Cardiology
Oncology
Neurology
Rheumatology
Gastroenterology
Gut Ecology
Intestinal Permeability
Cleaning The Blood
Case History: Tyler
Gut Dysbiosis And The Brain
Nutritional and Lifestyle Factors That Damage Circulation
Clinical Application
Cardiology
Neurology
Oncology
Rheumatology
Gastroenterology
Gut Ecology
Intestinal Permeability
Cleaning The Blood
Case History: Tyler
Gut Dysbiosis And The Brain
Nutritional and Lifestyle Factors That Damage Circulation
Clinical Application
Cardiology
Neurology
Oncology
Rheumatology
Gastroenterology
Associations Between Intestinal Problems & Systemic Illness

- Malnutrition (Malabsorption/maldigestion)
- Skin disease (endotoxin, infection)
- Allergies (protein)
- Neurological/behavioral problems (fungal or bacterial organic acids)
- Joint disease (antigenic cross-reactivity)
Gut function is a complex set of interdependent relationships:
- Digestion
- Absorption
- Detoxification
- Immune recognition
- Ecological balance of bacterial flora
If gut ecology is unhealthy, it affects every other system in the body. To heal gut dysbiosis, use detoxification plans of fasting, diet modification and supplementation.
- Bacteria exceed the total number of cells in the body.
- Total of 3 pounds of bacteria in the gut.
- A complex interdependent ecosystem system.
- Four hundred species of bacteria in our GI tract.
- Bacteria are beneficial and dangerous; both compete for dominance.
- Good bacteria outnumber the bad and make natural “antibiotics”.
Acute and Chronic Diseases From Altered Gut Ecology

- rheumatoid arthritis
- colitis
- diabetes
- meningitis
- myasthenia gravis
- Grave's disease
- Hashimoto's thyroiditis
- bowel cancer
- food allergies
- eczema
- psoriasis
- acne
- urticaria
- migraine headache
- ankylosing spondylitis
- systemic lupus erythematosus
- Crohn's disease
- otitis media
- sinusitis
- asthma
- premature labor
- peptic ulcers
- premenstrual syndrome
- cystitis.
A bacterial imbalance:
- allows harmful bacteria and yeast to multiply uncontrollably.
- injures the membranes that line the intestines, allowing undigested food products and other contaminants to leak into the bloodstream
- Alters “local” detoxification ability
- leads to the production of dangerous chemicals.
500 to 1,000 kinds of bacteria reside in the gastrointestinal (GI) tract

_Bacteroides thetaiotaomicron_: more than 1,000 times as abundant as _Escherichia coli_.

- breaks down indigestible complex carbohydrates into easily absorbed sugars
- produces vitamins
- can turn on specific intestinal genes to promote the growth of blood vessels necessary for the gut's function
- trigger production of chemicals that kill competing bacteria
Gut Romp

Germfree rodent:
- must consume about 30 percent more calories to maintain its body weight
- unusually susceptible to infections

“...the host’s physiology is the result of innumerable interactions that should not be considered as the autonomous pieces of a puzzle but rather like the result of subtle equilibria between changing components: species, age, physiological state, gender, diet, environment, intestinal bacterial populations and even stress.”

“Intestinal microflora may act either directly in toxicity or in association with endogenous metabolism of the host. The micro flora can reduce toxicity of a compound or enhance toxicity. Intestinal microflora can interfere with xenobiotic metabolism before or after chemical modification.”
“Autointoxication” resurfaces from the 19th century health culturists as endotoxins. Endotoxemia has now gained favor as an explanation for the multiple organ failure with severe trauma and sepsis.
Endotoxin:
- occurs in the cell walls of gram negative bacteria.
- lipopolysaccharide (LPS) is a sugar and fat molecule.
- cause cell membrane peroxidation.
- unchecked, lipid peroxidation results in massive cellular damage.
- lipid peroxidation causes aging, mutagenesis, carcinogenesis, changes in fluidity of membranes, necrosis, oxidative hemolysis of red blood cells.
“….systemic translocation of these enteric bacteria and endotoxin plays a major role in the development of multiple organ failure.”
Endotoxins (LPS) can transit the gut.

- Involved in multiple organ failure with severe trauma and sepsis.
- Has been clearly associated with Crohn’s and neonatal enterocolitis.
- LPS is scavenged by Kupffer cells, then depresses p450, and impairs mitochondrial function.
- LPS induces complications in chronic liver disease.
- Alcohol aggravates LPS toxicity.
- The Indican test and microclot generation test determine endotoxin load.
- Selenium and vitamin E deficient diet cause enhanced lipid peroxidation.
- Patients with food sensitivities and environmental sensitivities suffer from endotoxemia.
Intestinal Permeability

Stomach

Small intestine

Mucosa:
Epithelial cells
Mucus secreting cells
Causes of Leaky Gut

- Bacterial or yeast overgrowth
- Parasite infection
- NSAIDs, aspirin
- Gluten/Food allergy
- Ischemia
- Reactive oxygen species
- Alcohol

- Prolonged Fasting
- Low dietary fiber
- Chemotherapy
- Nutritional insufficiencies
  - zinc
  - vitamin A
  - folate

Intestinal Permeability
Roles in The GI Tract

- **Mouth**
- **Stomach** - HCL, mucus production
- **Small Intestine** - secretion of pancreatic enzymes triggered by vagus nerve and duodenal hormones (secretin/cholecystokinin)
- **Large Intestine** - water absorption, anaerobic fermentation of SCFA
Roles of HCL

- Rate limiting step in digestion
- Activates pancreatic enzymes
- Prevents bacterial overgrowth in SI
- Activates mineral absorption
- Sets the tone for gut ecology

Diseases linked to low gastric acidity:
- Addison’s disease
- Asthma
- Celiac disease
- Chronic autoimmune disorders
- Campylobacter jejuni
- Diabetes mellitus
- Eczema
- Food allergies
- Celiac disease
- Gastric carcinoma
- Gastritis
- Crohn’s disease
- IBD
- Lacto-ferrous
- Gastritis
- Peritonitis
- Pernicious anemia
- Pernicious anemia
- Porosis
- Fungal infections
- Urticaria
- Vitiligo
Intestinal Permeability

Typical Hypochlorhydria Picture

Digestion

Triglycerides
Ref Range <= 0.3 1.0

Chymotrypsin
Ref Range 6.2 41.0

Valerate, isobutyrate
Ref Range umol/L <= 10.0 25.0

Meat Fibers
Inside Range 0
Outside Range 0

Vegetable Fibers
Inside Range 1
Outside Range 0-4

**Occ = Occasional**

“...the gut is likely the source of the antigens causing inflammatory arthritis....”
IgG and IgE antibodies were high in patients with arthralgia, in the serum and the synovial fluid as compared to normals.

Intestinal permeability testing is a successful method to determine true food allergy.

Identical intestinal permeability changes in children with different clinical manifestations of cow's milk allergy

Trude Jahnert, MD (Tenerife, Spain)

To assess the relationship between clinical symptoms of cow's milk allergy (CMA) and intestinal permeability, 42 children (ages 1-12) sensitized to cow's milk by a diagnostic food challenge were studied. The children were divided into five groups according to the absence or presence of specific and non-specific gastrointestinal symptoms and the severity of symptoms. The test was performed after the fast before challenge in the morning. The test for intestinal permeability was carried out with lactulose and mannitol. The test was positive when the ratio of lactulose to mannitol exceeded 0.4. The results showed that intestinal permeability was significantly higher in symptomatic children than in asymptomatic children. The difference was noted in both the presence and severity of symptoms. The test was also used to determine the initial symptomatology of cow's milk allergy in children with no previous symptoms. The results indicated that intestinal permeability is a useful tool in the diagnosis of cow's milk allergy.

References:

Gut Ecology
Intestinal Permeability
Cleaning The Blood
Case History: Tyler
Gut Dysbiosis And The Brain
Nutritional and Lifestyle Factors That Damage Circulation
Clinical Application
Cardiology
Neurology
Oncology
Rheumatology
Gastroenterology
The Gut/Liver-Detoxification

- First pass breakdown
- Gut-hepatic circulation
- Filters blood and sewage
- Removal of bacterial toxin
Managing Intestinal Permeability

Body Fat Burden (Stored toxins)

Possible Causes
- Genetic State
- Nutritional History
- Current Nutritional Status

Toxin Burden
- Stress
- Medications
- Infection
- Food allergies
- Some disease states
- Dysbiosis and endotoxins
- Environmental toxins
- Endogenous metabolites (i.e., hormones)
- Substance abuse
- Alcohol
- Tobacco
- Drugs

Leaky Gut

Results in Organ System Dysfunction
- Alteration of Organ System Function and/or Structure
  - Muscle/skeletal
  - Immune
  - Endocrine
  - Nervous system
  - Cardiovascular
  - Genitourinary

Liver Burden and Altered Hepatic Detoxification

Mitochondrial Damage

Toxins

Nutritional Support
- 4R™ Program
  - Remove
  - Replace
  - Reinoculate
  - Repair

Liver Detoxification and Ongoing Hepatic Nutritional Support

Nutritional Support Results in Organ System Dysfunction

Eliminated in urine and feces

Body Fat Reduction Program (Released of stored toxins)

Oxidant stress
“Specific food residues are broken down by the colonic microrflora with the production of chemicals, which, in susceptible individuals with low concentrations of relative hepatic enzymes, pass into systemic circulation to produce distant symptoms.”
Increased breast, colon cancer, and coronary heart disease
Altered sex hormones, lipids, bile acid metabolism
Raises sex hormones, decreases plasma sex binding hormones, increasing the bioavailability of these steroids
Low in lignans, and isoflavonoid phytoestrogens: ediphenolic compounds affect hormone metabolism and production and cancer cell growth
Low fiber affects bile acid metabolism by alteration of intestinal metabolism and increasing fecal excretion

Beta-Glucuronidase

Glucuronidation of estrogen in liver

Conjugated estrogen excreted in bile

+++ Beta-Glucuronidase

Released into Stool

Re-absorption: Systemic estrogen toxicity

Release of free estrogen

cleaves glucuronide

Cleaning The Blood
Study links antibiotics and breast cancer

Women who took the most antibiotics (more than 25 prescriptions) faced double the risk of developing breast cancer over 17 years.

Re-absorption: Systemic estrogen toxicity

Release of free estrogen

cleaves glucuronide

Released into Stool

+++ Beta-Glucuronidase

Cleaning The Blood

Beta-Glucuronidase
Gut Ecology
Intestinal Permeability
Cleaning The Blood
Case History: Tyler
Gut Dysbiosis And The Brain
Nutritional and Lifestyle Factors That Damage Circulation
Clinical Application
Cardiology
Neurology
Oncology
Rheumatology
Gastroenterology
Case History: Tyler

06/06/02
Tyler
21yo WM

Dx: with autism
MEDS:
Ativan after seizures to prevent multiple seizures. On Ativan for 6 years. Tried not giving him the Ativan in Dec/01 and he had 3 seizures within 24 hrs.
Tegretol
Epival (valproic acid) anti seizure
Tested for fragile X, neg. Hx of family of other kids with learning disabilities.
A lot of anxiety disorders on mothers side.
Seizures onset age 1.5. Step-mother has known him since age 10. Put on tegretol just before seizures. Parents separated at age 10. Last seizure was 1 week ago. Now, seizures 1-2 weeks apart. Typical time is as he is going to sleep or waking, usually it is in the morning. After seizure, he is incontinent at noon for about 24 hrs. Both bowel and bladder.
Seizure early in the morning after getting up to urinate, dropping off to sleep. When he perseverates on something. When he was kneeling watching a CD go around. Used to scrape the letters off yogurt containers for hours. So active throughout the day now, more interactive now.
He did his own program at high school. He has also done the Sunrise program when he was 16. His seizures were down to 56 weeks apart. Interaction was better, less anxiety. Total attention. He talks about his seizures, likes the dramatics.
Case History: Tyler

06/06/02
Tyler
DARK SIDE: major aggression in high school, at home. He tried to push her down the stairs. Hit Gail over the head. His mother used to hit him. He slammed his cup of tea down on the counter. Told him to calm down. He looked like he would throw things which he has done. He does not like to be told what to do.
1 week ago was verbally abusive, he has a good memory. He started to yell at us. I have learned to leave. He threw a can at father.
Has a new Neurologist, told to increase the tegratol, he became more aggressive. Especially with the young woman who works with him after work, did not want to go for a walk. He actually hit co-worker in the van, it was the medication. Took him off the medication and he is fine.
O: 100/65
Heart rrr
T: red
No cerv nodes
P: deep

PRESEIZURE: tired, irritable. Like to repeat things you say to irritate you. Step-mother has watched his diet after she read about autism and sugar. He tested high on sugar and given a mineral supplement. Once he tested high on all the things he ate. Always high in corn and sugar.
Case History: Tyler

06/06/02
Tyler
Sleep 8:30-6. No bad dreams.
MS: he is quite shaky. Hand tremor.
DIG: on a good diet. Off wheat corn, sugar.
SLEEP: well, no dreams.
Seizures last 30 seconds, then he goes through snoring, then he sleeps. Can't talk for 10 min. His head will turn sideways and he won't answer. Parents take his glasses off and puts him on the ground. Thrashing, full tonic/clonic. Grande Mal.
Possible autism from immunization. First seizure when he was in Courtney.
Grandmother remembered that he had just had his immunization. Since birth cried a lot. Had a difficult birth, forceps. Treated with cranial.
Has scoliosis (typical with autism).
DIET: His hair changed when stopped sugar.
FHX
Father 53 good health
Mother 50 low thyroid.
Sister good health
Tyler talks to all the secretaries.
P/ Organic acids, amino acids, food allergy
Ethylmalonate 18.7-drug induced carnitine might be helpful

Inefficient energy producing pathways. Succinate is very high, rare, especially with fumarate and malate, this is the heart of the citric acid cycle. Indicates CoQ10 inadequate to accept electrons, not making enough CO Q10. Possible mitochondrial genetic flaw. Also add B complex.

Low alphaketoglutarate: key metabolic nutrient, can be drawn away from mitochondria.

High methylmalonate, very high: (B12) methylcobalamin.

High beta-betahydroxyisovalerate.
Bacteria and yeast overgrowth, toxins in the body, could be from giardia...could be yeast.
Intestinal dysbiosis. Needs B's, folic acid.

Beta-alanine competes for the retention of taurine. Produced from abnormal bacteria and breakdown of yeast. Also

Taurine is high. When it is this high, it is taurine wasting. Taurine is critical for maintaining intracellular magnesium.
Gut Ecology
Intestinal Permeability
Cleaning The Blood
Case History: Tyler
Gut Dysbiosis And The Brain
Nutritional and Lifestyle Factors That Damage Circulation
Clinical Application
Cardiology
Neurology
Oncology
Rheumatology
Gastroenterology
“If you talk to God, you are praying; If God talks to you, you have schizophrenia.”
Thomas Szasz, The Second Sin
Irritable bowel syndrome, found in 4% to 10% of the population, has been associated with psychiatric illness.

Researchers evaluated 20 patients with IBS and compared to a control group found 18 of 20 patients with irritable bowel syndrome had some history of psychiatric illness.

One half of the patients with irritable bowel syndrome met the criteria for panic disorder, while another half had social phobia. Major depression, somatization disorder and substance abuse were also seen frequently in those with irritable bowel syndrome.

Nutrition And The Mind

- Amino Acids From Protein
- Fats From Fish, Seeds and Nuts
- Carbohydrates From Vegetables, Fruit and Whole Grains
- Cofactors From Diet and Supplements

Building Blocks Of Our Thinking
GI Function And The Mind

- Behavior and Learning Disorders
- Depression, Anxiety and Stress
- Memory and Cognitive Disorders
<table>
<thead>
<tr>
<th>Neurological</th>
<th>Behavioral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuritis</td>
<td>ADD/ADHD</td>
</tr>
<tr>
<td>Migraine headaches</td>
<td>Affective disorders</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>Mental illness</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>Autism</td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>Insomnia</td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>PMS</td>
</tr>
</tbody>
</table>
Gut Dysbiosis And The Brain

Happy Heart=Healthy Intestines
Adaptation To Chronic Stress In Military Trainees

Stress alters the levels of progesterone, estrogen, and thyroxin. In this study it caused:

- increased free salivary cortisol levels
- decreased testosterone levels to hypogonadal levels
- increased salivary DHEA
- insulin insensitivity
- increased gut permeability

Our Intestines Change As We Age:

- Parietal cells atrophy
- HCL secretion decreases
- Increased delivery of undigested food to bacterial populations
- Altered nutrient absorption

Bacterial populations change
- Increased Clostridia
- Decrease in Bifido bacteria

Figure 7.1: Change in Intestinal Bacteria with Aging
As we get older, brain and immune memory gets weaker.

Dietary protein can interact with the gut immune tissue and result in immunological activation.

In mice, dietary antigens induced activation and resulted in accelerated biological aging.

Gut Ecology
Intestinal Permeability
Cleaning The Blood
Case History: Tyler
Gut Dysbiosis And The Brain
Nutritional and Lifestyle Factors That Damage Circulation
Clinical Application
Cardiology
Neurology
Oncology
Rheumatology
Gastroenterology
“If you eat the wrong food.....”
ABCs of Gut Health

- Enzymes
- Soluble fiber
- Probiotics
- Membrane promoters
- No sugar, healthy diet
- No food allergies
- Healthy heart
Membranes Degranulate

- Vasoconstriction
- Bronchoconstriction
- Vascular permeability
- Platelet aggregation
- Chemotaxis

Clinical Application
Fats On Fire Cause Cell Membranes To In-flame

Clinical Application

Vasoconstriction
Bronchoconstriction
Vascular permeability
Platelet aggregation
Cell Membrane

Arachidonic Acid (AA)

- Quercetin
- Curcuma longa
- Aspirin/Ibuprofen
- Prostaglandins Series 2
- Thromboxane A2
- Leukotrienes Series 4

- Cyclooxygenase
- Lipooxygenase

- Phospholipase A2

- Curcuma longa potentiates Cortisol

Clinical Application

- Hesperidin/quercetin: Cell membrane stabilizing
- Ginger: Curcuma longa, Quercetin (weak)
Clinical Application

**OMEGA 6 FAMILY**
*vegetable oils, grains*

- **Linoleic (LA)**
  - most vegetable oils

- **Gamma linolenic (GLA)**
  - borage oil
  - black currant seed
  - evening primrose

- **DiHomo Gamma Linolenic (DGLA)**

**ANTI-INFLAMMATORY PROSTAGLANDINS**

- **Arachidonic (AA)**
  - animal fat, shellfish

**PRO-INFLAMMATORY**

- **Eicosapentaenoic (EPA)**
  - cold water fish, cod liver oil, salmon

**OMEGA 3 FAMILY**
*cold water fish, flax oil*

- **Alpha Linolenic (ALA)**
  - flax, walnuts

**delta 6 desaturase**
*inhibited by age, alcohol*

**delta 5 desaturase**
*++ insulin, EPA*

**18:4 n-3**
**20:4 n-3**
blocks lipoxygenase to shut down inflammation in cell membranes

Boswellia

Myrrh
Boswellia serrata

- Invigorates Blood
- Promotes Qi circulation
- Relieves pain from Blood Stasis
- Relaxes sinews, activates channels
- Reduces swelling
- Promotes healing as a vulnerary
Boswellia serrata

Applications:
- Trauma
- Pain
- Inflammation
- Open sores
- Topical infections
**Clinical Application**

**Boswellia serrata**  
**Pharmacological Research**

- Active ingredients: boswellic acids
- Inhibits 5-lipoxygenase
- 82% of patients with ulcerative colitis went into remission (350mg tid for 6 weeks) compared to sulfsalazine 75%.

Boswellia serrata
Pharmacological Research


40 patients with Crohn’s disease were compared in treatment with mesalazine and it was concluded to be superior in terms or risk vs benefit evaluation. Gerhardt H, et al. Therapy of active Crohn’s disease with boswellia serrata extract H15. Z Gastroenterol. Ja;39(1):11-17,2001.