

Preconception Gut Preparedness

Autism One / Generation Rescue 2013

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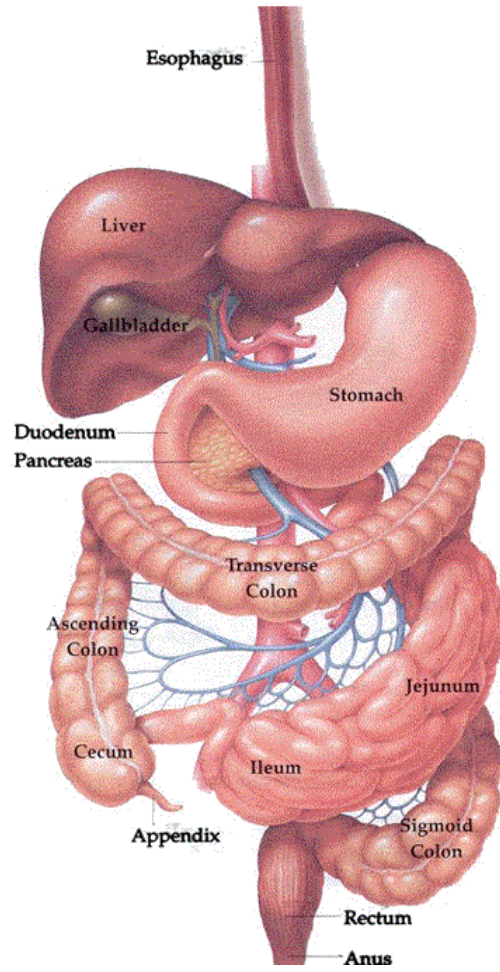
Today's Presentation

- Discuss the role of the gut and gut microbiome
- Identify the various conditions that can create inflammation in the gastrointestinal tract
- Identify the sequelae that may ensue and how this impacts nutritional status
- Understanding epigenetics and optimizing outcomes to protect future generations
- Understand some of the therapeutic diets and nutritional supplements that exist to assist in the healing process

Gastrointestinal Tract

- Gastrointestinal tract also known as the alimentary canal or GI tract starts with the mouth and proceeds to the esophagus, stomach, duodenum, small intestine, large intestine (colon), rectum and finally anus
- Intricately connected to the immune, nervous and endocrine systems
- Primary gateway between the external world and internal environment of the body

Gastrointestinal Tract



Healthy Digestion

- Mouth to anus should take 24 to 30 hours
- 2 bowel movements a day
- No floating stool, and stool is not overly odorous
- Feel good after eating
- No sleep problems
- Warm extremities
- Energetic throughout day and energetic after exercise
- No extreme food cravings
- No mood swings, anxiety, depression, shakiness without a reason

Inflammation and the Gut

- Inflammation in the gut could potentially create inflammation in other areas of the body
- Major gut-body paths:
 - Primary: small intestines pass blood and water soluble nutrients to liver
 - Secondary: intestines to the lymph system

GALT

- GALT (gut associated lymphatic tissue)
- Antigens that have survived the harsh environment of digestion are analyzed by GALT
- GALT responsible for homeostatic and localized inflammatory actions
- GALT development influenced by intestinal microbes

GALT Cont.

- The response to food or pathogenic antigens starts out the same – it is the microenvironment that determines whether the final response will be tolerogenic or immunogenic
- GALT is a powerful defender
 - Constantly differentiating unharmful substances from pathogenic antigens
- The mucosal barrier heavily influences the immune response that results from antigen interaction

GALT Cont.

- Generally GALT will inhibit the development of allergy and autoimmunity
- It has been shown that oral antigens from bacterial lysates may reduce the frequency of diarrhea, mucosal infection, and diverticulitis
 - This occurs by increasing IgA and cytokines at the mucosa and luminal level
- Food antigens, when presented with an adjuvant will induce an immunogenic response – chronic infection or inflammation may actually be an adjuvant.
 - This may lead to multiple food allergies or sensitivities

What are Some of the Causes of Gut Inflammation?

- Complex - not always one thing
- Initial inflammation left untreated can intensify and perpetuate the problem
- Common causes include:
 - Diet – food intolerances or sensitivities
 - Allergies
 - Medication: antibiotics, PPIs, NSAIDs, BC pill, steroids
 - Gut Disease
 - Unhealthy gut flora
 - Genetically Modified (GM) foods
 - Toxins



GM foods (not)

Specificity of the association of GM foods and specific disease processes is also supported. Multiple animal studies show significant immune dysregulation, including upregulation of cytokines associated with asthma, allergy, and inflammation.

Kroghsbo S, Madsen C, Poulsen M, et al. *Immunotoxicological studies of genetically modified rice expression PHA-E lectin or Bt toxin in Wistar rats*. Toxicology. 2008; 245:24-34.

Finamore A, Roselli M, Britti S, et al. *Intestinal and peripheral immune response to MON 810 maize ingestion in weaning and old mice*. J Agric. Food Chem. 2008; 56(23):11533-11539.



AMERICAN ACADEMY OF ENVIRONMENTAL MEDICINE CALLS FOR IMMEDIATE MORATORIUM ON ALL GENETICALLY MODIFIED FOODS

- The American Academy of Environmental Medicine (AAEM) called on "Physicians to educate their patients, the medical community, and the public to avoid GM (genetically modified) foods when possible and provide educational materials concerning GM foods and health risks." [i] They called for a moratorium on GM foods, long-term independent studies, and labeling.
- AAEM's position paper stated, "Several animal studies indicate serious health risks associated with GM food," including infertility, immune problems, accelerated aging, insulin regulation, and changes in major organs and the gastrointestinal system. **They conclude, "There is more than a casual association between GM foods and adverse health effects. There is causation,"** as defined by recognized scientific criteria. "The strength of association and consistency between GM foods and disease is confirmed in several animal studies."

Some Inflammatory Diseases of the Gut

- Oral Allergy Syndrome
- Hyperchlorhydria - Gastritis
- Hypochlorhydria – Gastric Polyps
- Eosinophilic Esophagitis
- Dysbiosis – microbial imbalance
 - SIBO (small intestinal bacterial overgrowth)
- Irritable Bowel Syndrome (IBS)
- Irritable Bowel Disease (IBD)
 - Crohn's Disease
 - Ulcerative Colitis

Inflammatory Sequela Example



Yang L, et al. *Inflammation and intestinal metaplasia of the distal esophagus are associated with alterations in the microbiome*. Gastroenterology 2009 Aug;137(2):588-97. <http://www.ncbi.nlm.nih.gov/pubmed?term=gerd%20dysbiosis>

Hoffman M, *Esophageal Cancer On the Rise*, WebMD. <http://www.webmd.com/cancer/features/esophageal-cancer-rise>

Intestinal Permeability and Disease

- Bowel disorders with increased permeability include Inflammatory bowel disease (Crohn's disease, food allergy and celiac disease)
- Systemic diseases with increased permeability include inflammatory joint disease, rheumatoid arthritis, ankylosing spondylitis, Reiter's syndrome, chronic dermatological conditions, schizophrenia, and allergic disorders

Holden W, Orchard T, Wordsworth P. *Enteropathic arthritis*. Rheum Dis Clin North Am. 2003;29(3):513-30

Fink MP. *Intestinal epithelial hyperpermeability: update on the pathogenesis of gut mucosal barrier dysfunction in critical illness*. Curr Opin Crit Care. 2003;9(2):143-51

Intestinal Permeability and Disease

- “This new theory implies that once the pathological process is activated, it is not auto-perpetuating. Rather, it can be modulated or even reversed by preventing the continuous interplay between genes and the environment. Since zonulin-dependent TJ dysfunction allows such interactions, new therapeutic strategies aimed at reestablishing the intestinal barrier function by downregulating the zonulin pathway offer innovative and not-yet-explored approaches for the management of these debilitating chronic diseases.”

Fasano A. *Zonulin and Its Regulation of Intestinal Barrier Function: The Biological Door to Inflammation Autoimmunity, and Cancer*. *Physiol Rev* 91: 151-175, 2011 doi:10.1152/physrev.00003.2008

Zonulin

- “Zonulin has been observed to be involved in intestinal innate immunity and to be upregulated in several autoimmune diseases, including celiac disease (CD) and type 1 diabetes (T1D), in which TJ dysfunction seems to be the primary defect.”
- “Among the several potential intestinal luminal stimuli that can trigger zonulin release, we identified small intestinal exposure to bacteria and gluten as the two more powerful triggers. Enteric infections have been implicated in the pathogenesis of several pathological conditions, including allergic, autoimmune, and inflammatory diseases, by causing impairment of the intestinal barrier. We have generated evidence that small intestines exposed to enteric bacteria secreted zonulin.”

Intestinal Permeability and Disease

“A role of the gastrointestinal tract is to act as a barrier to finely regulate the trafficking of macromolecules between external (food/microbes) and internal environment (systemic, cells, tissues, etc).”

Fasano A, Shea-Donohue T, *Mechanisms of Disease: the role of intestinal barrier function in the pathogenesis of gastrointestinal autoimmune diseases*, Nat Clin Prac Gast Hep. 2005;2(9):416-422

Intestinal Permeability and Disease

“When the complex (intestinal) barrier is broken, foreign molecules can enter, interact with the immune system, and result in an inflammatory response which can lead to a multitude of local intestinal and systemic extraintestinal diseases.”

Fasano A, Shea-Donohue T, *Mechanisms of Disease: the role of intestinal barrier function in the pathogenesis of gastrointestinal autoimmune diseases*, Nat Clin Prac Gast Hep. 2005;2(9):416-422

Intestinal Permeability and Disease

- “...the autoimmune process can be arrested if the interplay between genes and environmental triggers is prevented by re-establishing intestinal barrier function.”
- “This review is timely given the increased interest in the role of a ‘leaky gut’ in the pathogenesis of gastrointestinal diseases and the advent of novel treatment strategies, such as the use of probiotics.”

Fasano A, Shea-Donohue T, *Mechanisms of Disease: the role of intestinal barrier function in the pathogenesis of gastrointestinal autoimmune diseases*, Nat Clin Prac Gast Hep. 2005;2(9):416-422

Intestinal Permeability and Disease

“A leaky gut has been recently proposed to be a universal initiating trigger for autoimmune diseases.”

Fasano A. *Surprise from Celiac Disease*. Sci Am. 2009 Aug;301(2):54-61

Intestinal Permeability and Disease

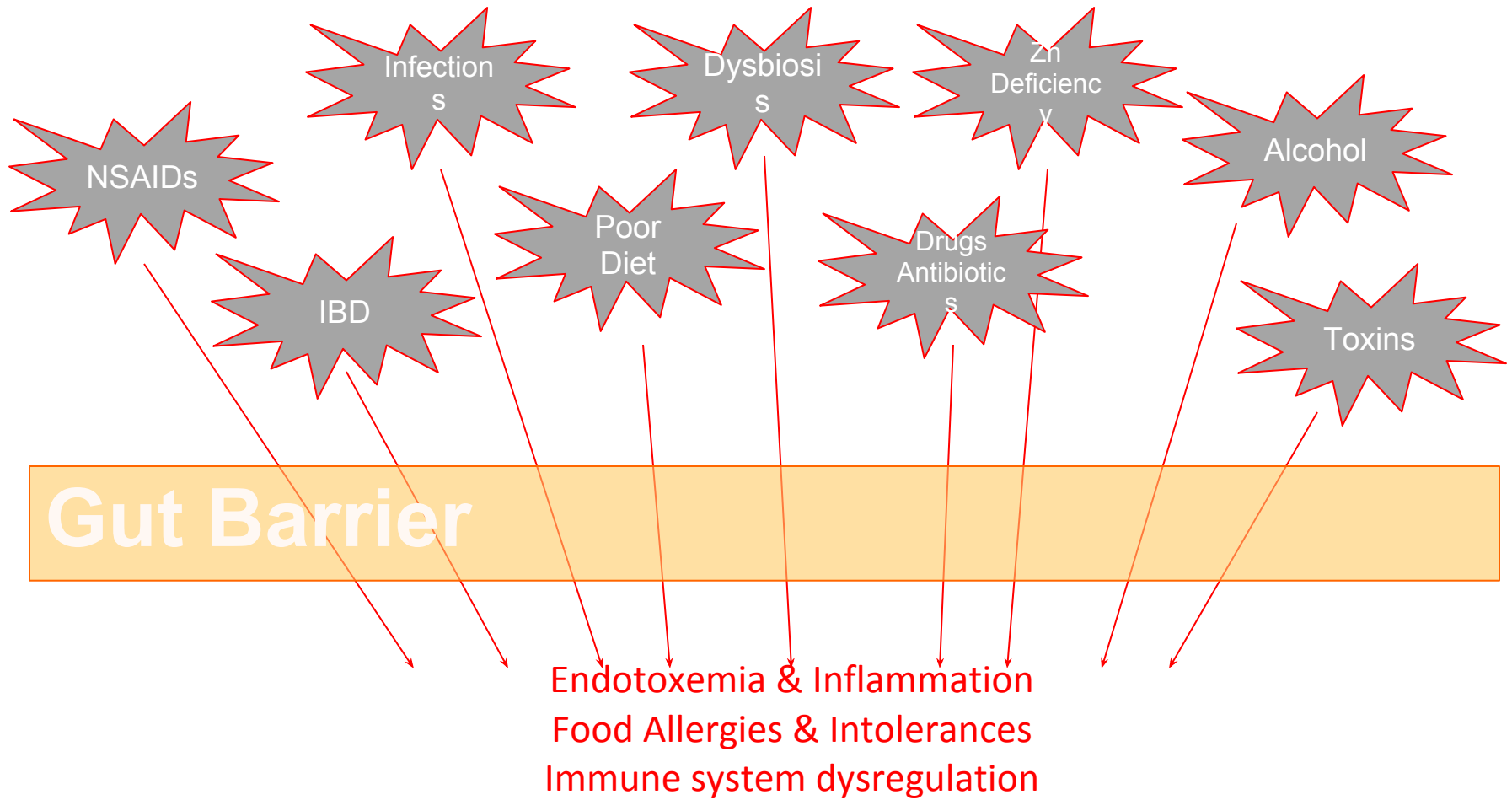
“This double-blind, randomized, placebo controlled re-challenge trial in patients who claim considerable improvement in gut symptoms with the institution of a gluten-free diet does indeed support the existence of non-celiac gluten sensitivity.”

Biesiekierski JR, et al. *Gluten Causes Gastrointestinal Symptoms in Subjects Without Celiac Disease: A Double Blind Randomized Placebo Controlled Trial*. Am J Gastroenterol advance online publication, 11 January 2011; doi: 10.1038/ajg.2010.487

Intestinal Permeability and Disease

- 1. Obesity** Bajzer M and Seeley R. *Nature*. 2006;444:1009-10.
- 2. Alcoholic Liver Disease** Banan A, et al. *Alcohol* 41 (2007) 447-460
- 3. Systemic and localized Inflammation** Scharz B, et al. *Wien Klin Wochenschr*,1999;111 (14):539-48
- 4. Inflammatory Bowel Disease** Laukoetter MG et al. *World J Gastroenterol* 2008 January 21; 14 (3): 401-407
- 5. Insulin Resistance** Mehta NN, et al. *Diabetes* 2010;59:172-181.
- 6. Type 1 Diabetes** Bosi E, Molteni L, et al. *Diabetologia*. 2006 Dec;49(12):2824-7.; Visser J et al. *Ann N Y Acad Sci*. (May 2009);1165:195-205
- 7. Atherosclerosis** Erridge C et al. *Am J Clin Nutr* 2007; 86: 1286-92
- 8. Heart Failure** Sandek A et al. *Curr Opin Clin Nutri Metab Care* 2008; 11:632-639
- 9. Chronic Fatigue** Maes M et al. *Journal of Affective Disorders* (2007); 99: 237-240

Intestinal Permeability and Disease



Our Toxic Body Burden

- Phthalates
- Flame retardants
- PBDEs-brominated flame retardants and autism susceptibility
- BPAs
- PCBs-alter activity dendritic growth in vivo; exposure alters development of the primary auditory cortex in rat; pcb 95 level is significantly elevated in postmortem brains of children with a genetic form of ASD
- Lead, mercury, arsenic, cadmium, organophosphate pesticides
- Alcohol and tobacco

Our Toxic Body Burden

"In one study testing the cord blood of 2,050 babies, levels of chlorinated pesticides were found to be positively associated with allergy. Neonates with high cord blood chlorinated pesticide levels had significantly higher IgE levels correlating with a higher incidence of eczema."

See <https://www.protherainc.com/images/prod/UpdateArticles/AllergyInflamationSpring2013.asp>

Lead Toxicity and Pregnancy Outcomes

- Infertility
- Miscarriage
- Low birth weight
- Preterm labor
- Stillbirths
- Macrocephaly

Fish

- The 1999-2000 NHANES survey showed ~8% of women ages 16-to-49 had blood mercury concentrations greater than 5.8 ug/L, the current RfD.
- This means an estimated 300,000 newborns each year with increased risk of learning disabilities from in-utero exposure to methylmercury.

<http://www.epa.gov/hg/exposure.htm>

<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5343a5.htm>

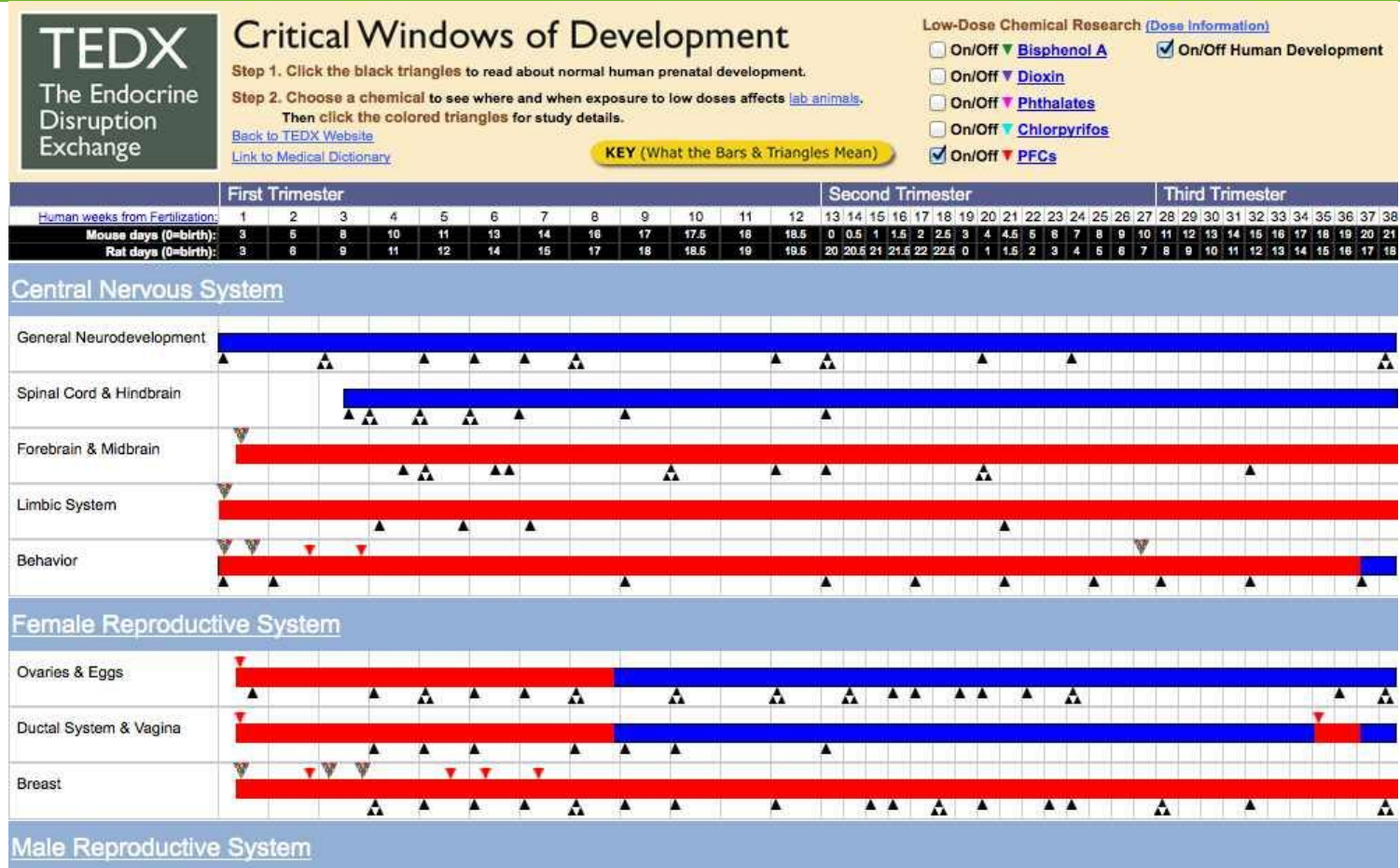
- NAC and GSH protect against the toxicity of mercury in neuronal cells

EPA ToxCast

"EPA launched ToxCast™ in 2007 to develop ways to predict potential toxicity of chemicals and to develop a cost-effective approach for prioritizing the thousands of chemicals that need toxicity testing. ToxCast™ uses advanced science tools to help understand how human body processes are impacted by exposures to chemicals and helps determine which exposures are most likely to lead to adverse health effects."

<http://www.epa.gov/ncct/toxcast/>

The Endocrine Disruption Exchange



www.criticalwindows.com/go_display.php

www.endocrinedisruption.com

Environmental Effect on Moms

- "Our findings suggest a beneficial impact of surrounding greenness on measures of fetal growth but not pregnancy length."

Dadvand, Sunyer, Basagaña, et. al., *Surrounding Greenness and Pregnancy Outcomes in Four Spanish Birth Cohorts*. *Environ Health Perspect.* 2012 October; 120(10): 1481–1487. Published online 2012 August 16. doi: 10.1289/ehp.1205244. Available at <http://ehp.niehs.nih.gov/wp-content/uploads/2012/09/ehp.1205244.pdf>

- "A study led by Michigan State University found that newborns with low birth weight are seven times more likely to develop autism later in life if ultrasound scans taken immediately after birth shows enlarged ventricles, brain cavities that store spinal fluid."

<http://www.medicaldaily.com/articles/14140/20130225/ultrasound-autism-risk-birth-revealed-scan.htm>

Movsas, Pinto-Martin, Whitaker, MD, et. al., *Autism Spectrum Disorder Is Associated with Ventricular Enlargement in a Low Birth Weight Population*. *The Journal of Pediatrics*, published online February 13, 2013. Available at <http://www.jpeds.com/article/S0022-3476%2812%2901573-abstract>

Junk In Equals Junk Out

"These findings suggest that exposure to a maternal junk-food diet results in early desensitization of the opioid system which may explain the increased preference for junk food in these offspring."

Gugusheff, J. R., Ong, Z. Y., Muhlhausler, B. S. *A maternal "junk-food" diet reduces sensitivity to the opioid antagonist naloxone in offspring postweaning*. Federation of American Societies for Experimental Biology (FASEB) Journal, December 11, 2012, doi: 10.1096/fj.12-217653 (online at <http://m.fasebj.org/content/27/3/1275>); March 2013 vol. 27 no. 3 1275-1284 (printed).

Egypt Divided / Pot's Big Moment / Best of 2012 100th Anniversary

TIME

Want to Know My Future?



New genetic tests can point to risks — but not always a cure

BY BONNIE ROCHMAN

Epigenetics

- Bacteria dictate epigenetics - the interface of how genes express themselves based on environmental exposure - genes meet environment, leads to health outcomes
- Researchers have linked a number of genes to autism

Diet and Metabolic Syndrome

"Maternal metabolic conditions may be broadly associated with neurodevelopmental problems in children. With obesity rising steadily, these results appear to raise serious public health concerns."

Krakowiak P, Walker CK, Bremer AA, Baker AS, Ozonoff S, Hansen RL, Hertz-Picciotto I., *Maternal metabolic conditions and risk for autism and other neurodevelopmental disorders*. Pediatrics. 2012 May;129(5):e1121-8. doi: 10.1542/peds.2011-2583. Epub 2012 Apr 9. Available at <https://www.ncbi.nlm.nih.gov/pubmed/22492772>

Autism, Imprinting and Epigenetic disorders

"The most important pathway for Hcy recycling is the folate pathway, which requires vitamins B3, B9 (folic acid) and B12. The second Hcy recycling mechanism is the cystathionine beta synthase pathway (CBS), requiring vitamin B6, which leads to the formation of cysteine (and then glutathione). Glutathione is the universal natural (endogenous) protector against DNA decays caused by oxidative stress. A third pathway is Betaine-homocysteine methyl transferase (BHMT), which is usually weakly represented in tissues other than the liver."

Ménézo, Mares, Cohen, et. al., *Autism, imprinting and epigenetic disorders: a metabolic syndrome linked to anomalies in homocysteine recycling starting in early life??*, *J Assist Reprod Genet.* 2011 December; 28(12): 1143–1145. Published online 2011 November 3. doi: 10.1007/s10815-011-9645-2. PMID: PMC3241847 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3241847/>

Epigenetics and Autism

- Environment/genes/physiology-autisms has complex etiologies
- A complex set of disorders—very high but complex heritability
- 60% concordance in monozygotic twins
- Syndrome forms of autism, fragile x, rett, and rare mutations
- Idiopathic autism, majority of cases
- Single nucleotide polymorphisms cMET
- Copy number variations: duplications or deletions of gene sequencing
- Epigenetic contributions such as DNA methylation

The Autism Phenome Project

- UC Davis Mind Institute's "APP" is the largest and most comprehensive assessment of children with autism ever attempted.
- It aims to distinguish among recognized subgroups or phenotypes of autism.

<http://www.ucdmc.ucdavis.edu/mindinstitute/research/app/>

CHARGE!

- Childhood Autism Risks from Genetics and the Environment study launched in 2003 as the first comprehensive study of environmental causes and risk factors for autism and developmental delay.
- It recognizes that no single factor accounts for all autism cases, nor is there one event or exposure that can be responsible for the rapid increase in diagnoses over the last few decades. Instead, each child's path to altered brain development may be different.
- The first study to identify an interaction between genes and environment:
 - Showed that the combination of certain unfavorable genes and a lack of prenatal vitamin supplementation in the preconception period led to exceptionally high risk for autism—as much as 7-fold!
 - Found that both the mother's and the child's genes could have this impact.

<http://beincharge.ucdavis.edu/>

Mount Sinai Children's Environmental Health Center (CEHC)

- CEHC's Laboratory for Environmental Analytical Chemistry conducts research examining the science behind
 - Toxins and neonatal and child health & development
 - Epigenetics and mitochondria



Mount
Sinai

*Children's Environmental
Health Center*

Beneficial Bacteria = Flora

- The gastrointestinal microbiota plays a vital role in maintaining human health.
- Comprised of 100's of trillions of cells and bacterial species numbering in the 100's to 10's of thousands, the intestinal microbiota is a unique, highly active, accessory organ that performs numerous beneficial functions.
- Failure to acquire and develop a healthy microbiota during infancy may also limit the extent to which a balanced stable microflora can be established later in life.
- Dysbiosis has been associated with numerous GI and systemic health disorders including IBD, IBS, asthma, eczema, fibromyalgia, chronic fatigue

What are Probiotics?

- Probiotics are beneficial bacteria and yeasts that reside in our digestive tract
- When they are in balance, and there are enough of them, they maintain the health of the gut, and play a role in assimilation of minerals and the production of B vitamins and vitamin K.
- Keep yeast in check



Metabolic Functions of Gut Bacteria

- Mucous production (Biofilm)
- Short Chain Fatty Acids Metabolism
- Primary Bile Acid Deconjugation
- Vitamin Absorption
- Fats, TG, Cholesterol regulation
- Undigested dietary fiber breakdown
- Gas production
- Fermentation
- Production of Phenols
- Breakdown of oligo-saccharides
- Aid in digestion
- Combat diarrhea

Baby's First Flora

"...intriguing evidence suggests that a baby's immune system may interact with the mother's gastrointestinal microflora prior to birth. Maternal commensal microorganisms have been isolated from the meconium of term infants delivered vaginally and by cesarean section as well as from umbilical cord blood from neonates born by cesarean section."

Olmstead S, Wolfson D, Meiss D, Ralston J, *Allergies, Autoimmune Disorders, and the Gut Microbiota: Prebiotics and Probiotics as Old Friends*. Klaire Labs Technical Summary, citing Jiménez E, Fernández L, Marín ML, et al. *Isolation of commensal bacteria from umbilical cord blood of healthy neonates born by cesarean section*. *Curr Microbiol* 2005;51:270-4; Jiménez E, Marín ML, Martín R, et al. *Is meconium from healthy newborns actually sterile?* *Res Microbiol* 2008;159:187-93.

Baby's First Flora

- Acquisition of infant microflora occurs during the birth process.
- Maternal diet, medications and manner of delivery influence it.
- Bacterial cultures of gastric contents of newborns have been found similar to maternal cervical microflora.

Brook I, Barrett CT, Brinkman CR 3rd, Martin WJ, Finegold SM. *Aerobic and anaerobic bacterial flora of the maternal cervix and newborn gastric fluid and conjunctiva: a prospective study*. Pediatrics 1979;63:451-5.

Gut-Brain Connection

- The gut is also called the enteric nervous system (ENS) or second brain in the body
- It contains about 100 million neurons – more than the spinal cord or peripheral nervous system
- All types of CNS neurotransmitters have been found in the ENS

Gut-Brain Connection Cont.

- Neural activity in the gut is triggered by digestion – gut can control its behavior independently from the brain
- “The brain in the head doesn’t need to get its hands dirty with the messy business of digestion, which is delegated to the brain in the gut.” Gershon, M. *The Second Brain*. 1999

Gut-Brain Connection Cont.

- The gut is also abundant in immune tissue
- 70% of lymph nodes found around the GI tract
- The immune and neurological systems of the gut are intertwined – communication is via neuronal, immunological and endocrinological pathways
- Bi-directional information continually passes between the gut and CNS
- This suggests that some neurological and gastrointestinal conditions may have both a gut and brain component

Depression, Anxiety & the Gut

- “Psychiatric disorders especially major depression and anxiety can be seen in up to 94 percent of IBS patients; the disorder is frequently interconnected with fibromyalgia and chronic fatigue syndrome. Treatments used for IBS patients often are tied as much to emotional health as to gut health. Cognitive-behavioral therapy is known to be effective in IBS sufferers.”

Hunt MG, Moshier S, Milonova M. *Brief cognitive-behavioral internet therapy for irritable bowel syndrome*. Behav Res Ther. 2009 May 20.

Can Acquired Infections Influence Brain Function and Behavior in Autism and Other Neurodevelopmental Disorders?

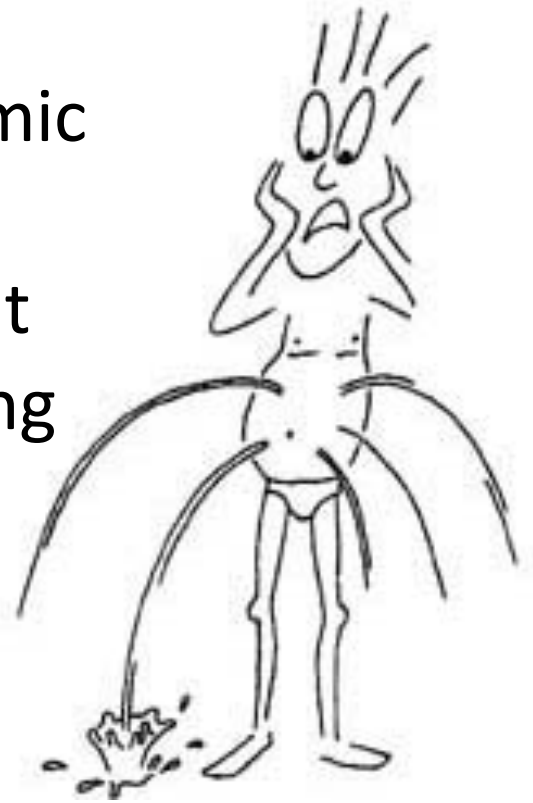
- “Metabolic products of opportunistic digestive system infections provide behaviors and brain changes resembling autism. Specifically, propionic acid (PPA) a short chain fatty acid and intermediate of cellular fatty acid metabolism. Along with acetic and butyric acid, PPA is also a by-product of a subpopulation of human gut enteric bacteria, such as clostridial species. It is increased to millimolar levels systemically following carbohydrate ingestion.”

Can Acquired Infections Influence Brain Function and Behavior in Autism and Other Neurodevelopmental Disorders?

- “PPA is also known as a common preservative in refined wheat and dairy products. In addition to passive diffusion via the gut into the systemic circulation, PPA is actively taken up by specific transporters in the gut, cerebral vasculature, and CNS neurons and glia. PPA has a number of interesting neurobiological effects on receptor activation, neurotransmitter release, pH, cholesterol/fatty acid metabolism, mitochondrial function, and immune system activation, making it an ideal compound linking diet, digestive system function, and bacterial infection with ASD.”

How to Heal the Gut

- Because inflammation at the level of the gut mucosa plays a role in the development of GI and other systemic diseases, it is important to optimize inflammatory balance within the gut
- Inflammation can be controlled using therapeutic diets and nutritional supplements to assist in the healing process



Control the Inflammatory Environment

- Control of leakiness of the gut and antigen presentation at the lamina propria within the gut may help balance T-helper cell population distribution and thus control inflammation.
- Control of leakiness of the gut wall may reduce inappropriate gut luminal content/immune interactions, thus reducing immune-mediated inflammation both locally and at a distance.

Healing with Diet

- Use nutrition to nourish the body, especially the gut which houses the immune system and modulates the neurological system through its functions.
- Proper nutrition to reduce inflammation and support detoxification of our body waste and body burden.

Go Gluten Free

"Gliadin binds to CXCR3 and leads to MyD88-dependent zonulin release and increased intestinal permeability."

Lammers, Lu, Brownley, et. al., *Gliadin induces an increase in intestinal permeability and zonulin release by binding to the chemokine receptor CXCR3*. *Gastroenterology*. 2008 Jul;135(1):194-204.e3. doi: 10.1053/j.gastro.2008.03.023. Epub 2008 Mar 21. Available at <https://www.ncbi.nlm.nih.gov/pubmed/18485912>

Low Clean Sugars

"When broad sugar utilization was compared within the five major body sites, the gastrointestinal tract contained the highest potential for total sugar degradation, while dextran and peptidoglycan degradation were highest in oral and vaginal sites respectively. Our analysis suggests that the carbohydrate composition of each body site has a profound influence and probably constitutes one of the major driving forces that shapes the community composition and therefore the CAZyme profile of the local microbial communities, which in turn reflects the microbiome fitness to a body site."

Healing with Probiotics

- Probiotics are modulators of the immune system and the gut-brain connection
- Probiotics may help both gastrointestinal and systemic conditions
 - Complex subject involving a balance of protective probiotics versus a dysbiotic set of organisms that create their own biofilm
- Probiotics produce cytochrome P450-like enzymes and help with detoxification

Healing with Probiotics

- 700+ randomized, controlled human studies show strong clinical support for their use in both the prevention and treatment of gastrointestinal disorders and metabolic syndrome.
- In addition, probiotics exert antimutagenic, antitumor, and immunomodulation effects.
- They may also modulate the leakiness of the gut. This could help practitioners with the task of treating inflammatory ENS neuropathies

Jones DS. Textbook of Functional Medicine. 2006

The Probiotic *Bifidobacteria Infantis*: an Assessment of Potential Antidepressant Properties in the Rat

- Probiotics can counteract adverse changes in intestinal barrier function, visceral sensitivity, and gut motility, as well as decrease inflammatory cytokines and so positively influence mood in patients whose emotional symptoms and inflammatory immune chemicals are elevated
- In an animal study, *B. infantis* significantly reduced cytokine levels of IFN-gamma, TNF-alpha, and IL-6 compared with controls, as well as markedly increasing plasma concentrations of tryptophan, the precursor to serotonin, supporting its role as a potential antidepressant.

Desbonnet L, Garrett L, Clarke G, Bienenstock J, Dinan TG. *J Psychiatr Res.* 2008 Dec;43(2):164-74

Fermented Foods - Rich In Probiotics

- Raw fermented foods- have billions of bacteria per serving- nature's way of colonizing the gut
- Functions of good bacteria
 - Regulate peristalsis and bowel movements
 - Break down bacterial toxins
 - Make vitamins needed and utilize: B1, B2, B3, B5, B6, B12, A and K
 - Digest protein into amino acids (for use by the body)
 - Produce antibiotics and antifungals which prevent colonization and growth of bad bacteria and yeast/ fungus
 - Help break down sugars, lactose, and oxalates
 - Support the immune system and increase the number of immune cells
 - Balance intestinal pH
 - Protect against environmental toxins: mercury, pesticides, pollution

Fermented Foods

- Kombucha: a soda-like beverage that contains beneficial yeast that combats candida. Can be made from a traditional Kombucha “mushroom” starter or from a starter packet. May be made from black tea, or young coconut water
- Raw sauerkraut: made with cabbage, and salted with vinegar
- Fermented carrots, beets, pickles
- Milk-based yogurt/kefir
- Note: vinegar should not be used in traditionally fermented products to obtain beneficial bacteria



Elimination Diets

- Identify and clear the body of reactive foods – those that produce sensitivity or allergy symptoms
- Typically involves removing suspected or common reactive foods for a period of time and then reintroducing them to see if symptoms return
- Once reactive foods are identified they can be removed from the diet in order to initiate healing

Low Histamine Diet

- Histamines are produced endogenously in the GI tract
- Histamine load in body can be compounded by high histamine foods
 - Can cause pathogenesis of GI diseases

Maintz L, et al., *Histamine and Histamine intolerance*. Am J Clin Nutr 2007;85:1185-1196

Symptoms Possibly Histamine-Related

- Abdominal pain
- Diarrhea, alternating with normal bowel movements
- Chronic constipation
- Flushing or reddening of the skin (rosacea of the face)
- Itching

High Histamine Foods

- Wine
- Champagne
- Cheese
- Fish
- Salami
- Sauerkraut



Image courtesy of Flickr user n.karim

The Mediterranean Diet

- Touted as one of the healthiest ways to eat
- Includes the antioxidants of fruits and vegetables; fiber; omega 3 F.A.; monounsaturated fats and polyphenols from olive oil; resveratrol from red wine and grapes; and beta-sitosterols from plants.
- Associated with lower CVD, Neurological Dx, Cancer and age related bone loss.
- Alternative to SAD (Standard American Diet)



Other Healing Foods and Supplements

- Soluble and insoluble fiber
- Cruciferous vegetables
- Curcumin
- Green Tea
- Digestive enzymes
- Essential fatty acids



In Summary

- Prenatally improve digestion/correct digestive problems
- Optimize gut flora
- Reduce infection, inflammation, allergies, sensitivities
- Correct for deficiencies
- Detoxify and reduce your body burden

Thanks!

- Download this presentation and find links to more resources at geribrewster.com/AO2013
- A few suggested links:
 - <http://www.autismone.org/content/gut-brain-link-autism-derrick-macfabe-md>
 - <http://humanfoodproject.com/from-meat-to-microbes-to-main-street-is-it-time-to-trade-in-your-george-foreman-grill/>
 - <http://holisticprimarycare.net/topics/topics-o-z/vitamins-a-supplements/1459-perinatal-choline-may-reduce-risk-of-schizophrenia>
 - <http://healthland.time.com/2012/12/13/want-to-know-my-future-parents-grapple-with-delving-into-their-kids-dna/>
 - labelgmo.org



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CELLULAR ADVANCEMENT
THROUGH NUTRITION

Additional References

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