<td>94.8</td>
<td>$\leq 2.0E-8$</td>
</tr>
<tr>
<td>Myeloid leukaemia (deaths)</td>
<td>0.878</td>
<td>77.1</td>
<td>$\leq 1.5E-6$</td>
</tr>
<tr>
<td>Lipoprotein metabolism (deaths)</td>
<td>0.973</td>
<td>94.8</td>
<td>$\leq 7.9E-9$</td>
</tr>
<tr>
<td>Hypertension (deaths)</td>
<td>0.923</td>
<td>85.2</td>
<td>$\leq 1.6E-7$</td>
</tr>
<tr>
<td>Stroke (deaths)</td>
<td>0.925</td>
<td>85.5</td>
<td>$\leq 1.5E-7$</td>
</tr>
<tr>
<td>Obesity</td>
<td>0.962</td>
<td>92.5</td>
<td>$\leq 1.7E-8$</td>
</tr>
<tr>
<td>Diabetes (prevalence)</td>
<td>0.971</td>
<td>94.3</td>
<td>$\leq 9.2E-9$</td>
</tr>
<tr>
<td>Diabetes (incidence)</td>
<td>0.935</td>
<td>87.4</td>
<td>$\leq 8.3E-8$</td>
</tr>
<tr>
<td>ESRD (deaths)</td>
<td>0.975</td>
<td>95.0</td>
<td>$\leq 7.2E-9$</td>
</tr>
<tr>
<td>Renal failure (deaths)</td>
<td>0.978</td>
<td>95.6</td>
<td>$\leq 6.0E-9$</td>
</tr>
<tr>
<td>Autism (prevalence)</td>
<td>0.989</td>
<td>97.9</td>
<td>$\leq 3.6E-7$</td>
</tr>
<tr>
<td>Alzheimer's (deaths)</td>
<td>0.917</td>
<td>84.1</td>
<td>$\leq 2.2E-7$</td>
</tr>
<tr>
<td>Parkinson's (deaths)</td>
<td>0.875</td>
<td>76.6</td>
<td>$\leq 1.6E-6$</td>
</tr>
<tr>
<td>Dementia (deaths)</td>
<td>0.994</td>
<td>98.8</td>
<td>$\leq 1.8E-9$</td>
</tr>
<tr>
<td>Multiple sclerosis (deaths)</td>
<td>0.828</td>
<td>68.5</td>
<td>$\leq 1.1E-5$</td>
</tr>
<tr>
<td>Intestinal infection (deaths)</td>
<td>0.974</td>
<td>94.8</td>
<td>$\leq 7.6E-9$</td>
</tr>
<tr>
<td>Inflammatory bowel</td>
<td>0.938</td>
<td>88.0</td>
<td>$\leq 7.1E-8$</td>
</tr>
</tbody>
</table>
• The health effects of a Roundup-tolerant genetically modified maize (from 11% in the diet), cultivated with or without Roundup, and Roundup alone (from 0.1 ppb in water), were studied 2 years in rats.

• In females, all treated groups died 2-3 times more than controls and more rapidly. All results were hormone and sex dependent and the pathological profiles were comparable.

• Females developed large mammary tumors almost always more often than controls, the pituitary was the second most disabled organ; the sex hormonal balance was modified by GMO and Roundup treatments.

• Males presented up to four times more large palpable tumors starting 600 days earlier than in the control group, in which only one tumor was noted.

• One of the countries most affected by genetically engineered soy is Argentina, whose population is being sickened by massive spraying of herbicides.
• Glyphosate, the main ingredient in Roundup, is blamed for the dramatic increase in devastating birth defects as well as cancer.
• More than 18 million hectares (*1 hectare approx. 2-1/2 acres = 72 square miles*) in Argentina are covered by genetically engineered soy, on which more than 300 million liters of pesticides are sprayed.
Dr. Medardo Vasquez, the neonatal specialist of the Children’s Hospital in Cordoba, Argentina:

“I see new-born infants, many of whom are malformed. I have to tell parents that their children are dying because of these agricultural methods. In some areas in Argentina the primary cause of death for children less than one year old is malformations.”

In the village of Malvinas, Argentina, which is surrounded by GMO soy plantations, the rate of miscarriage is 100 times the national average.
Glyphosate Upregulates Retinoic Acid*


Growth market
Sales of herbicides, insecticides and fungicides in 2013, by country

- BRAZIL $10.0 billion
- U.S. $7.4 billion
- CHINA $4.8 billion
- JAPAN $3.4 billion
- FRANCE $2.9 billion
- GERMANY $2.1 billion
- REST OF THE WORLD $23.6 billion

Source: Phillips McDougall
Glyphosate Inhibits Plant and Some Bacteria EPSP Synthase

Glyphosate inhibits EPSP synthase

Tyrosine Phenylalanine

Tryptophan

Chorismic acid

5-enolpyruvylshikimate-3-phosphate
Glyphosate disrupts the microbiome in the intestine, causing a decrease in the ratio of beneficial to harmful bacteria.

Highly pathogenic bacteria such as Salmonella enteritidis, Salmonella gallinarum, Salmonella typhimurium, Clostridium perfringens and Clostridium botulinum are highly resistant to glyphosate.

Most beneficial bacteria such as Enterococcus faecalis, Enterococcus faecium, Bacillus badius, Bifidobacterium adolescentis and Lactobacillus spp. were found to be moderate to highly susceptible.
American Gut Project: Robert Knight and Jeff Leach

What do you think affects your gut microbiome?

- Types Of Plants
- Age
- IBD
- Collection Season
- Antibiotic Use
- Sex
- Sleep Duration
- BMI
- Types Of Plants, 6-10 Vs 30+
- Alcohol Consumption
- Exercise Frequency
Environmental Working Group

United States environmental organization that specializes in research and advocacy for:

- Toxic chemicals.
- Agriculture subsidies.
- Public lands.
- Corporate accountability.

- Non-profit.
- Non-partisan.

- Founded in 1993 in Washington, D.C.
More from EWG

- **FOCUS ON SPINACH**
  - LEARN MORE
- **GROW ORGANICS!**
  - TAKE ACTION
- **NEW TO LIST: PEARS**
  - LEARN MORE
- **STRAWBERRY UPDATE**
  - LEARN MORE
- **EWG's FOOD SCORES**
- **DIRTY DOZEN**
  - SEE THE LIST
- **CLEAN FIFTEEN**
  - SEE THE LIST
- **FREQUENTLY ASKED**
  - EXPLORE

Integrative Medicine Academy
Clean Fifteen

1. Sweet corn*
2. Avocados
3. Pineapple
4. Cabbage
5. Onions
6. Sweet peas *(frozen)*
7. Papayas*
8. Asparagus
9. Mangos
10. Eggplant
11. Honeydew melon
12. Kiwi
13. Cantaloupe
14. Cauliflower
15. Grapefruit

* Indicates a small amount is grown from GMO seeds
Dirty Dozen

1. Strawberries
2. Spinach
3. Nectarines
4. Apples
5. Peaches
6. Pears
7. Cherries
8. Grapes
9. Celery
10. Tomatoes
11. Sweet bell peppers
12. Potatoes
Strawberries – The Worst

• Americans each approximately 8 lbs. of strawberries annually.

• Samples tested by the USDA between 2014 and 2015 showed an average of 7.7 different pesticides (some of which are linked to cancer and reproductive problems) compared to 2.3 per sample for all other produce.

• About 88% come U.S. crops and the rest from Mexico.

“USDA tests found that strawberries were the fresh produce items most likely to be contaminated with pesticide residues, even after they are picked, rinsed in the field and washed before eating.” EWG
EWG's Tap Water Database

Since 2010, water utilities' testing has found pollutants in Americans' tap water, according to an EWG drinking water quality analysis of 30 million state water records.

Enter your zipcode

or find your state

advanced search
What’s most important to you in a water filter?
Whether you want the least expensive or most effective filter, a filter to soften hard water or one to remove specific contaminants, you can find options below.

**Least Expensive**  **Most Effective**  **Softhen Hard Water**  **Remove Specific Contaminants**

---

**Carbon Filters**
Use a carbon filter to reduce contaminants at low cost. There are many types to choose from, but effectiveness varies widely.

**See all Carbon Filters**
2,4-Dichlorophenoxoacetic Acid

Toxic Compounds

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Result µg/g creatinine</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Herbicide</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16) 2,4-Dichlorophenoxyacetic Acid (2,4-D)</td>
<td>2.3</td>
<td></td>
</tr>
</tbody>
</table>

2,4-Dichlorophenoxyacetic Acid (2,4-D) is a very common herbicide that was a part of Agent Orange, which was used by the U.S. in the Vietnam War. It is most commonly used in agriculture on genetically modified foods, and as a weed killer for lawns. Exposure to 2, 4-D via skin or oral ingestion is associated with neuritis, weakness, nausea, abdominal pain, headache, dizziness, peripheral neuropathy, stupor, seizures, brain damage, and impaired reflexes. 2, 4-D is a known endocrine disruptor, and can block hormone distribution and cause glandular breakdown.
Enlist Duo® herbicide

Twice as tough on problem weeds

Only Enlist Duo® herbicide with Colex-D® technology combines the proven performance of a new 2,4-D and glyphosate. The result: unrivaled weed control designed to land and stay on target.
Thank You

Phone – 951-461-4800
Email – SCMedicalCenter@gmail.com

MySunriseCenter.com – practice website