Nutrition and Pain: The Rules for Success

Hal S. Blatman

Do We Not Treat Everyone’s Treatment Failures?

- Headaches every day?
- Disabling headaches/month?
- Fibromyalgia?
- Rain pain (worse with weather changes)?
Is Your Office Visit Negotiation for More Medicine?

- My medicine only lasts 2 to 3 hours?
- I take all my medicine by evening and have no help for sleep?
- I need more medicine to handle all
  this… >> … >> … >> … >> … >> … >> … >> … ……..

Can We Change How We Think of and Treat Pain?

- Does what we do work as well as needed?
- Why do our treated pain patients still hurt?
- What if we could provide our patients with education leading them to make choices that provide opportunity to live without pain
- Is it possible that the patient is 40% to 60% responsible for feeling better, or feeling worse by lifestyle choices?
- When people understand more about medicine, they make better choices
PAIN: An Epidemic

- The USA has 4% of the world’s population and uses more than 90% of the world’s supply of hydrocodone.

Report Shows Hydrocodone and Oxycodone Use Continues to Increase
| April 21, 2011
Primary Care | Pain Management |

Audit of prescription data reveals that hydrocodone is by far the most frequently dispensed product in the US.

Medication Treatment Failures Are Not Your Fault

- Medicine can only do so much
- Aren’t there other reasons for pain besides a medication deficiency?
- What if some foods actually overpower or make medicine not work?
- Wouldn’t it be awesome to show patients easy things they can do to stop their own pain?
Nutrition and Pain: The Rules for Success

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Objectives

- Describe how food choices affect inflammation and pain
- Discuss the nutrition rules that complement treatment for pain
- Explain how food choices may change efficacy of pain medication
- Explain how to integrate new treatment options for pain patients
**Potential Conflict of Interest**

- Speakers Bureau: Standard Process

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**Inflammatory Process**

Theorized for a Variety of Chronic Pain Issues

- Rheumatoid arthritis
- Osteoarthritis
- Irritable bowel disease
- Crohn’s disease
- Skin diseases
- Chronic fatigue
- Chronic pain
- Back pain
- Headache
- Cardiovascular disease
- Cancer
- Fibromyalgia
- Diabetic neuropathy
How much difference?

Man in his 50s
Pain since 1988, fell off 2 story roof
Landed on sand pile on his back

How much difference?

Woman in her 40s
Pain, fatigue, weakness since 2006
How much difference?

We Get Out of Our Body What We Put Into It:
Good, Bad
Beneficial, Detrimental

We eat to get raw materials to build new parts
We eat to get fuel
Hippocrates

- “Let food be thy medicine and medicine be thy food.”

- Concept has been around for a long time......

Overview

- Rules for nutrition
- Nutrition underlies illness
- Nutrition underlies healing
- Leaky gut
- Food is medicine
Is Pain Just About Medicine?

- It is also about getting healthier
  - Patients tend to have multiple problems
    - Many of these problems have common denominator
  - Need to do what it takes for the body to help heal itself

THE RELATIONSHIP
OF DIET AND PAIN
Mathematical Formula
Describes Wellness and
The Concept of Disease

\[ G - B + R = P \]

- \( G \) = the good things you can do for, and put into, your body
- \( B \) = the bad things you can do for, and put into, your body
- \( R \) = the reserve that your body has left (given at birth minus what’s been used up)
- \( P \) = the pain and problems you are going to experience
- **P** — people seek care because they are not happy with the pain and problem number
- **R** — people go to church to negotiate for how much reserve is left in their body
- **G - B** — these numbers can be changed and should be taught by health care

**G - B + R = P**

- **R** = theoretically, if we have enough reserve left.....
- **G - B** = and we change enough of the good and bad.....
- **P** = our body can heal itself!
This brings us to diet and nutrition…

There Are 3 Rules
Rule #1

- Do not eat fake food
  - NutraSweet
  - Splenda
  - Saccharin
  - Margarine
  - Olestra?

Rule #2

- Do not eat inflammatory food
Rule #3

- Inside the large intestine are billions of life forms we call flora
  - Healthy flora (good microbes)
    - Lactobacillus acidophilus
    - Bifidobacterium infantis
    - Help digest food, provide vitamins, B-12
    - Help degrade toxins, prevent colonization of bad microbes
  - Toxic flora (bad microbes)
    - Candida, fungi, bacteria, parasites
    - Produce endogenous toxins
    - Increase intestinal permeability
    - Injure the good microbes


Rule #3 (cont’d)

- Need to learn to feed the beneficial flora
  - Like they were pet fish in a fish tank
- Need to learn to starve the bad flora
  - So that they die
RULE #1

POISONS
- “FOODS”
- NEVER TO INGEST
**Artificial Sweeteners, Fake Fat**

- NutraSweet (aspartame)
- Splenda (sucralose)
- Saccharin (ortho-sulfobenzoic acid imide)
- Margarine

**Aspartame**

- Aspartame causes elevation in serum methanol
- Aspartame causes increase in serum methanol in rats and humans
- Aspartame completely metabolized in gut and absorbed as aspartate, phenylalanine, and methanol, but doesn’t cause health problem
- Oral aspartame caused rise in serum methanol in men and rats
  - Cappellini Metabolism 1991;Jun;40(6):612-18
- Dietary labeled aspartame results in labeled formaldehyde bound to tissue in rats
  - Troche et al. Departament de Bioquimica, Universitat de Barcelona, Spain.
- Repeated
  - Hertelendy et al. Gastroenterol. 1993;88:737-743
Aspartame (cont’d)

- Dose related increase in hepatocellular carcinomas—rats
- Men increased risk non-Hodgkin’s lymphoma and multiple myeloma > 1 diet soda or high consumption regular soda / day
- Multipotential carcinogenic agent, 20 mg/kg, less than “acceptable” daily intake


ICMP Journal Spring 1997
(International Congress for Medical Professionals)

- Aspartame
  - 40% aspartic acid
  - 50% phenylalanine
  - 10% methanol, converts to formaldehyde and formic acid (ant sting poison)
- Free methanol is created when heated above 86° F
  - Cumulative poison – slow rate of excretion
  - 7.8 mg/day (EPA)
  - Average diet drink 15-36 mg/can

Methanol Metabolism

- Mostly hepatic (90%-95%)
- Alcohol dehydrogenase oxidizes methanol to formaldehyde
- Rapidly converted to formic acid (1/2 life 15-30 hour)
- Folate dependent pathway oxidizes to CO2
- Ethanol will slow metabolism and reduce toxicity
- Toxicity from formaldehyde, methanol, and formic acid

NutraSweet

- Worsens depression in patients with mood disorders\(^1\)
- Methanol (about 10% converted)\(^2\)
  - Neurotoxic
    - Brain damage and brain cancer
    - Lowers seizure threshold\(^3\)
  - Causes pain in many people\(^4\) (clinically 2 months)
    - Inhibits glutamate binding to NMDA receptor

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Splenda (sucrasose)

- Made by chlorinating sugar
- Reduction in beneficial fecal microflora
- Increased fecal pH
- Enhanced expression levels of P-gp, CYP3A4, CYP2D1, known to limit bioavailability of orally administered drugs

Journal Tox and Envir Health; 71, 21, Jan 2008; 1415-1429.

Splenda Alters Gut Microflora and Increases Intestinal P-Glycoprotein and Cytochrome P-450 in Male Rats

Authors: Mohamed B. Abou-Doniaa; Eman M. El-Masrya; Ali A. Abdel-Rahmana; Roger E. McLendonb; Susan S. Schiffmanc

Abstract

Splenda is comprised of the high-potency artificial sweetener sucralose (1.1%) and the fillers maltodextrin and glucose. Splenda was administered by oral gavage at 100, 300, 500, or 1000 mg/kg to male Sprague-Dawley rats for 12-wk, during which fecal samples were collected weekly for bacterial analysis and measurement of fecal pH. After 12-wk, half of the animals from each treatment group were sacrificed to determine the intestinal expression of the membrane efflux transporter P-glycoprotein (P-gp) and the cytochrome P-450 (CYP) metabolism system by Western blot. The remaining animals were allowed to recover for an additional 12-wk, and further assessments of fecal microflora, fecal pH, and expression of P-gp and CYP were determined. At the end of the 12-wk treatment period, the numbers of total anaerobes, bifidobacteria, lactobacilli, Bacteroides, clostridia, and total aerobic bacteria were significantly decreased; however, there was no significant treatment effect on enterobacteria. Splenda also increased fecal pH and enhanced the expression of P-gp by 2.43-fold, CYP3A4 by 2.51-fold, and CYP2D1 by 3.49-fold. Following the 12-wk recovery period, only the total anaerobes and bifidobacteria remained significantly depressed, whereas pH values, P-gp, and CYP3A4 and CYP2D1 remained elevated. These changes occurred at Splenda dosages that contained sucralose at 1.1-11 mg/kg (the US FDA Acceptable Daily Intake for sucralose is 5 mg/kg). Evidence indicates that a 12-wk administration of Splenda exerted numerous adverse effects, including (1) reduction in beneficial fecal microflora, (2) increased fecal pH, and (3) enhanced expression levels of P-gp, CYP3A4, and CYP2D1, which are known to limit the bioavailability of orally administered drugs.
Ortho-Sulfobenzoic Acid Imide (Saccharin)

- Alters gut bacteria...microbiome
- Increases glucose intolerance

J Suez et al., Nature http://dx.doi.org/10.1038/nature13793; 2014

Hydrogenated Fat—Margarine

- In the late 1800s Napoleon ran out of butter, held a contest to find a replacement
- Scientist bubbled hydrogen gas through vegetable oil, creating margarine, won contest
- For USA, became important during WW I and WW II when we ran out of butter, coffee, cigarettes, toast, bullets
- Margarine grew as an industry, and restrictive laws and taxes were eventually repealed
Hydrogenated Fat—Margarine (cont’d)

- Then it was discovered that
  - Insects wouldn’t eat it
  - Mold wouldn’t grow on it
  - It would not support life
  - It would not sustain life
- So it was put into food and fed to people!
- So food would stay on the supper market shelf longer without growing mold or spoiling
- Bubble hydrogen gas through vegetable oil
  - Turn it into processed chemical (poison) that won’t grow mold

Hydrogenated Fat—Peanut Butter

- Skippy, Peter Pan, Jiff...
  - Sit in the cupboard, unrefrigerated, never grow mold...
  - Because there is hydrogenated fat in the peanut butter that keeps the mold from growing
**Margarine**

- If your food won’t grow mold, it won’t grow you
- You can’t afford to be eating things that won’t help you build new parts
- Patients understand this!

**Prepared Food—Shelf Life**

- Essential fatty acids decrease shelf life
  - Go rancid when exposed to heat, light, oxygen
- Hydrogenation improves shelf life
Primary Effects of Hydrogenated Oil

- Cholesterol levels rise,\(^1\) HDL decrease, LDL increase\(^2\)
- Prostaglandin balance changes\(^3,5\)
  - Effects on gastric acid secretion, inflammation, blood vessel constriction
- Increased incidence of diabetes\(^3\)
- Cell membrane composition


Inflammation and Pain

- Saturated fatty acids (low concentration) activate skeletal muscle cells to release inflammatory mediators that trigger macrophages\(^1\)
- Proinflammatory cytokines induce genes in dorsal root ganglion neurons and increase pain\(^2\)

1. Pilon NJ et al., Cell Communication and Signaling 2012, 10:30.
**Partially Hydrogenated Vegetable Oil**

- One of the most serious dangers is related to cell membrane composition


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**Cell Membrane Composition**

- 2 layers of fat: bi-lipid layer
- Specific ratio
  - Omega-6 essential fatty acids
  - Omega-3 essential fatty acids
- Triglycerides
- Phospholipids
- Protein
Job of Cell Membrane

- Nutrients in, waste out
  - Active and passive transport
- Remain flexible and alive
- Neurons transmit information

Cell Membrane

- In order to perform these functions optimally...
- Membrane composition is critical
Cell Membrane (cont’d)

- The fats we eat are the raw materials that make up cell membranes
- Every cell made or repaired that day

When we eat hydrogenated oil

every cell in the body that gets

made or repaired that day

incorporates “plastic” into the cell membrane
“Plastic” Membranes

- Do not transmit nutrients
- Do not transmit waste
- Lose their flexibility
- Neuron transmission is not normal

With years of eating hydrogenated oil—

our body becomes like a Genuine GM truck

fixed with plastic parts
After Eliminating Hydrogenated Oil From the Diet

- It takes 4 months to get it out of the RBCs
- We have billions of RBCs floating around delivering O2 to poor tired muscles and poor tired brain
- Doesn’t it make sense that they will do a better job made of fish oil than PHS?
- Teach patients that French fry increases pain for 4 months (and carcinogen)

Metabolic Pathways of Essential Fatty Acids

<table>
<thead>
<tr>
<th>Omega-6 Fatty Acids</th>
<th>Omega-3 Fatty Acids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linoleic Acid</td>
<td>Alpha-Linolenic Acid (ALA)</td>
</tr>
<tr>
<td>Gamma-Linolenic Acid (GLA)</td>
<td>Steridonic Acid</td>
</tr>
<tr>
<td>Dihomo-Gamma-Linolenic Acid (DGLA)</td>
<td>Eicosatraenoic Acid</td>
</tr>
<tr>
<td>PGE1</td>
<td>delta-6-desaturase</td>
</tr>
<tr>
<td>Arachidonic Acid</td>
<td>Steridonic Acid</td>
</tr>
<tr>
<td>cyclooxygenase</td>
<td>Eicosatraenoic Acid</td>
</tr>
<tr>
<td>PGE2</td>
<td>delta-6-desaturase</td>
</tr>
<tr>
<td>lipoxygenase</td>
<td>DHA</td>
</tr>
<tr>
<td>LTB4</td>
<td>EPA</td>
</tr>
<tr>
<td>lipoxygenase</td>
<td>DHA</td>
</tr>
<tr>
<td>PGE5</td>
<td>LTB5</td>
</tr>
</tbody>
</table>
Goal of Nutritional Balancing

- Displace arachidonic acid from membrane
- Compete with arachidonic acid and change balance of eicosanoid synthesis
  - Toward anti-inflammatory mediators
  - Away from pro-inflammatory mediators

Evidence for Fish Oil Supplementation

- Significant improvement in joint tenderness, and joint swelling in RA patients after 24 weeks\(^1\)
- Meta-analysis omega-3 for inflammatory joint pain, RA\(^2\)
- Other studies support use of fish oil\(^3,4,5\)
  - Heart disease, hypertension, cancer, atopic dermatitis

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3. Swapril V et al., Botanical oils enriched in n-6 and n-3 FADS2 products are equally effective in preventing atherosclerosis and fatty liver, June 2015 The Journal of Lipid Research, 56, 1191-1205.
Evidence for Fish Oil Supplementation (cont’d)

- Significant improvement in major depression:
- 1,050 mg/d EPA and 150 mg/d DHA was found to be more effective than placebo in reducing depressive symptoms


Blood EPA and DHA Predict All-Cause Mortality
Patients with Stable CHD

- Blood levels (EPA and DHA) above median found 27% reduced risk of death (HR=0.73)
- (Hazard Ratio)
"Blood Eicosapentaenoic and Docosahexaenoic Acids Predict All-Cause Mortality in Patients With Stable Coronary Heart Disease: The Heart and Soul Study," Pottala JV, Garg S, et al, Circ Cardiovasc Qual Outcomes, 2010 June 15; [Epub ahead of print]. (Address: Cardiovascular Health Research Center, Sanford Research/USD and Sanford School of Medicine, Sioux Falls, SD, USA).

Summary:

In a prospective cohort study involving 956 patients with stable coronary heart disease who were followed up with for an average of 5.9 years, during which time 237 of the subjects died, higher blood levels of EPA and DHA were found to be associated with a reduced risk of all-cause mortality. As compared to patients with EPA and DHA levels below the median (<3.6%), those whose levels were above the median were found to have a 27% reduced risk of death (HR=0.73). The authors conclude, "In these outpatients with stable coronary heart disease, blood omega-3 FA levels were inversely associated with total mortality independent of standard and emerging risk factors, suggesting that reduced tissue omega-3 FA levels may adversely impact metabolism."

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Evening Primrose Oil Supplementation (Omega-6)

- Rheumatoid arthritis, atopic eczema¹,²
- Decrease arachidonic acid related inflammation²
  - Elevates concentration of dihomo-y-linolenic acid (DGLA; 20:3n-6), increases production 1-series PGs (ie. PGE1)
  - Forms 15-hydroxyl derivative that blocks transformation of arachidonic acid to LTs
    - DGLA may act as competitive inhibitor of 2-series PGs, 4-series LTs, thus suppressing inflammation

Dose Omega-3 Fatty Acids?

- Ideal dose unknown
- 1 g/day healthy adults, good diet
- 1-3 g/day cardiovascular disease
- 5-10 g/day autoimmune disease, chronic pain, neuropsychiatric conditions

Why Not Esterified Fish Oil?

- 70% greater absorption with triglyceride form vs ethyl ester form\(^1\)
- Faster and higher increase in RBC membranes with triglyceride form
- No increase in bleeding, even 3 g/day + ASA + clopidogrel\(^3\)
- No increase bleeding risk undergoing CABG, carotid endarterectomy, femoral artery cath\(^4\)

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1. Prostaglandins Leukot Eset Fatty Acids. 2010;83:137-141
3. Am J Cardiol. 2009;104:1052-1054
4. Am J Cardiol. 2007;99:44C-46C
How About Bleeding Risk With Fish Oil Supplementation?

- No increase in bleeding, even 3 g/day + ASA + clopidogrel\(^1\)
- No increase bleeding risk undergoing CABG, carotid endarterectomy, femoral artery cath\(^2\)

1. Am J Cardiol. 2009;104:1052-1054
2. Am J Cardiol. 2007;99:44C-46C

What Fish Oil Should I Buy?

- EPA + DHA = > 50% of the oil in the pill
- Discount stores: 30%
- Drug stores: 30% to 50% to 70%
- Health food stores: 70% to 90%
Rule #1
No Fake Food

- Fats we eat have major effect
- Health of cells, composition of cell membrane
- Development of inflammation and pain
- Affect development of chronic disease
Rule #2
Do Not Eat Inflammatory Food

- The human body is a highly tuned biochemical Ferrari
- It does not do work well with damaged or inflammation causing parts
- Inflammatory food wears it out faster

We like to feel like this.. We like to feel like this..
And might feel like this.. And might feel like this..
Rule #2

- Inflammatory food (hidden sugars)
  - White sugar
  - White flour
  - White/red potato
    * (medium potato = 1/2 cup sugar)
  - Fruit juice

Rule #2 (cont’d)

- Next is all wheat grain
  - Bread
  - Pasta
  - Cereal
  - Thickener in soup/sauce

- Not just for gluten sensitive people
  - Zonulin proteins (can now be tested)
  - Intestinal permeability issues
Rule #2 (cont’d)

- Soda is devastating to the human body
  - 10 + tsp sugar per can
  - Phosphates deplete calcium

One soda

is more dangerous than

one cigarette
Soda

- Teenage girls have 3 to 5 times increased risk of bone fractures\(^1\)
- Questionnaire study, soda not quantified
- Other studies\(^2,3\)

3. Wyshak, G, et al., Carbonated beverages, dietary calcium, the dietary calcium/phosphorus ratio, and bone fractures in girls and boys, The Journal of

Effect of Sugar

- Induces insulin secretion—> more inflammation\(^1\)
- More pain
- Weight gain
- Insomnia (cortisol 4-5 hour later)
- Opioid medications less effective (clinical experience)
  - Patient cut down from 6 Mt Dew to 3/day
  - Patients complain meds less effective with time

1. Aeberli, I., et al., Low to moderate sugar-sweetened beverage consumption impairs glucose and lipid metabolism and promotes inflammation in healthy young men: a randomized controlled trial\(^1,2,3,4\), Am J Clin Nutr, 94;(2):479-485, August 2011
Why Is My Pain Worse?
Pain Does Not Fall From the Sky

- Too much physical activity
- Increased stress
- Poor sleep
- Food/diet change – look at tongue
Sugar, Wheat, Potato, Fruit Juice

- Patients with RA, 1 teaspoon of sugar causes pain and inflammation for a month
- Biochemistry is increased inflammatory mediators for 2.5 to 3 weeks

Wheat Has Changed

- Hybridization
- Genetic engineering?
- Now 1 1/2 feet tall, not amber waves
  - More gluten
  - Healthy people get sick (clinical experience)
  - Sick people don’t get better (clinical experience)

Wheat Has Changed (cont’d)

- Consumption is linked to visceral fat
  - Metabolic factory producing:
    - Inflammatory signals
    - Abnormal cytokines
    - Tumor necrosis factor
  - Pain

DeMarco VG et al Curr Hypertens Rep 2010

Human Zonulin

- Regulates intestinal permeability
  - Opening of tight junctions between enterocytes
- Released by gliadin, primary component of gluten
- Also found in lungs and blood brain barrier
- Can now be measured for your patients

Fasano A., Physiol Rev. 2011;91(1):151-175
Lammers KM et al., Gastroenterology. 2008;135(1):194-204
Pizzorno J., Altern ther Health Med. 2014;20(suppl 1):10-15
Potato

- Glycoalkaloids
  - Increase intestinal permeability
  - Aggravate inflammatory bowel disease (IBD)
- Frying concentrates glycoalkaloids
  - Prevalence of IBD highest in countries where fried potato consumption is highest


Rule #3

- The Rule of “Critters”
- Gut flora and microbiome
Rule #3

- Healthy flora (symbiotic microbes)
  - Eat green leafy vegetables
- Toxic flora (dysbiotic microbes)
  - Eat white flour, white sugar
  - Thrive behind residue of red meat

Craving Problem?
We Rule Our Bodies as A Democracy

- When we choose food, all of our critters vote
- There are more of them, than there are of us
- We eat what they want to be fed:
  - White flour, white sugar, red meat
- Encourage benevolent dictatorship
  - I love me, so I’m worth fixing
  - I will decide who in my body eats today
Leaky Gut and Dysbiosis

Leaky Gut
Dysbiosis

- **Symbiosis**
  - When bacteria inside our body thrive and also help us thrive
- **Dysbiosis**
  - When bacteria inside our body thrive and injure us in the process

Normal gut bacteria

- **Synthesize vitamins**
  - Cobalamin, biotin, pyridoxine, pantothenic acid, riboflavin, vitamin K
  - Synthesize short chain fatty acids
- **Degrade metabolic toxins**
- **Prevent colonization by pathogens**
- **Stimulate maturation of normal immune response**
**Dysbiosis**

- Produced by diet conditions that encourage growth of bad flora
  - Soda, sugar, white flour, red meat
- Toxins from bad flora injure intestinal mucosa
- Toxins from bad flora give more work to the immune system
  - Fatigue, immune system dysfunction

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**Intestinal Function**

![Intestinal Function Model](image)
Intestinal Function (cont’d)

Food in here → Absorb food → Waste out here

Intestinal mucosal cells

Intestinal Function (cont’d)

Food in here → Make IgA → Waste out here

Intestinal mucosal cells

WBC
Intestinal Function (cont’d)

Intestinal mucosal cells

Food in here

Make 95% of the serotonin in the body

Waste out here

Intestinal Function (cont’d)

Food in here

Make a barrier

Waste out here
Intestinal Function (cont’d)

Intestinal mucosal cells

Food in here

Cell injury caused by:
NSAIDs
bad flora

Waste out here

What Is Leaky Gut Syndrome?

- Intestinal mucosa cells have been injured
- Intestinal permeability barriers have been broken
- Intestinal immune regulation severely compromised
- Leads to bacterial and toxic exposure
  - Super fund site/toxic waste dump
  - Leak = contaminated water supply
Diagnosis—How to Measure Gut Permeability

- Ingest 5 grams each of sugars
  - Lactulose
  - Mannitol
- Not metabolized, are excreted in urine 6 hours
- Mannitol is passively transported
- Lactulose does not permeate
- Normal ratio L/M 0.03
  - Higher suggests desmosomes aren’t sealing tight junctions

What Triggers Leaky Gut?

- Substances that damage integrity of intestinal mucosa
- Disrupt desmosomes, increasing passive paracellular absorption
  - Infectious agents (viral, bacterial, protozoan, fungal/yeast)
  - Ethanol
  - NSAIDs
  - Elevated reactive oxygen metabolites (biliary, food borne or produced by inflammatory cells)
  - Radiation/chemotherapy
Significance of Leaky Gut

- Increased permeability stimulates hypersensitivity responses to food
- Increased intestinal permeability—pathogenesis of food allergy and result of food allergy
- Animal models, chronic low-grade endotoxemia causes autoimmune disorders

Leaky Gut—Translocation

- 1928 Arnold demonstrated bacterial translocation
- 1931 Fisher demonstrated yeast translocate through intestinal mucosa of normal dogs
- 1961 Sanders et al demonstrated absorption of polystyrene latex particles
- 1968 Krause et al 38 year old surgeon, attempt to convince colleagues that Candida albicans in the gut was of no consequence, ingested a beaker of suspension of candida
  — Within a few hours became febrile
  — Positive blood cultures for Candida and candiduria
Diseases Associated With Altered Intestinal Permeability

- Inflammatory bowel disease – Crohn’s
- Chronic inflammatory joint disease
- Irritable bowel syndrome
- Eczema, acne
- Chronic fatigue syndrome?

Leaky Gut Syndrome

- Bowel health is of primary importance
- Diet improved to promote good flora
- Restore integrity of intestinal lining
  - L-glutamine
    - Nourishes cells of intestinal mucosa
    - Take 500 mg 4 x / day before meals and bed
Enterocytes

- Repletion rate 3 to 5 days
- 17 billion cells replaced daily
- Accelerated by folic acid
  - 15 mg t.i.d. stops diarrhea

Nutrients that Reduce Translocation

- Gianotti et al in several articles 1992-1995
  - Arginine
  - Glutamine
  - Omega-3 fatty acids
  - Insoluble fibers, especially lignin
Symptoms Associated With Increased Bowel Permeability

- Abdominal pain and distention
- Diarrhea
- Fatigue, malaise
- Arthralgias, myalgias
- Skin rashes
- Cognitive memory deficits
- Feeling “toxic”

L-Glutamine: Primary Fuel Enterocytes

- Deficiency associated with villous atrophy and degeneration
- Preferential fuel for cells of small intestine
- 1957 study in Texas J Med showing peptic ulcer healing in 4 weeks with 1.6 gm/day
Proton Pump Inhibitors
Compatible With Life and Health?

- Consequences of decreased GI acid include:
  - Decreased absorption of minerals
    - Mg – more muscle spasm
    - Ca – osteopenia
  - Decreased absorption of vitamins
    - B12
  - Decreased digestion and absorption of protein
- Recently reported kidney disease
- Increase heart attacks (inhibit abs vit K)

How to “Get Off” PPI’s

- Continue PPI
- Start l-glutamine 500 mg qid, best before meals and at bedtime
  - Extra dose with any indigestion symptoms
- After 2-4 weeks, miss 1 dose of 3
- After 4-6 weeks, miss 1 dose of 2
- After 6-8 weeks, miss 2 doses of 3
- After 8-10 weeks, quit PPI, continue l-glutamine and then taper by symptoms
Bowel Health

- **Remove**
  - Eliminate parasites and undesirable bacteria or fungi
  - Discontinue eating foods allergic/sensitive to

- **Replace**
  - Digestive factors (enzymes) body might not be making enough of

For patient with significant GI symptomatology, these steps are key. For many people, stop sugar, wheat, potato, fruit juice, PHS, and take l-glutamine.

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Bowel Health (cont’d)

- **Reinoculate**
  - Reintroduce desirable gastrointestinal bacteria
    - Probiotic supplements
    - More than “take some acidophilus”

- **Repair**
  - Provide nutrients needed for cellular repair
Water

- 71% to 73% of fat free body mass
- Daily requirement = 2 quarts/day
- 1 quart/50lb/day

Water (cont’d)

- 700 synthetic organics found in drinking water, <10% tested for safety
- Positive association between chlorination by-products and bladder and rectal cancer
- Skin absorption of contaminants contributes 29% to 91% of total daily dose
- Respiratory exposure important in shower
G - B + R = P

- G - B = when years are spent trying to run this high performance biochemical Ferrari on bad oil and low octane fuel...
- R = we wear out the reserve more quickly...
- P = and we develop pain, problems, and illness

What is Fibromyalgia?
Fibromyalgia is Not a Disease
It is a Condition of Being

Overheard FMS sufferers talking

- I gave up my life because of this disease...
- I’m not giving up my food!
Perhaps..

- It’s because of the food
- That life has become what it is

It is Too Much Hassle to Eat Right
Hassle

- Ulcer disease
- Diabetes
- Heart disease

Cancer
- Fibromyalgia
- Chronic fatigue

PAIN!!

Can you measure what is in an Apple?
Can you measure what is in Broccoli?

- 1-O-FERULOYL-BETA-D-GLUCOSE Leaf:
- 1-O-P-COUMAROYL-BETA-D-GLUCOSE Leaf:
- 1-O-P-SINAPOYL-BETA-D-GLUCOSE Leaf:
- 2-HYDROXY-BUT-3-ENYL-GLUCOSINOLATE Leaf:
- 4-METHOXY-INDOL-3-YL-METHYL-GLUCOSINOLATE Leaf:
- ALFA-LINOLENIC-ACID Leaf 990 - 7,069 ppm
- ALFA-TOCOPHEROL Leaf 4 - 63 ppm
- ANTEISO-HEPTACOSAN-1-OL Flower:
- ANTEISO-MONTANYL-ALCOHOL Leaf:
- ANTEPENTACOSAN-1-OL Leaf:
- ARACHIDONIC-ACID Leaf 10 - 71 ppm
- ARGinine Leaf 2,030 - 14,494 ppm
- ASCORBIC-ACID Leaf 720 - 6,069 ppm
- ASH Leaf 13,700 - 97,818 ppm
- BETA-CAROTENE Leaf 5 - 41 ppm
- BORON Leaf 57 ppm; Stem 21 ppm;
- CAFFEIC-ACID Leaf 34 ppm;
- CALCIUM Leaf 395 - 3,177 ppm
- CARBOHYDRATES Leaf 89,600 - 639,744 ppm
- CITRIC-ACID Leaf:
- COPPER Leaf 1 - 5 ppm
- COUMESTROL Shoot 400 ppm;
- CYSTINE Leaf 220 - 1,571 ppm
- FAT Leaf 2,000 - 28,560 ppm
- FERULIC-ACID Leaf 10 ppm;
- FIBER Leaf 15,100 - 107,814 ppm
- FOLACIN Leaf 0.56 - 4 ppm
- FUMARIC-ACID Leaf:
- HEPTACOSAN-1-OL Flower:
- HEXACOSAN-1-OL Leaf:
- HISTIDINE Leaf 760 - 5,426 ppm
- INDOLE-3-ACETONITRILE Shoot:
- INDOLE-3-CARBINOL Shoot:
- INDOLE-3-CARBOXALDEHYDE Shoot:
- INDOLE-3-CARBOXYLIC-ACID Shoot:
- INDOLYL-3,3'-DIMETHANE-CARBOXYLIC-ACID Shoot:
- IRON Leaf 9 - 136 ppm
- ISOHEXACOSAN-1-OL Leaf:
- ISOLEUCINE Leaf 1,320 - 9,425 ppm
- ISOOCTACOSAN-1-OL Leaf:
- KILOCALORIES Leaf 430 - 3,070 /kg
- LEUCINE Leaf 1,520 - 10,853 ppm
- LINOLEIC-ACID Leaf 450 - 3,213 ppm
- LYSINE Leaf 1,540 - 10,996 ppm
- MAGNESIUM Leaf 230 - 1,642 ppm
- MALIC-ACID Leaf:
- MANGANESE Leaf 3 - 24 ppm
- METHIONINE Leaf 320 - 2,285 ppm
- MOLYBDENUM Leaf 0.9 ppm; Stem 0.36 ppm;
- MONTANYL-ALCOHOL Leaf:
- NIACIN Leaf 6 - 64 ppm
- OCTACOSAN-1-OL Leaf:
- OLEIC-ACID Leaf 190 - 1,357 ppm
- OXALATE Leaf 3,600 - 25,704 ppm
- P-COUMARIC-ACID Leaf 12 ppm;
- PALMITIC-ACID Leaf 530 - 3,784 ppm
- PALMITOLEIC-ACID Leaf 20 - 142 ppm
- PANTOTHENIC-ACID Leaf 3.1 - 22 ppm
- PENTACOSAN-1-OL Leaf:
- PHENYLALANINE Leaf 980 - 6,997 ppm
- PHOSPHORUS Leaf 690 - 4,927 ppm
- PHYTOSTEROLS Leaf 240 - 1,710 ppm
- POTASSIUM Leaf 3,670 - 29,343 ppm
- PROP-2-ENYL-GLUCOSINOLATE Leaf:
- PROTEIN Leaf 32,580 - 250,000 ppm
- QUERCETIN Sprout Seedling 25 ppm;
- QUINIC-ACID Leaf:
- RIBOFLAVIN Leaf 0.4 - 10 ppm
- RUTIN Shoot 20 ppm;
- SEC-BUTYL-ISOTHIOCYANATE Seed:
- SELENIUM Leaf 0.024 ppm; Stem 0.012 ppm;
- SINAPIC-ACID Leaf 107 ppm;
- SODIUM Leaf 221 - 1,990 ppm
- STEARIC-ACID Leaf 30 - 214 ppm
- SUCCINIC-ACID Leaf:
- TETRACOSAN-1-OL Leaf:
- THIAMIN Leaf 1.3 - 11 ppm
- THREONINE Leaf 1,200 - 8,568 ppm
- TRIACONTAN-1-OL Leaf:
- TRYPTOPHAN Leaf 370 - 2,642 ppm
- VALINE Leaf 1,550 - 11,067 ppm
- VIT-B-6 Leaf 2.2 - 16 ppm
- WATER Leaf 846,000 - 945,500 ppm
- ZINC Leaf 10 - 157 ppm

How Can This Help ME?

- I can’t prescribe more medicine, my patient with increased pain can learn that changing their food will lessen their pain .. No options, nothing to lose
- How clean do they need to be? Partial credit?
  — Hammer, bee, allergy/sensitivity?
- How long is inflammatory pain effect from food?
THANK YOU

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