The Role of IgG and Immune Complexes in Food Sensitivity

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Introduction to Food Sensitivity

- Food Sensitivity and related diseases affect at least 100 million people worldwide.

- The prevalence of Food Sensitivities has increased > 50% in adults and children in the past few years.

- Symptoms include a variety of illnesses from skin rashes and headaches to chronic intestinal diseases.

- 90% of sensitivities are in eight food groups: Milk, Soy, Eggs, Wheat, Peanuts, Tree Nuts, Fish, Shellfish.

- One or all of the foods in a specific group may cause Food Sensitivity.

- Delayed Food sensitivities occur hours or days after food ingestion.

- Delayed Food sensitivities are caused by IgG 1–4 and Immune Complexes that activate Complement.
Immune Complex Formation

Modified from Ari Vojdani © 2009
Comparison of conventional conjugate: anti-IgG with enhanced conjugate: anti-IgG(1-4) and anti-C3d

Conventional conjugate generates only one signal

- Anti-IgG-HRP
  - Bound to Hu IgG

Enhanced Conjugate generates two signals: Patent # 8,309,318

- Anti-C3d-HRP
  - Bound to Hu IgG(1-4)
- Anti-IgG(1-4)-HRP

Well of ELISA plate with Food antigens

Human IgG bound to Food

Food Antigen

C3d

Enzyme
## Food Sensitivity Test: Enhanced Sensitivity

The Effect of anti-Human IgG-HRP and anti-Human C3d-HRP used separately or combined.

<table>
<thead>
<tr>
<th>Patient</th>
<th>Milk IgG-HRP</th>
<th>Milk C3d-HRP</th>
<th>Milk IgG+ C3d-HRP</th>
<th>Peanut IgG-HRP</th>
<th>Peanut C3d-HRP</th>
<th>Peanut IgG+ C3d-HRP</th>
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</thead>
<tbody>
<tr>
<td>CD</td>
<td>1.428</td>
<td>1.275</td>
<td>2.333</td>
<td>0.898</td>
<td>0.100</td>
<td>1.008</td>
</tr>
<tr>
<td>JE</td>
<td>1.076</td>
<td>1.501</td>
<td>2.379</td>
<td>0.205</td>
<td>0.072</td>
<td>0.275</td>
</tr>
<tr>
<td>HW</td>
<td>0.346</td>
<td>0.165</td>
<td>0.511</td>
<td>0.068</td>
<td>0.194</td>
<td>0.244</td>
</tr>
<tr>
<td>CP</td>
<td>0.121</td>
<td>0.835</td>
<td>1.080</td>
<td>0.063</td>
<td>0.157</td>
<td>0.241</td>
</tr>
<tr>
<td>GM</td>
<td>0.644</td>
<td>0.842</td>
<td>1.556</td>
<td>0.032</td>
<td>0.103</td>
<td>0.155</td>
</tr>
<tr>
<td>Control</td>
<td>0.026</td>
<td>0.086</td>
<td>0.093</td>
<td>0.028</td>
<td>0.104</td>
<td>0.158</td>
</tr>
</tbody>
</table>
Food Sensitivity Test: Variability, Accuracy and Controls

- Intra-assay variability: 8 samples were run in duplicate on the same day. CV% 3.9–6.8
- Inter-assay variability: 29 samples run in duplicate on 9 separate days. CV% 2.8–6.3

Accuracy: > 95% confidence that foods are either positive or negative
- Standard Curve: r > 0.97; controls show the kits function properly
Food Sensitivity Test: Summary

- **Sensitivity:** BBS test measures IgG\(_{1-4}\) and IC–C3d together resulting in enhanced sensitivity over IgG only tests.

- **Reproducibility:** Intra-/Inter-assay variability: overall CV% is less than 7%; Standards have linearity of \(r > 0.97\).

- **Accuracy:** > 95% confidence that foods are either positive or negative.

- **Quality:** Manufacturing is ISO 13485 certified which assures that process controls are in place.
Organ of Immune tolerance

The intestinal mucosa forms the largest area of the body in direct contact with the exterior environment. If expanded, the surface of the small intestine alone can reach roughly the size of a tennis court, or 100 times the area of the
Other types of Food Allergy testing

- IgE
- IgG4
- Live Cell Analysis
- IgA
Mechanisms of gliadin-induced zonulin release, increased intestinal permeability, and onset of autoimmunity.
The Key to Inflammation is in the Gut

The cells in the intestinal mucosa consist of mainly activated or antigen experienced T cells (CD45RBlo, CD44hi, CD69hi, CD62Llo) that are capable of producing several proinflammatory cytokines such as IL-4, IFN-γ, IL-17A/F, IL-22, and TNF-α [6–15].
Why test Food Sensitivity C3d/IgG?

Symptoms of C3d/IgG sensitivity include:

- Fatigue
- Bloating
- IBS
- Constipation
- Anxiety/Depression
- Palpitations
- Headaches
- Joint pain
- Eczema
- Circles under eyes
- Pain
- Auto-immune reactions
IBS

12–22% of the population
12% of doctor’s visits
As a result, an attempt is made to suppress symptoms with anti-cholinergic, anti-spasmodic, anti-diarrheal, and serotonergic agents with variable success as symptoms are not completely eliminated.
The value of eliminating foods according to food–specific immunoglobulin G antibodies in irritable bowel syndrome with diarrhoea.


Source
Department of Gastroenterology, The First Affiliated Hospital of Henan University of Science and Technology, Luoyang, China.

Abstract
OBJECTIVE: This study investigated the role of food intolerance in irritable bowel syndrome with diarrhoea (D-IBS).

METHODS: Specific immunoglobulin G (IgG) antibodies against 14 common food antigens in the serum were measured in 77 patients with D-IBS and 26 healthy controls. Food–specific IgG antibodies were identified in 39 (50.65%) patients with D-IBS patients compared with four (15.38%) controls. For 12 weeks following the serological testing, 35 patients with D-IBS and food intolerance consumed diets that excluded the identified food. Changes in the main symptoms of D-IBS were evaluated before treatment and regularly during treatment in these patients.

RESULTS: After 4 weeks' dietary therapy, most symptoms of D-IBS had improved. By 12 weeks, all symptom scores had decreased significantly compared with the baseline scores.

CONCLUSIONS: The 12-week specific-food exclusion diets resulted in significant improvements in abdominal pain (bloating level and frequency), diarrhoea frequency, abdominal distension, stool shape, general feelings of distress and total symptom score compared with baseline in patients with D-IBS.

PMID: 22429360 [PubMed – indexed for MEDLINE]
Food-specific IgG4 antibody–guided exclusion diet improves symptoms and rectal compliance in irritable bowel syndrome.

Zar S, Mincher L, Benson MJ, Kumar D.

Source
OGEM Department, St George's Hospital Medical School, London, UK.

Abstract
OBJECTIVE:
Dietary modification improves symptoms in irritable bowel syndrome (IBS). Identification of offending foods by dietary elimination/re–challenge is cumbersome. IgG4 antibodies to common food antigens are elevated in IBS. The aim of this article was to evaluate the effect of exclusion diet based on IgG4 titres on IBS symptoms and rectal sensitivity and compliance.

MATERIALS AND METHODS:
The study comprised 25 patients with IBS (3 M, 22 F, mean age 43 years, Rome II criteria). IgG4 titres to 16 foods (milk, eggs, cheese, wheat, rice, potatoes, chicken, beef, pork, lamb, soya bean, fish, shrimps, yeast, tomatoes and peanuts) were measured. Foods with titres >250 microg/l were excluded for 6 months. Symptom severity was assessed with a previously validated questionnaire at baseline, at 3 months and at 6 months. Rectal compliance and sensitivity were measured in 12 patients at baseline and at 6 months.

RESULTS:
IgG4 antibodies to milk, eggs, wheat, beef, pork and lamb were commonly elevated. Significant improvement was reported in pain severity (p < 0.001), pain frequency (p = 0.034), bloating severity (p = 0.001), satisfaction with bowel habits (p = 0.004) and effect of IBS on life in general (p = 0.008) at 3 months. Symptom improvement was maintained at 6 months. Rectal compliance was significantly increased (p = 0.011) at 6 months but the thresholds for urge to defecate/discomfort were unchanged.

CONCLUSIONS:
Food–specific IgG4 antibody–guided exclusion diet improves symptoms in IBS and is associated with an improvement in rectal compliance.

PMID: 16109655 [PubMed – indexed for MEDLINE]
The effects of provocation by foods with raised IgG antibodies and additives on the course of Crohn's disease: a pilot study.


Source
Department of Gastroenterology, İstanbul University Cerrahpaşa Medical School İstanbul/Turkey. hulyauzunismail@gmail.com

Abstract
BACKGROUND/AIMS:
This study was designed to assess the role of foods with raised IgG antibodies and additives on the symptoms and inflammation of Crohn's disease.

METHODS:
Eight patients with Crohn's disease in remission were studied. They followed a strict diet during phase I. Then, provocations with two, three-day periods (phases II and III) followed: in phase II, pure forms of foods with high IgG antibodies and in phase III, off-the-shelf forms of those foods were added. Stool samples were collected for fecal calprotectin assay. Blood samples were taken on the 11th and 17th days for highly sensitive C-reactive protein, ferritin, erythrocyte sedimentation rate, white blood cells, and platelets. Patients kept a diet-symptom diary.

RESULTS:
Increased Crohn's disease activity index scores were found statistically significant (p=0.012) between pre- and during the provocation weeks. There were significant increases according to Harvey-Bradshaw Index when the highest values during the phases I, II (p=0.027) and I, III (p=0.027) were compared. The increases in highly sensitive C-reactive protein (p=0.025) and white blood cells (p= 0.036) were found statistically significant. Fecal calprotectin levels showed day-to-day variability. When compared, the levels of fecal calprotectin increased in all patients on the last day of the restriction (10th day) and the first day of the provocation (11th day) with the exception of one patient.

CONCLUSIONS:
Foods with raised IgG antibody levels and food additives can provoke the symptoms and may stimulate the inflammation in patients with Crohn's disease. Addition of a proper diet with restriction of those foods may be beneficial in the medical treatment.
Clinical relevance of IgG antibodies against food antigens in Crohn's disease: a double-blind cross-over diet intervention study.


Source
Division of Gastroenterology and Hepatology, University Hospital Zurich, Zurich, Switzerland.

Abstract
BACKGROUND:
Environmental factors are thought to play an important role in the development of Crohn's disease (CD). Immune responses against auto-antigens or food antigens may be a reason for the perpetuation of inflammation.

METHODS:
In a pilot study, 79 CD patients and 20 healthy controls were examined for food immunoglobulin G (IgG). Thereafter, the clinical relevance of these food IgG antibodies was assessed in a double-blind cross-over study with 40 patients. Based on the IgG antibodies, a nutritional intervention was planned. The interferon (IFN)gamma secretion of T cells was measured. Eosinophil-derived neurotoxin was quantified in stool.

RESULTS:
The pilot study resulted in a 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. IFNgamma secretion of T cells increased. No difference for eosinophil-derived neurotoxin in stool was detected.

CONCLUSION:
A nutritional intervention based on circulating IgG antibodies against food antigens showed effects with respect to stool frequency. The mechanisms by which IgG antibodies might contribute to disease activity remain to be elucidated.
IgG: autoimmune, allergy, cancer


The immunoglobulin, IgG Fc receptor and complement triangle in autoimmune diseases.

Karsten CM, Köhl J.

Source
Institute for Systemic Inflammation Research, University of Lübeck, 23538 Lübeck, Germany.

Abstract
Immunoglobulin G (IgG)-mediated activation of complement and IgG Fc receptors (FcyRs) are important defense mechanisms of the innate immune system to ward off infections. However, the same mechanisms can drive severe and harmful inflammation, when IgG antibodies react with self-antigens in solution or tissues, as described for several autoimmune diseases including systemic lupus erythematosus, rheumatoid arthritis, and immune vasculitis. More specifically, IgG immune complexes (ICs) can activate all three pathways of the complement system resulting in the generation of C3 and C5 cleavage products that can activate a panel of different complement receptors on innate and adaptive immune cells. Importantly, complement and FcyRs are often co-expressed on inflammatory immune cells such as neutrophils, monocytes, macrophages or dendritic cells and act in concert to mediate the inflammatory response in autoimmune diseases. In this context, the cross-talk between the receptor for the anaphylatoxin C5a, i.e. C5ar1 (CD88) and FcyRs is of major importance. Recent data suggest a model of bidirectional regulation, in which CD88 acts upstream of FcyRs and sets the threshold for FcyR-dependent effector responses by regulating the ratio between activating and inhibitory FcyRs. Vice versa, FcyR ligation can either amplify or block C5ar1-mediated effector functions, depending on whether IgG IC aggregate activating or inhibitory FcyRs. Further, complement and FcyRs cooperate on B cells and on follicular dendritic cells to regulate the development of autoreactive B cells, their differentiation into plasma cells and, eventually, the production of autoantibodies. Here, we will give an update on recent findings regarding this complex regulatory network between complement and FcyRs, which may also regulate the inflammatory response in allergy, cancer and infection.
IgG Higher in Pathologies


Pathologies Associated with Serum IgG4 Elevation.

Ebbo M, Grados A, Bernit E, Vély F, Boucraut J, Harlé JR, Daniel L, Schleinitz N.

Source

Université de la Méditerranée Aix–Marseille II, France.

Abstract

Statement of Purpose. IgG4-related disease (IgG4-RD) is usually associated to an increase of serum IgG4 levels. However other conditions have also been associated to high serum IgG4 levels. Methods. All IgG subclasses analyses performed in our hospital over a one-year period were analyzed. When IgG4 level were over 1.35 g/L, the patient's clinical observation was analyzed and both final diagnosis and reason leading to IgG subclasses analysis were recorded. Only polyclonal increases of IgG4 were considered. Summary of the Results. On 646 IgG subclass analysis performed, 59 patients had serum IgG4 over 1.35 g/L. The final diagnosis associated to serum IgG4 increase was very variable. Most patients (25%) presented with repeated infections, 13.5% with autoimmune diseases, and 10% with IgG4-RD. Other patients presented with cancer, primary immune deficiencies, idiopathic interstitial lung disease, cystic fibrosis, histiocytesis, or systemic vasculitis and 13.5% presented with various pathologies or no diagnosis. Mean IgG4 levels and IgG4/IgG ratio were higher in IgG4-RD than in other pathologies associated to elevated IgG4 levels. Conclusions. Our study confirms that elevation of serum IgG4 is not specific to IgG4-RD. Before retaining IgG4-RD diagnosis in cases of serum IgG4 above 1.35 g/L, several other pathological conditions should be excluded.
Melatonin and the Gut


Thirty four years since the discovery of gastrointestinal melatonin.

Bubenik GA.
Department of Integrative Biology, University of Guelph, Guelph, Ontario, Canada. gbubenik@uoguelph.ca

After the discovery of melatonin in the pineal gland by Lerner and co-workers in 1958, melatonin was also detected in the retina and the human appendix. Later, melatonin was confirmed immunohistologically in all segments of the gastrointestinal tract (GIT), in the guts of bovine embryos and in the GIT of low vertebrates. Melatonin was also confirmed in the pancreas and the hepatobiliary system. Melatonin is produced in the enteroendocrine cells of the GIT mucosa. The concentrations of melatonin in the GIT are 10–100x higher than in the plasma and the total amount of melatonin in the GIT is around 400x higher than the amount of melatonin in the pineal gland. Similar to pineal melatonin, GIT melatonin is a multifunctional compound which exhibits some general as well as some specific effects, depending on the organ and the location of GIT tissue. In the GIT, melatonin exhibits endocrine, paracrine, autocrine and luminal actions. Generally, the episodic secretion of melatonin from the GIT is related to the intake and digestion of food and to the prevention of tissue damage caused by hydrochloric acid and digestive enzymes. Some actions, such as the scavenging of hydroxyl free radicals, immunoenhancement and antioxidant effects are of general nature, whereas others, such as an increase of mucosal blood flow, the reduction of peristalsis and the regulation of fecal water content, are specific to the tubular GIT. Generally, melatonin actions oppose those of serotonin. Laboratory and clinical studies indicate that the utilization of melatonin can prevent or treat pathological conditions such as esophageal and gastric ulcers, pancreatitis, colitis, irritable bowel disease, and colon cancer.
Epithelial and Mesenchymal Cell Biology

Role of a Serotonin Precursor in Development of Gut Microvilli

Kazuhiro Nakamura,* Taku Sato,† Akiko Ohashi,† Hiromichi Tsurui,* and Hiroyuki Hasegawa†

From the Department of Pathology,* Juntendo University School of Medicine, Tokyo; and the Department of Biosciences,† Tokai University of Science and Technology, Uenobara, Japan

Monoamines exert diverse functions in various cells in peripheral organs as well as in the central nervous system. 5-Hydroxy-L-tryptophan (5-HTP) has been simply regarded as a precursor of several functions in several peripheral organs and tissues such as liver, platelet, and immune systems. An enormous proportion of 5-HT is produced in the enterochromaffin cells and is stored in the platelets that release 5-HT in multiple peripheral organs. It has been believed that the released 5-HT essentially exerts its biological effects via 5-HT receptors on various cells in a paracrine manner. There are multiple types of 5-HT receptors that are distributed widely among endocrine, cardiovascular, immune, and gastrointestinal tissues. Receptors for 5-HT fall into one of four distinct families (5-HTR1, 5-HTR2, 5-HTR3, 5-HTR4-7), which are characterized by different
Gluten causes Neurological Harm


The gluten syndrome: a neurological disease.
Ford RP.
The Children's Gastroenterology and Allergy Clinic, P.O. Box 25-265, Christchurch 8144, New Zealand. Rodney@rodneyford.co.nz

Hypothesis: Gluten causes symptoms, in both celiac disease and non-celiac gluten-sensitivity, by its adverse actions on the nervous system. Many celiac patients experience neurological symptoms, frequently associated with malfunction of the autonomic nervous system. These neurological symptoms can present in celiac patients who are well nourished. The crucial point, however, is that gluten-sensitivity can also be associated with neurological symptoms in patients who do not have any mucosal gut damage (that is, without celiac disease). Gluten can cause neurological harm through a combination of cross reacting antibodies, immune complex disease and direct toxicity. **These nervous system affects include:** dysregulation of the autonomic nervous system, cerebella ataxia, hypotonia, developmental delay, learning disorders, depression, migraine, and headache. If gluten is the putative harmful agent, then there is no requirement to invoke gut damage and nutritional deficiency to explain the myriad of the symptoms experienced by sufferers of celiac disease and gluten-sensitivity. This is called "The Gluten Syndrome".
Celiac disease and chronic headache


Range of neurologic disorders in patients with celiac disease.
Zelnik N, Pacht A, Obeid R, Lerner A.
Source
Department of Pediatrics, Carmel Medical Center, The Bruce Rappaport Faculty of Medicine, Technion–Israel Institute of Technology, Haifa, Israel. nzelnik@netvision.net.il

Abstract
OBJECTIVE:
During the past 2 decades, celiac disease (CD) has been recognized as a multisystem autoimmune disorder. A growing body of distinct neurologic conditions such as cerebellar ataxia, epilepsy, myoclonic ataxia, chronic neuropathies, and dementia have been reported, mainly in middle-aged adults. There still are insufficient data on the association of CD with various neurologic disorders in children, adolescents, and young adults, including more common and "soft" neurologic conditions, such as headache, learning disorders, attention-deficit/hyperactivity disorder (ADHD), and tic disorders. The aim of the present study is to look for a broader spectrum of neurologic disorders in CD patients, most of them children or young adults.

METHODS:
Patients with CD were asked to fill in a questionnaire regarding the presence of neurologic disorders or symptoms. Their medical charts were reviewed, and those who were reported as having neurologic manifestations underwent neurologic examination and brain imaging or electroencephalogram if required. Their neurologic data were compared with that of a control group matched for age and gender.

RESULTS:
Patients with CD were more prone to develop neurologic disorders (51.4%) in comparison with control subjects (19.9%). These disorders include hypotonia, developmental delay, learning disorders and ADHD, headache, and cerebellar ataxia. Epileptic disorders were only marginally more common in CD. In contrast, no difference was found in the prevalence of tic disorders in both groups. Therapeutic benefit, with gluten-free diet, was demonstrated only in patients with transient infantile hypotonia and migraine headache.

CONCLUSION:
This study suggests that the variability of neurologic disorders that occur in CD is broader than previously reported and includes "softer" and more common neurologic disorders, such as chronic headache, developmental delay, hypotonia, and learning disorders or ADHD. Future longitudinal prospective studies might better define the full range of these neurologic disorders and their clinical response to a gluten-free diet.
Migraine and gastrointestinal symptoms in autism

The minicolumnopathy of autism: A link between migraine and gastrointestinal symptoms.
Casanova MF.
Source
Department of Psychiatry and Behavioral Sciences, 500 South Preston Street, Building 55A, Room #217, Louisville, KY 40292, United States. M0CASA02@louisville.edu
Abstract
Gastrointestinal symptoms are common medical problems among autistic patients. A leaky gut and viruses have been proposed as possible culprits but evidence for these etiological agents remains elusive. In this article, we put forward an alternate etiology: abdominal migraines. Recent postmortem studies in autism indicate the presence of a minicolumnopathy and its relationship to both serotonergic abnormalities and a hyperexcitable cortex. These features of phenomenology are also observed in migraineurs. A putative relationship between autism and migraine is further suggested by similarities in clinical histories and laboratory evidence. Some commonalities include the presence of neuroinflammation, sensory overstimulation (e.g., flickering of fluorescent lights), "food allergies", benefits from similar diets, and the role of nitric oxide. Abdominal migraine therefore stands as a falsifiable hypothesis with added importance accrued to potential therapeutic interventions.
PMID: 17574771 [PubMed – indexed for MEDLINE] PMCID: PMC2211386
Abdominal nervous system and neurological disorders (migraines)

The abdominal brain and enteric nervous system.
McMillin DL, Richards DG, Mein EA, Nelson CD.
Source
Meridian Institute, Virginia Beach, Virginia 23454, USA. meridianinst@mindspring.com
Abstract
Conventional medical treatment for neurologic disorders such as epilepsy, migraine, and autism focuses on the brain. Although standard medical treatment is often helpful, the underlying causes of these disorders are not well understood. Furthermore, some individuals respond poorly or not at all to regular medicine. Evidence is accumulating in the medical literature that the enteric nervous system (ENS)—that part of the nervous system associated with the alimentary canal—also plays a role in these disorders. Historically, the concept of an autonomous abdominal nervous system was advocated by Byron Robinson, Johannis Langley, and Edgar Cayce. The work of these three prominent historical figures is considered along with modern viewpoints on the abdominal nervous system. Complementary therapies that address the nervous system of the abdomen have potential as useful adjuncts to conventional treatment for certain neurologic disorders.
Pregnancy migraine–C3d as noninvasive treatment


Headaches During Pregnancy.

Digre KB.

Source
Departments of *Neurology and Ophthalmology †Obstetrics and Gynecology ‡Anesthesia and Pain Management, University of Utah, Salt Lake City, Utah.

Abstract
Headache is a common symptom in pregnant women. Although most headaches seen in women are primary headache disorders (migraine, tension-type headache), complications or conditions associated with pregnancy can present with a secondary headache. Headaches are common symptoms in idiopathic intracranial hypertension, eclampsia, and reversible cerebral vascular syndrome. Migraines may begin or worsen during pregnancy, but pregnancy tends to reduce migraine frequency and severity. Although it is desirable to avoid medications for headaches during pregnancy, treatment should be considered when headaches are severe and cause significant disability. Being aware of possible treatments for migraine and headaches during pregnancy is essential.
Probiotics can be used to treat

A strain of Lactobacillus casei inhibits the effector phase of immune inflammation.
Schiffer C, Lalanne AI, Cassard L, Mancardi DA, Malbec O, Bruhns P, Dif F, Daëron M.

Source
Institut Pasteur, Département d'Immunologie, Unité d'Allergologie Moléculaire et Cellulaire, 75015 Paris, France.

Abstract
Some nonpathogenic bacteria were found to have protective effects in mouse models of allergic and autoimmune diseases. These "probiotics" are thought to interact with dendritic cells during Ag presentation, at the initiation of adaptive immune responses. Many other myeloid cells are the effector cells of immune responses. They are responsible for inflammation that accounts for symptoms in allergic and autoimmune diseases. We investigated in this study whether probiotics might affect allergic and autoimmune inflammation by acting at the effector phase of adaptive immune responses. The effects of one strain of Lactobacillus casei were investigated in vivo on IgE-induced passive systemic anaphylaxis and IgG-induced passive arthritis, two murine models of acute allergic and autoimmune inflammation, respectively, which bypass the induction phase of immune responses, in vitro on IgE- and IgG-induced mouse mast cell activation and ex vivo on IgE-dependent human basophil activation. L. casei protected from anaphylaxis and arthritis, and inhibited mouse mast cell and human basophil activation. Inhibition required contact between mast cells and bacteria, was reversible, and selectively affected the Lyn/Syk/linker for activation of T cells pathway induced on engagement of IgE receptors, leading to decreased MAPK activation, Ca(2+) mobilization, degranulation, and cytokine secretion. Also, adoptive anaphylaxis induced on Ag challenge in mice injected with IgE-sensitized mast cells was abrogated in mice injected with IgE-sensitized mast cells exposed to bacteria. These results demonstrate that probiotics can influence the effector phase of adaptive immunity in allergic and autoimmune diseases. They might, therefore, prevent inflammation in patients who have already synthesized specific IgE or autoantibodies.
Aphthous Stomatitis

- **Recurrent aphthous stomatitis caused by food allergy.**
- **Wardhana, Datau EA.**
- **Source**
  - Department of Internal Medicine, Sam Ratulangi University, Faculty of Medicine—Prof. Dr. RD Kandou Hospital and Sitti Maryam Islamic Hospital. Jl. Raya Tanawangko, Manado, North Sulawesi, Indonesia. wadiswas@yahoo.com
- **Abstract**
  - Recurrent Aphthous Stomatitis (RAS) is one of the most common oral lesions which occur either in single or multiple forms in oral mucosa. The mouth is subjected to a wide spectrum of antigenic agents, including foodstuff, and allergic reactions to such antigens may manifest in a number of diverse ways. Food allergy, however, has not been widely investigated as the cause of RAS. The main complaint of RAS typically is pain, and the main therapy is still corticosteroids, besides avoiding allergenic foodstuff. In RAS, there is often a genetic basis. More than 42 percent of patients with RAS have first-degree relatives with RAS. The likelihood of RAS is 90 percent when both parents are affected, but only 20 percent when neither parent has RAS, and it is also likely to be more severe and to start at an earlier age in patients with a positive family history. The primary goals of therapy of RAS are relief of pain, reduction of ulcer duration, and restoration of normal oral function. The secondary goals include reduction in frequency and severity of recurrences and maintenance of remission. Diagnostic elimination diets are frequently utilized both in diagnosis and management of RAS caused by food allergy. Patients with RAS may have increased levels of CD8+ T-lymphocytes and/or decreased CD4+ T-lymphocytes. There may be a reduced percentage of "virgin" T-cells and an increased of "memory" T-lymphocytes. Patients with active RAS have an increased proportion of gd T-cells compared with healthy control subjects and RAS patients with inactive disease. The gd T-cells may play a role in ADCC and it is believed that gd T-cells play a role in immunological damages. Preventive treatment is a consideration for patients with RAS caused by food allergy who report regular exacerbations of their condition. It focuses on dietary modifications, the earliest stage, the prodromal stage, and attempts to intercept ulcer development again by the use of topical immunosuppressant and particularly corticosteroids.
Multiple Symptoms

Functional bowel symptoms, fibromyalgia and fatigue: a food–induced triad?
Berstad A, Undseth R, Lind R, Valeur J.

Source
Department of Medicine, Unger-Vetlesen’s Institute, Lovisenberg Diakonale Hospital, Oslo, 0440, Norway. Arnold.Berstad@med.uib.no

Abstract
OBJECTIVE:
Patients with perceived food hypersensitivity typically present with multiple health complaints. We aimed to assess the severity of their intestinal and extra-intestinal symptoms.

MATERIALS AND METHODS:
In a prospective study, 84 patients referred to our outpatient clinic for investigation of perceived food hypersensitivity were enrolled consecutively. Irritable bowel syndrome (IBS) was diagnosed according to the Rome III criteria. Severity and impact of bowel symptoms, fatigue and musculoskeletal pain were evaluated by using the following questionnaires: The IBS Severity Scoring System (IBS-SSS), the Fatigue Impact Scale (FIS), the FibroFatigue Scale (FFS), and visual analogue scales (VAS) for scoring of musculoskeletal pain.

RESULTS:
All but one patient were diagnosed with IBS, 58% with severe symptoms. Extra-intestinal symptoms suggestive of chronic fatigue and fibromyalgia were demonstrated in 85% and 71%, respectively. Neither IgE-mediated food allergy nor organic pathology could explain the patients' symptoms. Nevertheless, malabsorption of fat was demonstrated in 10 of 38 subjects.

CONCLUSIONS:
Perceived food hypersensitivity may be associated with severe, debilitating illness. The comorbid triad of IBS, chronic fatigue, and musculoskeletal pain is striking and may point to a common underlying cause.
Joint Pain


**Intestinal permeability in patients with chronic urticaria–angioedema with and without arthralgia.**

Paganelli R, Fagiolo U, Cancian M, Scala E.

**Source**
Department of Allergy and Clinical Immunology, University La Sapienza, Rome, Italy.

**Abstract**
We evaluated the clinical response to oligoallergenic dietary treatment and the intestinal absorption of a protein antigen, cow milk beta-lactoglobulin (BLG) in 24 patients with chronic urticaria/angioedema syndrome 13 of whom also suffered from joint symptoms. Sixteen patients (77% of those with arthralgia) responded to diet (RD) with marked reduction of symptoms; the others did not respond (NR). Ten (all but one RD with arthralgia) had increased permeability to BLG after oral administration of cow milk. Four with high titers of IgG to BLG showed the highest absorption of BLG and the groups with arthralgia showed higher BLG levels than those without arthralgia. In all cases, specific IgE to cow milk was absent. These data suggest that the symptoms of a subgroup of patients with chronic urticaria, and especially patients with joint complaints that subside with diet, are related to excess intestinal permeability. The measurement of gut permeability to food proteins may be useful to define those who may benefit from dietary restriction.

PMID: 1994789 [PubMed – indexed for MEDLINE]
RA and Food

Background and aims
Patients with rheumatoid arthritis (RA) often feel there is an association between food intake and rheumatoid disease severity. To investigate a putative immunological link between gut immunity and RA, food antibodies were measured in serum and perfusion fluid from the jejunum of RA patients and healthy controls to determine the systemic and mucosal immune response.

Methods
IgG, IgA, and IgM antibodies to dietary antigens were measured in serum and jejunal perfusion fluid from 14 RA patients and 20 healthy subjects. The antigens originated from cow’s milk (α-lactalbumin, β-lactoglobulin, casein), cereals, hen’s egg (ovalbumin), cod fish, and pork meat.

Results
In intestinal fluid of many RA patients, all three immunoglobulin classes showed increased food specific activities. Except for IgM activity against β-lactoglobulin, all other IgM activities were significantly increased irrespective of the total IgM level. The RA associated serum IgM antibody responses were relatively much less pronounced. Compared with IgM, the intestinal IgA activities were less consistently raised, with no significant increase against gliadin and casein. Considerable cross reactivity of IgM and IgA antibodies was documented by absorption tests. Although intestinal IgG activity to food was quite low, it was nevertheless significantly increased against many antigens in RA patients. Three of the five RA patients treated with sulfasalazine for 16 weeks had initially raised levels of intestinal food antibodies; these became normalised after treatment, but clinical improvement was better reflected in a reduced erythrocyte sedimentation rate.

Conclusions
The production of cross reactive antibodies is strikingly increased in the gut of many RA patients. Their food related problems might reflect an adverse additive effect of multiple modest hypersensitivity reactions mediated, for instance, by immune complexes promoting autoimmune reactions in the joints.

Keywords: rheumatoid arthritis, intestinal mucosa, food antibodies, inflammation
Foods, Inflammation and Lupus

- IgG Anticardiolipin Antibodies and Progression to Q Fever Endocarditis.
- Source
  Unité de Recherche sur les Maladies Infectieuses et Tropicales Emergentes, Faculté de Médecine, CNRS UMR 7278, IRD 198, Aix-Marseille Université, 27 Bd Jean Moulin, 13005 Marseille, France.
- Abstract
  Background. IgG anticardiolipin (aCL) antibodies are associated with valvulopathy and endocarditis in patients with lupus and other diseases. During acute Q fever, high IgG aCL prevalence has been reported, but the clinical significance remains unknown. Methods. To test if increased IgG aCL at acute Q fever diagnosis is associated with an increased risk of progression to endocarditis, all patients diagnosed in the French National Referral Center for Q fever from January 2007 to December 2011 were included and followed regularly until January 2013 in a 5-year prospective cohort study. Q fever endocarditis was defined according to recently updated criteria. Results. Seventy-two patients were followed for a median time of 31 months (interquartile range of 18–47 months). Of these, 13 patients with valvulopathy without antibiotic prophylaxis progressed to endocarditis. IgG aCL levels were highly prevalent (57%) and significantly higher in the presence of a valvulopathy (P=0.005). Using Cox regression analysis, highly increased levels of IgG aCL (adjusted hazard ratio (HR) 12.95 [2.85–58.95], P=0.001) and high levels of phase II IgM (6.59 [1.37–31.62], P=0.018) were the only independent predictors of progression to endocarditis. Conclusions. Rapid progression from acute Q fever to endocarditis is associated with high levels of IgG aCL and high levels of phase II IgM, findings that should be critical in the prevention of endocarditis.
Dietary derived factors influence immune function

In addition to their regulatory role, it was also demonstrated that mucosal DCs from mesenteric lymph nodes (MLNs) and Peyer’s Patches (PPs) are unique in their capacity of degrading vitamin A to generate retinoic acid (RA) [70]. RA, in a TGF-β-dependent process, was proposed to play a crucial role in iTreg induction [25, 27, 69], demonstrating that diet-derived factors are also part of immune regulatory mechanisms involved in the prevention of aberrant immune responses towards the diet itself and other environmental antigens. When oral tolerance
BJ: 5/1/70

• Cc: Weight gain and HTN
• Initial BP: 174/107
• Energy 1–2/10
Eating ourselves to death (and despair): The contribution of adiposity and inflammation to depression

Richard C. Shelton*, Andrew H. Miller

Vanderbilt University, 1500 21st Avenue South, Suite 2200, Nashville, TN 37212, United States

ARTICLE INFO

Article history:
Received 29 January 2010
Received in revised form 7 April 2010
Accepted 16 April 2010

Keywords:
Obesity
Inflammation

ABSTRACT

Obesity and related metabolic conditions are of epidemic proportions in most of the world, affecting both adults and children. The accumulation of lipids in the body in the form of white adipose tissue in the abdomen is now known to activate innate immune mechanisms. Lipid accumulation causes adipocytes to directly secrete the cytokines interleukin (IL) 6 and tumor necrosis factor α (TNFα), but also monocyte chemoattractant protein 1 (MCP-1), which results in the accumulation of leukocytes in fat tissue. This sets up a chronic inflammatory state which is known to mediate the association between obesity and conditions such as cardiovascular disease, type 2 diabetes, and cancer. There is also a substantial literature linking inflammation with risk for depression. This includes the observations that: (1) people...
Patient Information Sheet:

Name: 
Age: NA
Date of Birth: 05/01/70 
Date Drawn: 04/26/11 
Date Test Completed: 04/29/11 
Doctor: Matalone 

Color Key:

Severe Reaction 4+ 
High Reaction 3+ 
Moderate Reaction 2+ 
Mild Reaction 1+ 
No Reaction Negative 

Contact Information:

NutraTest 
4646 North Shallowford Road, Suite N 
Dunwoody, GA 30338 
Phone: 678-736-6374 
Fax: 770-392-9805 
contact@nutratestlabs.com
Patient Information Sheet:

Name: 
Age: NA
Date of Birth: 09/13/61
Date Drawn: 09/20/11
Date Test Completed: 10/05/11
Doctor: Matalone

Color Key:

- Severe Reaction 4+
- High Reaction 3+
- Moderate Reaction 2+
- Mild Reaction 1+
- No Reaction Negative

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4646 North Shallowford Road, Suite N
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Reaction Scale

Almond
Apple
Apricot
Artichoke
Asparagus
Aspartame
Avocado
Baker's Yeast
Banana
Barley
Basil
Beef
Bee
Benzoic Acid
BHA
Black Pepper
Blueberry
Brewer's Yeast
Broccoli
Buckwheat
Cabbage
Canola Oil
Cantaloupe
Carob
Carrot
Casein
Cashew
Catfish
Cauliflower
Celery
Cherry
Chicken
Chili Pepper
Cinnamon
Clam
Cocoa
Coconut
Codfish
Coffee
Corn
Cottonseed
Cow's Milk
Crab
Cranberry
Gluten-free vegan diet induces decreased LDL and oxidized LDL levels and raised atheroprotective natural antibodies against phosphorylcholine in patients with rheumatoid arthritis—a randomized study. Arthritis Res Ther. 2008;10(2):R34

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<tr>
<th>Test</th>
<th>Patient Results</th>
<th>Reference Range</th>
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<tbody>
<tr>
<td>Ox LDL:HDL Ratio</td>
<td>3.5</td>
<td>4.2–28.0 mU/mg</td>
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<tr>
<td>Ox LDL</td>
<td>4.7</td>
<td>1.4–9.6 U/L</td>
</tr>
<tr>
<td>Total Cholesterol</td>
<td>176</td>
<td>0.0–200 mg/dl</td>
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<tr>
<td>LDL</td>
<td>119</td>
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<tr>
<td>HDL</td>
<td>34</td>
<td>0.0–40 mg/dl</td>
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<tr>
<td>Triglycerides</td>
<td>114</td>
<td>2.0–150 mg/dl</td>
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</table>
Follow-up visit

- Lost 33 lbs
- BP: 138/85
- Feels much better
GL: 10/16/1955

- CC: fatigue and stomach issues
- Standard bloodwork: elevated monocytes
### Patient Information Sheet:

<table>
<thead>
<tr>
<th>Name:</th>
<th></th>
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</thead>
<tbody>
<tr>
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### Color Key:

- **Severe Reaction**: 4+
- **High Reaction**: 3+
- **Moderate Reaction**: 2+
- **Mild Reaction**: 1+
- **No Reaction**: Negative

### Contact Information:

NutraTest  
4646 North Shallowford Road, Suite N  
Dunwoody, GA 30338
Patient Information Sheet:
Name:
Age: NA
Date of Birth: 10/16/55
Date Drawn: 06/12/12
Date Test Completed: 07/04/12
Doctor: Donaldson

Color Key:
Severe Reaction 4+
High Reaction 3+
Moderate Reaction 2+
Mild Reaction 1+
No Reaction Negative

Contact Information:
NutraTest
4646 North Shallowford Road, Suite N
Dunwoody, GA 30338
Phone: 678-736-6374
Fax: 770-392-9805
contact@nutratestlabs.com
Follow-up

- Energy 7/10
- Feels much better
- Less hair loss
- BM: 2 qd
- Gas/Bloating-Resolved
- H. Pylori-negative
- Monocytes – in normal range
JL: 4/17/84

- Professional athlete
- Rash on his stomach 2–3 months
- History of frequent antibiotics
- Pan in left wrist
- High monocytes
- High EBV titers (mono 3/10)
Patient Information Sheet:

Name:
Age: NA
Date of Birth: 04/17/84
Date Drawn: 01/19/11
Date Test Completed: 01/31/11
Doctor: Matalone

Color Key:

- Severe Reaction 4+
- High Reaction 3+
- Moderate Reaction 2+
- Mild Reaction 1+
- No Reaction Negative

Contact Information:

NutraTest
4646 North Shallowford Road, Suite N
Dunwoody, GA 30338
Phone: 678-736-6374
Fax: 770-392-9805
contact@nutratestlabs.com
Patient Information Sheet:

Name: 
Age: NA 
Date of Birth: 04/17/84 
Date Drawn: 02/14/12 
Date Test Completed: 02/23/12 
Doctor: Matalone

Color Key:

- Severe Reaction 4+
- High Reaction 3+
- Moderate Reaction 2+
- Mild Reaction 1+
- No Reaction Negative

Contact Information:
NutraTest 
4646 North Shallowford Road, Suite N 
Dunwoody, GA 30338
F/U

- Feels great
- No pain in wrist
- Reports best season yet
- Better Energy
- Faster Recovery
JP 12/07/63

• Cc: migraines
• IBS
• GERD
• Anxiety and Depression
<table>
<thead>
<tr>
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<tbody>
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<tr>
<td>Moderate Reaction 2+</td>
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<tr>
<td>Mild Reaction 1+</td>
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<tr>
<td>No Reaction Negative</td>
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**Contact Information:**

4646 North Shallowford Road, Suite N
Dunwoody, GA 30338
Reaction Scale

Almond
Apple
Apricot
Artichoke
Asparagus
Aspartame
Avocado
Baker's Yeast
Banana
Barley
Basil
Beef
Bee
Benzoic Acid
BHA
Black Pepper
Blueberry
Brewer's Yeast
Broccoli
Buckwheat
Cabbage
Canola Oil
Cantaloupe
Carob
Carrot
Casein
Cashew
Catfish
Cauliflower
Celery
Cherry
Chicken
Chili Pepper
Cinnamon
Clam
Cocoa
Coconut
Codfish
Coffee
Corn
Cottonseed
Cow's Milk
Crab
Cranberry
### Patient Information Sheet:

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### Color Key:

- **Severe Reaction**: 4+
- **High Reaction**: 3+
- **Moderate Reaction**: 2+
- **Mild Reaction**: 1+
- **No Reaction**: Negative

### Contact Information:

NutraTest  
4646 North Shallowford Road, Suite N  
Dunwoody, GA 30338
F/U

- Able to D/C Cymbalta
- No longer suffering from migraines
- IBS has improved—occasional diarrhea, not daily (non compliance with diet)
RK: 01/42

- Cc: Osteoporosis
- Worse when consumed foods that she was sensitive too.
- GERD
**Patient Information Sheet:**

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**Color Key:**

- Severe Reaction: 4+
- High Reaction: 3+
- Moderate Reaction: 2+
- Mild Reaction: 1+
- No Reaction: Negative

**Contact Information:**

NutraTest  
4646 North Shallowford Road, Suite N  
Dunwoody, GA 30338
Patient Information Sheet:

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</table>

Contact Information:

NutraTest
4646 North Shallowford Road, Suite N
Dunwoody, GA 30338

Phone: 678-736-6374
<table>
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<tr>
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<tr>
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<td>Avocado</td>
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<td>Banana</td>
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</tr>
<tr>
<td>Cottonseed</td>
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</tbody>
</table>

Reaction Scale: 0 1 2 3 4 5
f/U

- GERD resolved
- Improvement on DEXA
Risk Factors:

Anti–acid medication as a risk factor for food allergy.

Pali–Schöll I, Jensen–Jarolim E.
IPA – Institute of Pathophysiology and Allergy Research, Center of Pathophysiology, Infectiology and Immunology, Medical University Vienna, Vienna, Austria.
Allergy. 2010 Dec 1

An important feature for oral allergens is their digestion–resistance during gastrointestinal transit. For some oral allergens, digestion stability is an innate feature, whereas digestion–labile antigens may only persist in times of impairment of the digestive system. In this review, we collect evidence from mouse and human studies that besides the inherent molecular characteristics of a food protein, the stomach function is decisive for the allergenic potential. Gastric acid levels determine the activation of gastric pepsin and also the release of pancreatic enzymes. When anti–ulcer drugs inhibit or neutralize gastric acid, they allow persistence of intact food allergens and protein–bound oral drugs with enhanced capacity to sensitize and elicit allergic reactions via the oral route. Mouse studies further suggest that maternal food allergy arising from co–application of a food protein with anti–acid drugs results in a Th2–biased immune response in the offspring. Especially, anti–ulcer drugs containing aluminum compounds act as Th2 adjuvants. Proton pump inhibitors act on proton secretion but also on expression of the morphogen Sonic hedgehog, which has been related to the development of atrophic gastritis. On the other hand, atrophic gastritis and resulting hypoacidity have previously been correlated with enhanced sensitization risk to food allergens in elderly patients. In summary, impairment of gastric function is a documented risk factor for sensitization against oral proteins and drugs.
Osteoporosis and H2blockers


Use of proton pump inhibitors and risk of hip fracture in relation to dietary and lifestyle factors: a prospective cohort study.

Khalili H, Huang ES, Jacobson BC, Camargo CA Jr, Feskanich D, Chan AT.

Source
Gastroenterology Unit, Massachusetts General Hospital, Boston, MA 02114, USA.

Abstract

OBJECTIVE:
To examine the association between chronic use of proton pump inhibitors (PPIs) and risk of hip fracture.

DESIGN:
Prospective cohort study.

SETTING:
Nurses' Health Study, which originally recruited from the 11 most populous states in the US.

PARTICIPANTS:
79,899 postmenopausal women enrolled in the Nurses' Health Study who provided data on the use of PPIs and other risk factors biennially since 2000 and were followed up to 1 June 2008.

MAIN OUTCOME MEASURE:
Incident hip fracture

RESULTS:
During 565,786 person years of follow-up, we documented 893 incident hip fractures. The absolute risk of hip fracture among regular users of PPIs was 2.02 events per 1000 person years, compared with 1.51 events per 1000 person years among non-users. Compared with non-users, the risk of hip fracture among women who regularly used PPIs for at least two years was 35% higher (age adjusted hazard ratio 1.35 (95% confidence interval 1.13 to 1.62)), with longer use associated with increasing risk (P(trend)<0.01). Adjustment for risk factors, including body mass index, physical activity, and intake of calcium did not materially alter this association (hazard ratio 1.36 (1.13 to 1.63)). These associations were also not changed after accounting for reasons for PPI use. The relation between PPI use and fracture differed by smoking history (P(interaction)=0.03). Among current and former smokers, PPI use was associated with greater than 50% increase in risk of fracture, with a multivariate hazard ratio of 2.15 (1.48 to 3.14). Among non-smokers, the risk was lower (hazard ratio 1.03 (0.74 to 1.43)).
### Patient Information Sheet:

<table>
<thead>
<tr>
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<tbody>
<tr>
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<tr>
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<td>12/02/10</td>
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<td>Date Test Completed:</td>
<td>01/06/11</td>
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<tr>
<td>Doctor:</td>
<td>Matalone</td>
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</tbody>
</table>

### Color Key:

- **Severe Reaction**: 4+
- **High Reaction**: 3+
- **Moderate Reaction**: 2+
- **Mild Reaction**: 1+
- **No Reaction**: Negative

### Contact Information:

4646 North Shallowford Road, Suite N  
Dunwoody, GA 30338  
Phone: 678-736-6374  
Fax: 770-392-9805  
contact@nutratestlabs.com
Peppermint
Pineapple
Pinto Bean
Plum
Polysorbate 80
Pork
Pumpkin
Raspberry
Red #2
Red #3
Red #40
Red Pepper
Rice
Rosemary
Rye
Saccharin
Safflower Seed
Salmon
Scallops
Sesame
Shrimp
Snapper
Sole
Soybean
Spinach
Squash Mix
Strawberry
Sugarcane
Sunflower Seed
Sweet Potato
Swordfish
Tea
Tomato
Trout
Turmeric
Tuna
Turkey
Vanilla
Watermelon
Wax Bean
White Potato
Whole Wheat
Yellow #6
Zucchini
Treatment

- Food allergen removal 6 months
- Nutrient protocol to build gut lining
- Physician line probiotics
- Functional foods to build gut integrity
Star Probiotics

- Probio Plus
- Probio Complete
- Florarestore DF
Probiotic Uses

• Antibiotics
• Inflammation
• Auto Immunity
• IBS
• Diarrhea
• GI Issues
• Allergy
Not All Probiotics Work

• In addition, although clinical evidence of the tangible benefits of probiotics is mounting, this does not yet reflect the commercial front. Unfortunately, many so-called probiotic products have not been properly identified, documented, manufactured under good manufacturing practices, or proven clinically, yet various companies make claims that lead consumers and caregivers to believe that they are using reliable products.
• ProbioMax DF™ is a dairy-free, vegetarian, gluten-free, four-strain probiotic totaling 100 billion CFU per vegetable capsule.
• Each strain has proven safety, acid and bile resistance, adherence to the human intestinal mucosa, and resiliency to survive and remain active in the gastrointestinal tract.
• Clinically proven health benefits include improvement of immune response and enhancement of the gastrointestinal environment.
• No refrigeration necessary. Stable up to 40 C
Overview on Bifidobacterium lactis HN019 studies.
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<td>(&gt;90% survival in hydrochloric acid and pepsin (1%) at pH 3 for 1h at 37°C)</td>
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<tr>
<td>Bile salt tolerance</td>
<td>++++</td>
<td>(&gt;90% survival in 0.3% bile salt containing medium)</td>
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<tr>
<td>Pepsin resistance</td>
<td>+++</td>
<td>(&gt;60% in 0.3% pepsin containing medium at pH 2 for 1h)</td>
</tr>
<tr>
<td>Pancreatin resistance</td>
<td>+++</td>
<td>(&gt;60% survival in 0.1% pancreatin containing medium at pH 8 for 2h)</td>
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Selected characteristics of *L. acidophilus* La-14 (internally generated data):

++++ Excellent; +++ Very good; ++ Good; + Fair
Selected characteristics of *L. plantarum* Lp-115 (internally generated data):

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<tr>
<th>Characteristic</th>
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<tr>
<td>Acid tolerance</td>
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<td>(&gt;90% survival in hydrochloric acid and pepsin (1%) at pH 3 for 1h at 37°C)</td>
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<td>Bile salt tolerance</td>
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<td>(&gt;90% survival in 0.3% bile salt containing medium)</td>
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Adhesion of *Bifidobacterium lactis* HN019 to human intestinal epithelial cells (Caco-2) in vitro.
### In vitro Data

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<th>S. bifidum 802</th>
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<th>L. acidophilus N06</th>
<th>L. brevis 1br-35</th>
<th>L. casei Lc-11</th>
<th>L. paracasei Lpc-37</th>
<th>L. plantarum Lp-115</th>
<th>L. rhamnosus Lr-32</th>
<th>L. salivarius Ls-33</th>
<th>L. lactis Li-34</th>
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</table>
Further, medical and scientific experts are confident that Bifidobacterium lactis HN019 is safe for humans and does not contribute to antibiotic resistance.
Effect of the consumption of milk supplemented with Bifidobacterium lactis HN019 on natural killer cell activity. *Significantly different from run-in.
Effect of six weeks’ consumption of milk supplemented with Bifidobacterium lactis HN019 on phagocytic activity relative to base-line levels. *Significantly different from control subjects.
Protection of mice infected with Salmonella typhimurium by Bifidobacterium lactis HN019
HOWARU™ **Biff** (*Bifidobacterium lactis* HN019): Internationally-renowned researchers have identified *Bifidobacterium lactis* HN019 as having the best probiotic potential of more than 2,000 strains based upon its resistance to bile and acidity in vitro. Further, medical and scientific experts are confident that *Bifidobacterium lactis* HN019 is safe for humans and does not contribute to antibiotic resistance. This strain has been shown to adhere in high numbers to cultured intestinal epithelial cells, enabling it to better modulate immunity. Also demonstrated for this specific strain are G.I. tract survival and possible support for the preservation or restoration of healthy intestinal microbiota. International studies involving middle-aged to elderly people revealed that *Bifidobacterium lactis* HN019 increases cytotoxic activity of NK cells and phagocytic activity of peripheral blood mononucleocytes and does not cause inflammation. In a year-long, double-blind, placebo-controlled trial (n=600), children (aged 1–3) receiving this strain along with galacto-oligosaccharides showed improved immunity, iron status, and growth.
HOWARU™ Biff (Bifidobacterium lactis HN019):

International studies involving middle-aged to elderly people revealed that Bifidobacterium lactis HN019 increases cytotoxic activity of NK cells and phagocytic activity of peripheral blood mononucleocytes and does not cause inflammation. In a year-long, double-blind, placebo-controlled trial (n=600), children (aged 1–3) receiving this strain along with galacto-oligosaccharides showed improved immunity, iron status, and growth.
Guys

Check this out. This is after 1 cap daily of probiomax DF for a few weeks. The came from a doc that I work with in Utah.

This little 6 month old had terrible constipation and no appetite, a chiro adjustment and the 100 billion CFU probiomax was all he had.

Mike
Lactobacillus acidophilus (L. acidophilus La–14):
This vancomycin-sensitive strain has shown inhibition of common bacterial strains in vitro, and re-establishment of the population of lactobacillus and bifidobacterium in the intestinal tracts of mice after antibiotic therapy. L. acidophilus La–14 has been demonstrated to support specific immunity in humans, shifting the immune system to the Th1 response (induced IL–12 and moderately induced TNF–α in vitro). It degrades oxalate 100%.
Lactobacillus plantarum (Lactobacillus plantarum Lp–115):

In animal models, L. plantarum Lp–115 reduced gut inflammation. Human studies indicated stimulation of specific immunity (IgG). This strain, like the other strains present, does not contribute to antibiotic resistance.
**Bifidobacterium longum** (Bifidobacterium longum Bl-05):

- Diarrhea prevention in antibiotic treated patients
- Cholesterol reduction (reduced inflammation)
- Improved lactose intolerance

Rat studies showed – suppression of colon tumor incidence
Probio Plus capsule

**Dosing:** Take one capsule, once a day, with water, preferably 30 minutes after a meal, or as directed.

**Storage:** Store in a cool, dry place. Refrigerate if desired. Although the organisms in ProbioMax are stable at 86°F, the formula is shipped from the manufacturer refrigerated. Higher quantities of living organisms are added to the capsules during manufacture to guarantee the label claim for viable organisms for up to two years when kept in a dry place at 72 °F or colder.
Protocol

- ProbioMax DF—one a day, or two a day based on severity for one to three months

- Probio Max Daily DF— one a day after as needed

- (increase use before allergy season, cold/flu seasons, or with change in bowel activity)
# ProbioMax vs Ultra Flora Inner Health

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<td>?</td>
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<td>Best on acid, bile rest</td>
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<td>Does not contribute to antibiotic resistance</td>
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<td>Reduced Tregs T Reg Cells—Major cont to immune dysregulation</td>
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Gut Immune Max

- The power of immunoglobulins
Allergy and the gastrointestinal system.

Vighi G, Marcucci F, Sensi L, Di Cara G, Frati F.
Clinical Pharmacology and Pharmacovigilance, Niguarda Ca' Granda Hospital, Milan, Italy.

Abstract
The gastrointestinal system plays a central role in immune system homeostasis. It is the main route of contact with the external environment and is overloaded every day with external stimuli, sometimes dangerous as pathogens (bacteria, protozoa, fungi, viruses) or toxic substances, in other cases very useful as food or commensal flora. The crucial position of the gastrointestinal system is testified by the huge amount of immune cells that reside within it. Indeed, gut-associated lymphoid tissue (GALT) is the prominent part of mucosal-associated lymphoid tissue (MALT) and represents almost 70% of the entire immune system; moreover, about 80% of plasma cells [mainly immunoglobulin A (IgA)-bearing cells] reside in GALT. GALT interacts strictly with gastrointestinal functions in a dynamic manner; for instance, by increasing intestinal permeability in replay to particular stimulations, or orientating the immune response towards luminal content, allowing either tolerance or elimination/degradation of luminal antigens, or sometimes provoking damage to the intestinal mucosa, such as in coeliac disease or food allergy. The immune mechanisms implicated in these actions are very complex and belong to both innate and adaptive immunity; innate immunity supplies an immediate non-specific response that is indispensable before specific adaptive immunity, which needs 7–10 days to be efficacious, takes place. The results of their interactions depend upon different contexts in which contact with external agents occurs and may change according to different genetic settings of the hosts.

PMID: 18721321
Immunoglobulin: Effectively Covers a Critical Immune Gap

Using the Pig as a Model for Lack of Immunity

IgG 2000 DF™
The Gut Flora and Immunity – Why Immunoglobulin Supplementation is Critical Today

We have pressing health issues in the world today in which immunity and gut health plays a very important role. Inflammation has become the primary contributor to chronic diseases in the industrialized world. Our health care system today understands disease and symptom treatment much better than “prevention and maintenance”. Antibiotics, for example, continue to be very effective treatments for bacterial diseases. But, the evidence is overwhelming that the age has past in which widespread frequent use of antibiotics is the panacea. The overuse of antibiotics has and will continue to generate antibiotic-resistant strains of bacteria, one of the greatest threats to the health care of an aging population.

In addition, in today’s culture, we live and work harder to an older age, food excess drives over consumption, we travel globally with few restrictions, and physical work is no longer an important part of most jobs. These are just a few of the factors that are putting us at risk for illness due to insufficient immunity and contributing to the inflammatory load on our bodies. In contrast to a treatment strategy, optimizing the function of the immune system and the gut through lifestyle, nutrition, and exercise is a preventative maintenance health strategy that should be a foundation of health care. A preventative health strategy is particularly essential to address the inflammatory challenges to our health today. Our success in building a healthier population today and in the future will be based on understanding the keys to immunity and immune function: controlling exposure, maintaining immune competence, and controlling inflammation and immune activation.
Harmful organisms or substances normally enter our bodies through the mouth or nose…
Wellness depends on the protection and defenses provided by our immune system. A healthy immune system must begin with defending the GI tract...
• Adults have about 400 sq. meters of surface area and 2 lbs of bacteria in the GI tract so it is no wonder that the GI tract is the site where many health problems begin. It can be considered the most important immunological organ, accounting for 70% of the body’s immune cells.
Immunoglobulins and oral administration

- Immunoglobulin is not completely broken down in the gastrointestinal tract and is biologically active throughout the GI Tract.
- IgG is stable in mildly acidic conditions (pH of 4) and is not easily hydrolyzed by digestive enzymes.

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<td>Adult</td>
<td>Powder</td>
<td>IgG, Colost.</td>
<td>10-20%</td>
<td>McClead et al.</td>
<td>1988</td>
</tr>
<tr>
<td>Cow</td>
<td>Infant</td>
<td>Powder</td>
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<td>13%</td>
<td>Zinkernagel et al.</td>
<td>1975</td>
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<tr>
<td>Human</td>
<td>Rat</td>
<td>Liquid</td>
<td>IgG, Serum</td>
<td>25.7%</td>
<td>Gmoshinskii et al.</td>
<td>1998</td>
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<tr>
<td>Cow</td>
<td>In vitro</td>
<td>Powder</td>
<td>IgG, colost.</td>
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<td>Petschow and Talbott</td>
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<td>Cow</td>
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<td>49%</td>
<td>Warny et al.</td>
<td>1999</td>
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<td>Human</td>
<td>Infant</td>
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<td>IgG, serum</td>
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<td>Blum et al.</td>
<td>1981</td>
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<tr>
<td>Human</td>
<td>Children</td>
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<td>~25%</td>
<td>Losonsky et al.</td>
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<td>Bovine</td>
<td>In vitro</td>
<td>Powder</td>
<td>IgG, colost.</td>
<td>50%</td>
<td>McClead and Gregory</td>
<td>1984</td>
</tr>
<tr>
<td>Bovine</td>
<td>In vitro</td>
<td>Powder</td>
<td>IgG, colost.</td>
<td>25%</td>
<td>Kelly et al.</td>
<td>1997</td>
</tr>
<tr>
<td>Bovine</td>
<td>Adult</td>
<td>Powder</td>
<td>IgG, colost.</td>
<td>25%</td>
<td>Kelly et al.</td>
<td>1997</td>
</tr>
<tr>
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<td>Adult</td>
<td>Powder</td>
<td>IgG, serum</td>
<td>++</td>
<td>Hanning and Drew</td>
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<tr>
<td>Bovine</td>
<td>Adult</td>
<td>Powder</td>
<td>IgG, colost.</td>
<td>++</td>
<td>Lissner et al.</td>
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<tr>
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<td>Adult</td>
<td>Powder</td>
<td>IgG, colost.</td>
<td>21%</td>
<td>Roos et al.</td>
<td>1995</td>
</tr>
</tbody>
</table>

++ Indicates the presence of immunoglobulin in fecal material.
The Five Powerful Effects of Immunoglobulin Supplementation

Neutralization and elimination of pathogens and antigens

Controlling endotoxin-mediated inflammation

Reducing gut inflammation

Increasing protein assimilation

Immunoglobulin and probiotic supplementation work together to maintain digestive health and immunity
Immunoglobulins and the 4R Program

• Remove
  (Bacteria and pathogens)

• Replace
  (Improves Digestive Function)

• Reinoculate
  (Changes Environment – Increases good bacteria)

• Repair
  (Reduces Inflammation)
<table>
<thead>
<tr>
<th></th>
<th>IGG 2000</th>
<th>Colostrum Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>IgG</td>
<td>46–53%</td>
<td>15–16%</td>
</tr>
<tr>
<td>Total Immunoglobulins</td>
<td>51–58%</td>
<td>18–20%</td>
</tr>
<tr>
<td>Lactose</td>
<td>0%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Fat</td>
<td>0.2%</td>
<td>26%</td>
</tr>
<tr>
<td>Casein</td>
<td>0%</td>
<td>15–20%</td>
</tr>
<tr>
<td>Endotoxins 5 &amp; up Bad</td>
<td>0.1 eu mg or less</td>
<td>9 eu mg</td>
</tr>
<tr>
<td>Coliforms</td>
<td>0 for 10 years</td>
<td>9.1/g</td>
</tr>
</tbody>
</table>
Controls endotoxin exposure

ENC_{50} of Plasma Products

• ENC_{50}: concentration of the sample at which 50% of the endotoxin is neutralized. Lower ENC_{50} indicates more capacity to neutralize endotoxin.

<table>
<thead>
<tr>
<th></th>
<th>ENC_{50} (mg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Plasma</td>
<td>0.118</td>
</tr>
<tr>
<td>Human IgG (99%)</td>
<td>6.999</td>
</tr>
<tr>
<td>IGG 2000</td>
<td>0.096</td>
</tr>
</tbody>
</table>

• IGG 2000 contains similar endotoxin neutralization capabilities to human plasma and significantly more than human IgG
Neutralization and elimination of bacteria, viruses, and other environmental pathogens

- IgG 2000 DF contains both natural and antigen–induced antibodies
- Natural antibodies react with common epitopes (e.g. endotoxin)
- Antigen–induced Ab’s react with specific infectious agent

These data indicate that antibodies against common pathogens are found in high concentrations in IgG 2000DF
Escherichia coli and endotoxin

C. difficile  Cryptosporidium  Klebsiella sp.

Viruses  

One gram of IGG  Billions of antibodies

Staph. aureus  Candida sp.  Salmonella sp.

viroles
1) **IBS/Stressed**: Imbalance in the gut. 35 extra days symptom free

2) **AIDS/Immune Deficient**: Chronic problems with diarrhea.

3) **Elderly**: Help for an immune system that doesn’t respond. Combine with fiber.

4) **Children**: Viral GI infections are common. Combine with immune nutrients such as zinc

5) **Travelers**: New exposure, high stress. (Next slide)

6) **Stressed** Individuals (next slide to explain)

7) **High Risk Exposure**: Doctors, Nurses, Retailers, Teachers,

8) **Recovery**:
   - Ulcers - NSAIDS,
   - Antibiotics
   - Medications: chemotherapy

Dose is important: 5-10 grams per day! (1-2 tablespoons)

*References available upon request*
All-natural antibodies for first-line defense

Our immune system depends on health at the gut level where 80% of all disease begins.

In the gut, immunoglobulin is released into the lumen to neutralize antigens and promote opsonization.

The battle in the gut is critical because it is the largest mucosal membrane in the body, and most toxins enter our bodies through the mucosal membranes of our mouth and nose.

Stress on the body, from our busy lives or inflammation, sends a signal to the gut that the body is under distress, and the body actually releases less immunoglobulin into the lumen as it prepares to need its resources elsewhere.

The bacteria colonize and attack the internal vesicles unchecked. We feel run down and tired.

As the toxins multiply they leak through the gut walls triggering cytokine (IL-1, IL-6 and TNF-a) production—a potentially dangerous immune cycle. The cytokines break muscle tissue down into amino acids. The liver processes the amino acids in an effort to fuel immune function. The result is increased urea and blood lipids.
Summary

• Billions of antibodies per gram
• Much cleaner product than other colostrum products
• Reduce gut inflammation
• Data on systemic reduction of inflammation
• Great with probiotics
• Immediate action on immune system
Ideal with Probiotics

• High quality immunoglobulin concentrate.
• Guaranteed IgG levels of 45% (Typical level of 53%)
• FDA’s GRAS recognition as safe food ingredient
• Lactose and casein free
• Ideal combination product to probiotics: “Excludes” immunogenic bacteria and neutralizes endotoxin.
• Not reactive with beneficial flora.
• Probiotics provide restorative flora
Normal Defensive Systems in the Intestine...

Healthy microflora
- Bacteria found in the healthy gut
- Produce enzymes for more complete digestion
- Also help occupy binding sites
- Don’t initiate a strong immune response

IgA
- Antibodies in the gut
- Important for defending the body against pathogenic bugs and toxins

IgG
- Antibodies in the blood
- Important for defending the body against pathogenic bugs and toxins
- Move from blood to intestine, where they assist intestinal immunity

Immune cells
- Circulating in the body
- Respond to stress
So, problems often occur in the intestine...

Pathogenic bugs / Toxins
- Substances in the gut
- Can be viral, bacterial, or environmental
- Such as:
  - E. coli
  - Salmonella
  - Rotavirus
  - Cryptosporidium
  - Bacterial toxins
  - Food Allergens
- If too many attach, infections and inflammation and tissue damage may result

Subsequent intestinal damage results in:
- Inflammation
- Decreased absorption and food utilization
- Diarrhea
- Leaky bowel

Inflammation immediately results in:
- Decreased appetite
- Fever
- Muscle weakness and joint soreness

Immune system responds to inflammation:
- Recruitment of immune cells from the body
What if the villi become damaged?

We want rapid recovery to bring the immune system and our health back to normal

Bioactive proteins have been proven to increase tissue healing by speeding the repair of damaged tissue.

The faster intestinal tissue heals, the sooner:
• diarrhea stops
• energy is diverted from immune system stimulation back to productive functions
• appetite and health return to normal

Stress, travel, aging, medications and food can all cause damage.
Results as mean ± SEM (n=4-6 animals)

2. Lung inflammation model

This study showed IGG 2000 reduced inflammation not only in the GI tract but also in the lungs.
Probiotics Build The Wall
IGG are The Soldiers
Therapeutic levels of proven probiotic strains in each convenient dose!

30 Billion!!!!!!

Powerful dairy-free immunoglobulins to reduce inflammation, eliminate unwanted pathogens, and restore immune response.

Supplement Facts

<table>
<thead>
<tr>
<th>Serving Size: 1 Sachet (3.8g)</th>
<th>Servings Per Container: 30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount Per Serving</td>
<td>%Daily Value</td>
</tr>
<tr>
<td>Calories</td>
<td>10</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>1 g</td>
</tr>
<tr>
<td>Fiber</td>
<td>1 g</td>
</tr>
<tr>
<td>Protein</td>
<td>1 g</td>
</tr>
<tr>
<td>HOWARU® Bifido</td>
<td>15 Billion CFU*</td>
</tr>
<tr>
<td>(Bifidobacterium lactis HN019)</td>
<td></td>
</tr>
<tr>
<td>Proprietary Blend</td>
<td>15 Billion CFU*</td>
</tr>
<tr>
<td>Lactobacillus acidophilus La-14</td>
<td></td>
</tr>
<tr>
<td>Lactobacillus plantarum Lp-115</td>
<td></td>
</tr>
<tr>
<td>Bifidobacterium longum Bl-05</td>
<td></td>
</tr>
<tr>
<td>IgG 2000 DF™ (serum-derived immunoglobulin concentrate)</td>
<td>1500 mg</td>
</tr>
<tr>
<td>Immunoglobulin G (IgG)</td>
<td>800 mg</td>
</tr>
<tr>
<td>Also provides other Immunoglobulins (IgA, IgM, IgE, IgD), Transferrins, IGF-1 and TGFβ-1</td>
<td></td>
</tr>
<tr>
<td>Saccharomyces boulardii (10 billion live organisms)</td>
<td>500 mg</td>
</tr>
<tr>
<td>Arabinogalactan</td>
<td>1500 mg</td>
</tr>
</tbody>
</table>

*Percent Daily Values are based on a 2,000 calorie diet. **Daily Value not established.

A TRUE FIRST

Proven levels of Saccharomyces boulardii in a single dose.
Conditions to consider Probiotics

- IBS
- Crohn’s
- Colitis
- Allergies
- Immune dysfunction (bacterial/yeast)
- Antibiotic adjunct
- Depression
Recent research of the virome found that DNA segments from viruses were species we are unfamiliar with.

Up to 81% of what is detected is unknown to us.
Recent research has used genetic probes to identify microbial populations. When normal subjects are compared to those auto-immune conditions, auto-immune patients have a radically different microbial population than normal.
Autoimmune disease and the human metagenome

Microbial genomes can now be defined which is allowing deciphering of many of the secrets of human disease.

Possibly responsible for autoimmune conditions and the root of inflammation in general
Differences in Microbe population

Over 150 different microbes that grow on the skin, just in the palm of the hand

Radically different microbe culture in are forearm and armpits

Different reactions of sIgA in saliva versus stool…more proteases in the gut to break it down, but also different microbial culture too
Science has advanced

• Formally reliant on culture methods, difficult and loses touch with in vivo environment
• Genetic sequencing even allows for better understanding of interaction of microbes in the system…superbugs
• Microbes out number our own cells 10:1
• “Human super organism”
• One bug for one disease paradigm is over…must think multiple infections at once
Conditions to consider Gut Tx

- Psoriasis: 8 novel species never before known to persist on the skin
- Obesity: bacteria is a predictor for high BMI
- Type 2 diabetes: different gut flora then healthy counterparts including Firmicutes and Clostridia
- Crohn's have higher proportion of Proteobacteria and Bacteroids in their gut
- Autism: urinary metabolites that are highly significant compared to controls
- MS: higher intestinal bacteria then normal
- Premature birth: more bacteria in the amniotic fluid then normal
- Prosthetic hips: higher and diverse bacteria then normal controls
Rheumatoid arthritis

- When a titer to rf is high, there is also more viral, bacterial and parasitic infections

- Correlation between patients with sub acute bacterial endocarditis which is tied to presence of Streptococcus and RF
Standard of Care

• Use medications that slow the immune response...e.g. prednisone
• ???? Is this exactly the wrong direction
After a certain level of dysbiosis = auto/immune inflammatory condition. Inflammatory response associated with aging, may be progression of chronic infections, aided by down regulation of VDR.
Herxheimer/Die-off

- Problematic to treatment is that people must feel worse to feel better.
- There must be an upregulation of the immune response, such as interferons which make us feel ill to kill bugs.
- “relapse” in auto-immune conditions my really be a time when the immune system is most effectively fighting microbes
- Herxheimer
Other infections conditions

• Alzheimer’s: research demonstrates that plaques wall off 8 common organisms, Strep, Staph, Listeria, HSV
Giving life back

• 70 year old female...bowel incontinence
Fructose and the Metabolic Syndrome

↑Calorie intake → Obesity → Insulin resistance → Diabetes → Atherosclerosis, Vascular diseases, High blood pressure → Dyslipidemia → Fructose

Fructose
Fructose metabolism influences Glucose metabolism

- Fructose strongly signals release of hexokinase (glucose-specific)
- Fructokinase
  - Not under metabolic control
  - Quickly taken up by liver
  - Very quickly enters into glycolysis pathway to yield fatty acids (plasma triglycerides)
  - “Fills” glycolysis substrate at a very high rate, promoting fat production
Consuming fructose-sweetened, not glucose-sweetened, beverages increases visceral adiposity and lipids and decreases insulin sensitivity in overweight/obese humans

Kimber L. Stanhope,1,2 Jean Marc Schwarz,3,4 Nancy L. Keim,5 Steven C. Griffen,6 Andrew A. Bremer,7 James L. Graham,1,2 Bonnie Hatcher,2 Chad L. Cox,2 Artem Dyachenko,3 Wei Zhang,6 John P. McGahan,8 Anthony Seibert,8 Ronald M. Krauss,9 Sally Chiu,9 Ernst J. Schaefer,10 Masumi Ai,10 Seiko Otokozawa,10 Katsuyuki Nakajima,10,11 Takamitsu Nakano,11 Carine Beysen,12 Marc K. Hellerstein,12,13 Lars Berglund,6,14 and Peter J. Havel1,2

1Department of Molecular Biosciences, School of Veterinary Medicine, and 2Department of Nutrition, UCD, Davis, California, USA. 3College of Osteopathic Medicine, Touro University, Vallejo, California, USA. 4UCSF, San Francisco, California, USA. 5United States Department of Agriculture, Western Human Nutrition Research Center, Davis, California, USA. 6Department of Internal Medicine and 7Department of Pediatrics, School of Medicine, UCD, Sacramento, California, USA. 8Department of Radiology, UCD Medical Center, Sacramento, California, USA. 9Children’s Hospital Oakland Research Institute, Oakland, California, USA. 10Lipid Metabolism Laboratory, Jean Mayer United States Department of Agriculture Human Nutrition Research Center on Aging at Tufts University, and Tufts University School of Medicine, Boston, Massachusetts, USA. 11Diagnostic Division, Otsuka Pharmaceutical Co., Tokyo, Japan. 12KineMed, Emeryville, California, USA. 13Nutritional Sciences and Toxicology, University of California, Berkeley, California, USA. 14Veterans Affairs Northern California Health Care System, Sacramento, California, USA.
Metabolic effects of dietary fructose

- **Metabolic effects of dietary fructose.**
  - Hallfrisch J.
  - Gerontology Research Center, National Institute on Aging, Baltimore, Maryland 21224.
  - **Abstract**
  - Fructose, a naturally occurring hexose, is a component of many fruits, vegetables, and sweeteners. Because of the introduction of high fructose corn sweeteners in 1967, the amount of free fructose in the diet of Americans has increased substantially in the last 20 years. Fructose is sweeter, more soluble, and less glucogenic than glucose or sucrose, so it has been recommended as a replacement for these sugars in the diets of diabetic and obese people. Although an acute dose of fructose causes smaller increases in glucose and insulin than a comparable dose of glucose, there are a number of changes after dietary adaptation that may reduce its desirability as a sugar replacement in certain segments of the population. Fructose is absorbed primarily in the jejunum and metabolized in the liver. When consumed in excess of dietary glucose, it may be malabsorbed. **Fructose is more lipogenic than glucose or starches, and usually causes greater elevations in triglycerides and sometimes in cholesterol than other carbohydrates.** Dietary fructose has resulted in increases in blood pressure, uric acid, and lactic acid. People who are hypertensive, hyperinsulinemic, hypertriglyceridemic, non-insulin-dependent diabetic, or postmenopausal are more susceptible to these adverse effects of dietary fructose than healthy young subjects. Although consumption of fructose as a component of fruits and vegetables is an unavoidable consequence of eating a healthy diet, added fructose seems to provide little advantage over other caloric sweeteners and compares unfavorably to complex carbohydrates in susceptible segments of the population.

- PMID: 2189777 [
Say No To Fructose!

• Xymogen does!
  – Fructose has been removed from the entire Xymogen product line

• Be wary of other manufacturers who claim that crystalline fructose is safer (less toxic?) than high-fructose corn syrup… *IT IS NOT (Crystalline Fructose = HFCS)*

• Some manufacturers have simply renamed HFCS to Corn Syrup!
Functional Medicine Triad™

Gastrointestinal  Inflammatory

Hepatic

GHI Restoration System

A comprehensive three-tiered approach to optimizing function in organs most associated with the underlying cause of chronic illness.
What is Foundation Gut Enhancement?

“Optimal Cleansing” functional food powder targeting those patients in need of Gastrointestinal, Hepatic, and/or Anti-Inflammatory (GHI) support, in conjunction with a modified elimination diet. Designed to offer overall systemic relief from inflammatory- or allergy-mediated issues.
### OptiCleanse GHI™ Chai

**Supplement Facts**

Serving Size: 2 Scoops (58 g)
Servings Per Container: 14

<table>
<thead>
<tr>
<th>Amount Per Serving</th>
<th>Calories from Fat % Daily Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong></td>
<td>5 g</td>
</tr>
<tr>
<td>Saturated Fat</td>
<td>0 g</td>
</tr>
<tr>
<td>Trans Fat</td>
<td>0 g</td>
</tr>
<tr>
<td>Polyunsaturated Fat</td>
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<tr>
<td>Monounsaturated Fat</td>
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<tr>
<td>Cholesterol</td>
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<tr>
<td><strong>Total Carbohydrates</strong></td>
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<tr>
<td>Dietary Fiber</td>
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<tr>
<td>Soluble Fiber</td>
<td>3 g</td>
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<tr>
<td>Sugars</td>
<td>7 g</td>
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<tr>
<td>Other Carbohydrates</td>
<td>4 g</td>
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<tr>
<td><strong>Protein</strong></td>
<td>26 g</td>
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</table>

<table>
<thead>
<tr>
<th>Vitamin A (as mixed carotenoids)</th>
<th>2500 IU</th>
<th>50%</th>
<th>Iodine (as potassium iodide)</th>
<th>60 mcg</th>
<th>40%</th>
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</thead>
<tbody>
<tr>
<td>Vitamin C (as sodium ascorbate)</td>
<td>250 mg</td>
<td>417%</td>
<td>Magnesium (as di-magnesium malate)</td>
<td>140 mg</td>
<td>35%</td>
</tr>
<tr>
<td>Thiamin (as thiamin HCl)</td>
<td>15 mg</td>
<td>1000%</td>
<td>Zinc (as bis-glycinate chelate)</td>
<td>10 mg</td>
<td>67%</td>
</tr>
<tr>
<td>Riboflavin (as riboflavin 5' phosphate)</td>
<td>5 mg</td>
<td>294%</td>
<td>Selenium (as selenium glycinate complex)</td>
<td>100 mcg</td>
<td>143%</td>
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<tr>
<td>Niacin (as niacinamide and niacin)</td>
<td>40 mg</td>
<td>200%</td>
<td>Manganese</td>
<td>2 mg</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin B6 (as pyridoxal 5’ phosphate)</td>
<td>5 mg</td>
<td>250%</td>
<td>Chromium</td>
<td>60 mcg</td>
<td>50%</td>
</tr>
<tr>
<td>Folic Acid (as folic acid and calcium folinate)</td>
<td>400 mcg</td>
<td>100%</td>
<td>(as chromium nicotinate-glycinate chelate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin B12 (as methylcobalamin)</td>
<td>50 mcg</td>
<td>833%</td>
<td>Molybdenum (as molybdenum bis-glycinate chelate)</td>
<td>35 mcg</td>
<td>47%</td>
</tr>
<tr>
<td>Biotin</td>
<td>150 mcg</td>
<td>50%</td>
<td>Sodium</td>
<td>230 mg</td>
<td>10%</td>
</tr>
<tr>
<td>Pantothenic Acid (as d-calcium pantothenate)</td>
<td>35 mg</td>
<td>350%</td>
<td>Potassium</td>
<td>330 mg</td>
<td>10%</td>
</tr>
<tr>
<td>Calcium (as di-calcium malate)</td>
<td>200 mg</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorus (as potassium phosphate)</td>
<td>125 mg</td>
<td>12%</td>
<td></td>
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</tbody>
</table>

**MeadowPure™ (XYMOGEN™’s Proprietary Blend of Rice Protein Concentrate and Pea Protein Isolate plus Aminogen® L-Glutamine, Glycine, and Taurine), Evaporated Cane Juice, Brown Rice Syrup Solids, Sunflower Oil, Natural Flavors, Maltodextrin, Canola Oil, Inulin Fiber (Chicory), Sodium Chloride, Xanthan Gum, Guar Gum, Carrageenan, Potassium Citrate, Sodium Citrate, Stevia Leaf Extract.**

*Percent Daily Values are based on a 2,000 calorie diet.** Daily Value not established.
The OptiCleanse GHI™ Advantage

TASTE!

• “Nothing ventured – nothing gained”
  (No benefit unless consumed!)

• Your patients will love the taste of the NEW, IMPROVED OptiCleanse GHI!

• Available in Chocolate, Vanilla, Chai
Foundation Gut Enhancement

26g Protein/Serving

• Phase 1 & Phase 2 are nutrient dependent. Protein is vital for proper Detoxification.

• NEW, IMPROVED OptiCleanse GHI contains almost DOUBLE the amount of protein as its top competitor (15g/serving)
More Protein!
26g vs. 15g
Very Important For High AM Cortisol!
“The best known action of cortisol is to increase the blood glucose supply for tissues, mainly the brain and heart. Cortisol exerts this action by promoting catabolism of tissues (GI, Bone & Immune Cells) and by stimulating the conversion of resultant amino acids to glucose. (Gluconeogenesis) It is for this role that cortisol and similar steroids are called glucocorticoids”

Physiology Textbook; Harper Collins. 1998 p. 121
New OptiCleanse GHI Amino Acid Profile

26 grams Per Serving OPC GHI
Glycine 1,052mg
Alanine 1,054mg
Valine 1,300mg
Leucine 2,138mg
IsoLeucine 1,082mg
Serine 1,442mg
Threonine 1,009mg
Tyrosine 955mg
Aspartic Acid 3,062mg
Phenylalanine 1,343mg
Tryptophan 196mg
Proline 1,086mg
Methionine 272mg
Cystine 253mg
Lysine 1,954mg
Histidine 620mg
Arginine 2,163mg
Glutamine 5,007mg
Taurine 500 mg

Foundation Gut Enhancement Vegan!
The Foundation Gut Enhancement

**VegaPRO™**

- Proprietary blend: Rice Protein Concentrate, non-GMO Pea Protein Isolate, Aminogen®, L-Glutamine, Glycine, and Taurine.

- Pea protein features:
  - Naturally obtained by water extraction, maintaining nutrients.
  - Excellent digestibility score (98%)
  - Well-balanced amino-acid profile, high lysine and arginine

- The combination of rice protein and pea protein achieves an Amino Acid Score of 100% (Higher AA profile than any other Detox shake mixes)

- Aminogen® - enhances amino acid uptake
Foundation Gut Enhancement

VegaPRO™

• **Glutamine**, replenishes AAs post exercise/stress. Preserves gut barrier function/intestinal health.

• **Glycine**, constituent of collagen; building block for CoA, nucleic acids, creatine phosphate, purines, bile & other amino acids (anxiety, sleep, detox).

• **Taurine** supports stabilization of cell membranes, cardiovascular health, GT, detoxification, and bile salt synthesis (detox, arrhythmia, seizures).
Foundation Gut Enhancement

Soy Free
Gluten Free
Dairy Free
Lactose Free
Casein Free
Fructose Free
Fructose Free

- Fructose is metabolized by the liver; glucose is absorbed directly into every cell.
  - Studies demonstrate fructose consumption increases triglycerides and may lead to fatty liver.
  - Rats fed water + HFCS gained more wt than rats fed water + sucrose & showed characteristics of Metabolic Syndrome (2 experiments @ Princeton Univ)  
  1. Jour Pharm, Biochem & Behav Feb 26, 2010
The Foundation Gut Enhancement

Activated B Vitamins

Albion® TRAACS Minerals

- Highly available, readily absorbed for quick energy, healthy cognition, anti-stress
- Reduced competition for absorption when consumed with other minerals or foods.
The Foundation Gut Enhancement

Preventium®

- Patented Potassium Hydrogen Glucarate –
  - Supports Glucuronidation
  - Aids in the healthy metabolism of estrogens and toxins
Foundation Gut Enhancement

MeadowPure™

- Organic flaxseed complex (5 g/serving)
- Patented quality selection and processing technology
- Naturally stable under wide variety of conditions for up to two years
- Delivers full nutritional value of flaxseed
- Excellent source of ALA omega 3
- Source of lignin – increases SHBG
Effect of flaxseed consumption on urinary estrogen metabolites in postmenopausal women.

Haggans CJ, Hutchins AM, Olson BA, Thomas W, Martini MC, Slavin JL. Department of Food Science and Nutrition, University of Minnesota, St. Paul 55108, USA.

Flaxseed, the richest known source of plant lignans, has been shown to have chemoprotective effects in animal and cell studies. Some of its effects may be mediated through its influence on endogenous hormone production and metabolism. Two competing pathways in estrogen metabolism involve production of the 2-hydroxylated and 16 alpha-hydroxylated metabolites. Because of the proposed differences in biological activity of these compounds, the balance of the two pathways has been used as a biomarker for breast cancer risk. We examined the effects of flaxseed consumption on urinary estrogen metabolite excretion in postmenopausal women. Twenty-eight postmenopausal women were studied for three seven-week feeding periods in a randomized crossover design. During the feeding periods, subjects consumed their usual diets plus ground flaxseed (0, 5, or 10 g/day). Urinary excretion of the estrogen metabolites 2-hydroxyestrogen (2-OHEstrogen) and 16 alpha-hydroxyestrone (16 alpha-OHE1) as well as their ratio, 2/16 alpha-OHE1, was measured by enzyme immunoassay. Flaxseed supplementation significantly increased urinary 2-OHEstrogen excretion (p < 0.0005) and the urinary 2/16 alpha-OHE1 ratio (p < 0.05) in a linear, dose-response fashion. There were no significant differences in urinary 16 alpha-OHE1 excretion. These results suggest that flaxseed may have chemoprotective effects in postmenopausal women.
Gastrointestinal
- Glutamine
- Quercetin
- Aminogen
- LignaMax

**Glutamine** acts as preferred fuel source for GI mucosal Cells

**Quercetin** has demonstrative gastroprotective effects for GI lesions

Patented **Aminogen®** demonstrated to increase amino acid uptake by over 60% and help aid in protein digestion

Patented **MeadowPure™** is high quality source of soluble fiber to aid in transit time, and reduction of excessive circulating estrogens
Foundation Gut Enhancement

**Glutamine**

- ~ 5g per scoop
- Clinical trials demonstrate trophic and cytoprotective effects of glutamine in small bowel and colonic mucosal cells.\(^1\)
- Glutamine decreases the permeability changes caused by NSAID-dosing.\(^2\)

\(^1\) Curr Opin Clin Nutr Metab Care 2000 Sep;3(5):355-62
\(^2\) Aliment Pharmacol Ther 1999 May;13(5):679-85
The Foundation Gut Enhancement
Phase 1 & Phase 2 Modulators

- Similar nutrients and herbs contained in MedCaps DPO
  - no extra capsules to consume!
- Ellagic Acid (glutathione conjugation)
- Sodium sulfate (sulfation)
- N-Acetylcysteine (glutathione conjugation)
- Preventium – potassium d-glucarate (glucuronidation)
- Watercress
- Taurine and Glycine (AA Conjugation)
- Vit B12, B6, Folate and TMG (Methylation)
**Hepatic**

- Ellagic Acid
- Watercress
- NAC
- Sodium Sulfate
- Preventium™
- Glycine
- Lipoic Acid

**Ellagic acid** is a bifunctional modulator that promotes balanced detoxification by several mechanisms.

**Watercress** is an exceptionally rich dietary source of B-phenylethyl isothiocyanate (PEITC). This compound acts as a bifunctional modulator.

**NAC** is used to increase intracellular glutathione levels and aids in sulfation.

**Sodium Sulfate** is used to enhance sulfate conjugation, a major phase II liver pathway for the biotransformation of phenolic drugs in humans and many animal species.

**Preventium™** (potassium d glucarate) is used to enhance glucuronidation a major phase II liver pathway and to inhibit beta-glucuronidase.

**Glycine** is present to enhance glycine conjugation, a major phase II liver pathway.

**Alpha Lipoic Acid** acts as a major antioxidant and hepatoprotectant. ALA has been shown to enhance glutathione synthesis.
Reactive Oxygen Intermediates

Secondary tissue damage

intermediary metabolites

more polar
more water-soluble

Nutrient/Plant Derivatives
Antioxidant/Protective

carotenoids (vit. A)
ascorbic acid (vit. C)
tocopherols (vit. E)
selenium
copper
zinc
manganese
coenzyme Q10
thiols (found in garlic, onions, & cruciferous vegetables)
bioflavonoids
silymarin
pycnogenol
green tea catechins

Phase II [conjugation pathways]

♦ sulfation
♦ glucuronidation
♦ glutathione conjugation
♦ acetylation
♦ amino acid conjugation
glycine
taurine
 glutamine
 ornithine
 arginine
♦ methylation

*N-acetyl cysteine, cysteine, methionine are precursors

Nutrient/Plant Derivatives
Antioxidant/Protective

carotenoids (vit. A)
ascorbic acid (vit. C)
tocopherols (vit. E)
selenium
copper
zinc
manganese
coenzyme Q10
thiols (found in garlic, onions, & cruciferous vegetables)
bioflavonoids
silymarin
pycnogenol
green tea catechins

excretory derivatives

polar water-soluble

Phase II
Liver
Detoxification
Pathways
&
Supportive
Nutrients

Serum
Kidneys
Urine
Bile
Feces/stools

Secondary tissue damage
Foundation Gut Enhancement

Anti-Inflammatory Herbs

• Efficacious quantities of
  – Curcumin (200 mg)
  – Ginger Root powder (150 mg)
  – Bioflavonoids
    • Lemon Bioflavonoids (250 mg)
    • Quercitin (250 mg)
    • Rutin (200 mg)
Botanical Modulation of Arachidonic Acid Cascade

Cell Membrane

Glycyrrhiza glabra
Quercetin
Curcumin
Ginger
Curcumin
Quercetin
Ananas Comosus (?)
Salix nigra
Gaultheria procumbens

Arachidonic Acid (AA)

Phospholipase A2

Cyclooxygenase
Lipoxygenase

Prostaglandins Series 2
Thromboxane A2
Leukotrienes

Potentiates cortisol: Glycyrrhiza glabra

Allium cepa
Allium sativum
Boswellia serrata
(specific for 5-lipoxygenase)
**Inflammatory**
- Curcumin
- Ginger
- Rutin
- Hesperidin
- Niacinamide

**Curcumin** has been shown to reduce the production of pro inflammatory cytokines; TNF $\alpha$ and NF kappa $\beta$.

**Ginger** has demonstrative gastroprotective effects for GI lesions.

**Rutin** has demonstrated an enhanced effect at inhibiting PLA 2 (phospholipase A2).

**Hesperidin**, a potent flavonone, has been shown to have strong inhibition against production of key inflammatory prostaglandins.

**Niacinamide** is a potent immunomodulator and has strong anti inflammatory qualities thru PARP inhibition.
OptiCleanse GHI Advantages

- GHI Contains 26 grams of VegaPro™ non GMO, water extracted, hypoallergenic pea/rice protein
- GHI contains Aminogen® proteolytic enzymes proven to increase protein utilization
- GHI contains only Albion® Chelates
- GHI contains Activated B Vitamins
- GHI contains 5 grams of Glutamine & 4520 mg of Branched Chained amino acids per serving
- GHI Contains Preventium® 250 mgs potassium d glucarate per serving
- GHI contains 5 grams of MeadowPure™ organic stabilized flax powder per serving
- GHI contains Dual Phase Optimizers – Watercress & Ellagic Acid
- GHI is Fructose Free and Suitable for Vegans

GHI TASTES GREAT! (No, Really it does)
<table>
<thead>
<tr>
<th>Formula</th>
<th>OPC GHI™</th>
<th>Ultra InflamX™</th>
<th>Ultra Clear™</th>
<th>Medi Clear™</th>
<th>Medi Clear Plus™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pro/svg</td>
<td>26g</td>
<td>15g</td>
<td>15g</td>
<td>29g</td>
<td>29g</td>
</tr>
<tr>
<td>Aminogen®</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Protein source</td>
<td>VegaPRO</td>
<td>Rice Protein Conc.</td>
<td>Rice Protein Conc.</td>
<td>Rice Protein Conc.</td>
<td>Rice Protein Conc.</td>
</tr>
<tr>
<td>Ph 1 &amp; 2 Modulators</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Vegan</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Fructose</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>NO (molasses and Lo Han)</td>
</tr>
<tr>
<td>Preventium®</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>MeadowPure™</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>
Case Study

• 35 y.o. female—Ulcerative Colitis
• --loss of bowel continence
• --unable to do ADL
• --not able to d/c prednisone
Initial Treatment Plan

• Elimination diet
• OptiCleanse GHI
<table>
<thead>
<tr>
<th>Predominant Bacteria</th>
<th>Units and Reference Ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organisms are detected by DNA analysis.</td>
</tr>
<tr>
<td></td>
<td>One colony forming unit (CFU) is equivalent to one bacteria. Each genome detected represents one cell, or one CFU. Results are expressed in scientific notation, so an organism reported as 2.5E7 CFU/gram is read as 25 million colony forming units per gram of feces. The cutoff for significance of Opportunistic Bacteria has been set at 1.0E+005 (100,000). These are levels above which clinically significant growth may be present. Rather than reporting semi-quantitative +1 to +4 levels, the new methodology provides full quantitative analysis.</td>
</tr>
<tr>
<td>Obligate anaerobes</td>
<td><strong>Prevalent Bacteria</strong> play major roles in health. They provide colonization resistance against potentially pathogenic organisms, aid in digestion and absorption, produce vitamins and SCFAs, and stimulate the GI immune system. DNA probes allow detection of multiple species (up) within a genus, so the genera that are reported cover many species.</td>
</tr>
<tr>
<td>Bacteroides sp.</td>
<td>Opportunistic Bacteria may cause symptoms and be associated with disease. They can affect digestion and absorption, nutrient production, pH and immune state. Antibiotic sensitivity tests will be performed on all opportunistic bacteria found, although clinical history is usually considered to determine treatment since the organisms are not generally considered to be pathogenic.</td>
</tr>
<tr>
<td>Clostridia sp.</td>
<td><strong>Taxonomy Unavailable</strong></td>
</tr>
<tr>
<td>Prevotella sp.</td>
<td>GfX will detect DNA from all commonly reported organisms in microscopic parasitology. In addition, any DNA present from yeasts/fungi or protozoa will also be detected. These are reported as positive, taxonomy unavailable.</td>
</tr>
<tr>
<td>Fusobacteria sp.</td>
<td></td>
</tr>
<tr>
<td>Streptococyes sp.</td>
<td></td>
</tr>
<tr>
<td>Mycoplasma sp.</td>
<td></td>
</tr>
<tr>
<td>Facultative anaerobes</td>
<td></td>
</tr>
<tr>
<td>Lactobacillus sp.</td>
<td></td>
</tr>
<tr>
<td>Bifidobacter sp.</td>
<td></td>
</tr>
<tr>
<td>Obligate aerobes</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td></td>
</tr>
</tbody>
</table>

### 2100 Gastrointestinal Function Profile

**Percentile Ranking by Quintile**

<table>
<thead>
<tr>
<th>Results CFU/gram</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
<th>Range (E+07)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Accession Number:**
**Reference Number:**
**Patient:**
**Age:** 35  **Sex:** Female
**Date of Birth:**
**Date Collected:** 10/9/08  
**Date Received:** 10/15/08  
**Report Date:** 10/27/08
**Telephone:**
**Fax:**
**Referred:**
**Comment:**

---

**Methodology:** DNA Analysis, GC/MS. Microscopic, Colorimetric, Automated Chemistry, ELISA

---

**Ordering Physician:**
Progressive Medical Centers
4646 N. Shallowford
Suite 100
Atlanta, GA 30338
2100 Gastrointestinal Function Profile

Percentile Ranking by Quintile

| Results | Reference Range |
|---------|-----------------
| CFU/gram | (E+007)         |

<table>
<thead>
<tr>
<th>Predominant Bacteria</th>
<th>(E+007)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Obligate anaerobes</strong></td>
<td></td>
</tr>
<tr>
<td>Bacteroides sp.</td>
<td>2.8</td>
</tr>
<tr>
<td>Clostridia sp.</td>
<td>2.1</td>
</tr>
<tr>
<td>Prevotella sp.</td>
<td>1.8</td>
</tr>
<tr>
<td>Fusobacteria sp.</td>
<td>2.6</td>
</tr>
<tr>
<td>Streptomyces sp.</td>
<td>2.1</td>
</tr>
<tr>
<td>Mycoplasma sp.</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Facultative anaerobes</strong></td>
<td></td>
</tr>
<tr>
<td>Lactobacillus sp.</td>
<td>2.3</td>
</tr>
<tr>
<td>Bifidobacter sp.</td>
<td>2.6</td>
</tr>
<tr>
<td><strong>Obligate aerobes</strong></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>2.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunistic Bacteria</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No clinically significant amounts.</td>
<td></td>
</tr>
</tbody>
</table>
## 2100 Gastrointestinal Function Profile

### Pathogenic Bacteria

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>CFU/gram</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helicobacter pylori</td>
<td>&lt;0.01</td>
<td>&lt;=1.0E+003</td>
</tr>
<tr>
<td>Clostridium difficile</td>
<td>&lt;0.01</td>
<td>&lt;=1.0E+003</td>
</tr>
<tr>
<td>Campylobacter sp.</td>
<td>&lt;0.01</td>
<td>&lt;=1.0E+003</td>
</tr>
<tr>
<td>E. H. E. coli</td>
<td>&lt;0.01</td>
<td>&lt;=1.0E+003</td>
</tr>
</tbody>
</table>

### Yeast/Fungi

No clinically significant amounts.

### Parasites

No Ova or Parasites

### Adiposity Index

<table>
<thead>
<tr>
<th>Phylum</th>
<th>%</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmicutes</td>
<td>66</td>
<td>&lt;= 80</td>
</tr>
<tr>
<td>Bacteroidetes</td>
<td>34</td>
<td>&gt;= 20</td>
</tr>
</tbody>
</table>

### Drug Resistance Genes

<table>
<thead>
<tr>
<th>Gene</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>aacA, aphD</td>
<td>Neg</td>
</tr>
<tr>
<td>mecA</td>
<td>Neg</td>
</tr>
<tr>
<td>vanA, B, and C</td>
<td>Neg</td>
</tr>
<tr>
<td>gyrB, ParE</td>
<td>Neg</td>
</tr>
<tr>
<td>PBP1a, 2B</td>
<td>Neg</td>
</tr>
</tbody>
</table>
**2100 Gastrointestinal Function Profile**

### Beneficial SCFA

- **Total SCFA**
  - Percentile: 56%
  - Value: 56 mM/g
  - Reference Range: >= 40 mM/g

- **n-Butyrate**
  - Percentile: 54%
  - Value: 8.0 mM/g
  - Reference Range: >= 4.5 mM/g

- **Acetate %**
  - Percentile: 68%
  - Value: 11%
  - Reference Range: 50 - 73%

- **Butyrate %**
  - Percentile: 10%
  - Value: 24%
  - Reference Range: 9 - 29%

- **Propionate %**
  - Percentile: 20%
  - Value: 24%
  - Reference Range: 12 - 28%

- **Valerate %**
  - Percentile: 1.5%
  - Value: 3.9%
  - Reference Range: 0.8 - 8.7%

### Inflammation

- **Lactoferrin**
  - Percentile: 1.0%
  - Value: 2.7 ug/mL
  - Reference Range: <= 6.1 ug/mL

- **WBCs**
  - Value: Neg

- **Mucus**
  - Value: Neg

### Immunology

- **Fecal sIgA**
  - Percentile: 79%
  - Value: 29 mg/dL
  - Reference Range: 16 - 136 mg/dL

- **Anti-gliadin sIgA**
  - Value: <1
  - Reference Range: <= 12.3 mg/dL
2100 Gastrointestinal Function Profile

### Percentile Ranking by Quintile

<table>
<thead>
<tr>
<th>Results</th>
<th>1st 20%</th>
<th>2nd 40%</th>
<th>3rd 60%</th>
<th>4th 80%</th>
<th>5th 80%</th>
<th>Reference Range</th>
</tr>
</thead>
</table>

### Additional Tests
- **pH**: 6.6
- Occult blood: Neg
- RBCs: Neg
- Color: Brown

### Digestion
- **Elastase 1**: 242 L
- Triglycerides: 227
- Putrefactive SCFA: 1.4
- Vegetable Fibers: Rare

### Absorption
- **LCFAs**: <0.25 L
- Total Fat: UC*
- Cholesterol: 37

---

* UC* represents the upper limit of the reference range.
2100 Gastrointestinal Function Profile

Methodology: DNA Analysis, SCFAs, Microscopic, Colorimetric, Automated Chemistry, ELISA

Consistency = Loose

<table>
<thead>
<tr>
<th>Percentile Ranking by Quintile</th>
<th>Results CFU/gram</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>90% Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predominant Bacteria</td>
<td>E+007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obligate anerobes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacteroides sp.</td>
<td>2.7</td>
<td>1.6</td>
<td>1.5</td>
<td>1.6</td>
<td>1.5</td>
<td>6.7</td>
<td>&gt;= 1.3</td>
</tr>
<tr>
<td>Clostridia sp.</td>
<td>2.5</td>
<td>2.6</td>
<td>3.2</td>
<td>3.2</td>
<td>1.6</td>
<td>6.2</td>
<td>&gt;= 1.0</td>
</tr>
<tr>
<td>Prevotella sp.</td>
<td>3.2</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>1.6</td>
<td>6.2</td>
<td>&gt;= 1.1</td>
</tr>
<tr>
<td>Fusobacteria sp.</td>
<td>2.6</td>
<td>1.5</td>
<td>1.8</td>
<td>1.8</td>
<td>1.5</td>
<td>6.2</td>
<td>&gt;= 1.1</td>
</tr>
<tr>
<td>Streptomyces sp.</td>
<td>4.1</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>6.2</td>
<td>&gt;= 1.2</td>
</tr>
<tr>
<td>Mycoplasma sp.</td>
<td>4.3</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>2.3</td>
<td>6.2</td>
<td>&gt;= 1.2</td>
</tr>
<tr>
<td>Facultative anerobes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactobacillus sp.</td>
<td>7.0</td>
<td>1.6</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
<td>7.8</td>
<td>&gt;= 1.2</td>
</tr>
<tr>
<td>Bifidobacter sp.</td>
<td>2.5</td>
<td>2.3</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
<td>7.8</td>
<td>&gt;= 1.8</td>
</tr>
<tr>
<td>Obligate aerobes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>4.1</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>7.7</td>
<td>&gt;= 1.1</td>
</tr>
<tr>
<td>Opportunistic Bacteria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
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- Predominant Bacteria play major roles in health. They provide colonization resistance against potentially pathogenic organisms, aid in digestion and absorption, produce vitamins and SCFAs, and stimulate the GI immune system. DNA probes allow detection of multiple species (sp.) within a genus, so the genera that are reported cover many species.

- Opportunistic Bacteria may cause symptoms and be associated with disease. They can affect digestion and absorption, nutrient production, pH and immune state. Antibiotic sensitivity tests will be performed on all opportunistic bacteria found, although clinical history is usually considered to determine treatment since the organisms are not generally considered to be pathogens.

These test results are not for the diagnosis of disease. They are intended to provide nutritional guidelines to qualified healthcare professionals with full knowledge of patient history and concerns to assist in their design of an appropriate healthcare program.

Accession Number: 36
Reference Number: 4/3/09
Sex: Female
Age: 36
Date of Birth: 3/13/09
Date Collected: 3/18/09
Date Received: 4/3/09
Report Date: 4/3/09
Telephone: 770.448.5483
Fax: 770.441.2237

Progressive Medical Centers
4646 N. Shallowford
Atlanta, GA 30338

Georgia Lab Lic. Code 4987-007
CLIA E91-150825349
New York Clinical Lab P13-0078
Florida Clinical Lab Lic. 800006/14

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2100 Gastrointestinal Function Profile

Percentile Ranking by Quintile

Results | 1st | 2nd | 3rd | 4th | 5th | 95% Reference Range
--- | --- | --- | --- | --- | --- | ---

Beneficial SCFA

- Total SCFA: 94
- n-Butyrate: 22.6

Inflammation

- Lactoferrin: 2.5
- WBCs: Neg
- Mucus: Neg

Immunology

- Fecal IgA: 64
- Anti-gliadin IgA: 1.5
- Anti-gliadin IgG: 42

Total SCFA: 94

n-Butyrate: 22.6

Acetate %: 62

Butyrate %: 24

Propionate %: 13

Valerate %: 1.6

Lactoferrin: 2.5

WBCs: Neg

Mucus: Neg

Fecal IgA: 64

Anti-gliadin IgA: 1.5

Anti-gliadin IgG: 42
<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>1st (20%)</th>
<th>2nd (40%)</th>
<th>3rd (60%)</th>
<th>4th (80%)</th>
<th>5th</th>
<th>Reference Range</th>
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<tr>
<td>pH</td>
<td>6.0</td>
<td>5.9</td>
<td></td>
<td></td>
<td>6.9</td>
<td></td>
<td>5.7 - 7.1</td>
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<tr>
<td>Occult blood</td>
<td>Neg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Neg</td>
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<tr>
<td>RBCs</td>
<td>Neg</td>
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<tr>
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<td>Elastase 1</td>
<td>188</td>
<td>376</td>
<td></td>
<td></td>
<td></td>
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<td>&gt;= 211 ug/mL</td>
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<tr>
<td>Triglycerides</td>
<td>32</td>
<td></td>
<td>247</td>
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<td></td>
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<td>&lt;= 365 mg/dL</td>
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<td>Putrefactive SCFA</td>
<td>1.5</td>
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<td></td>
<td>4.2</td>
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<td>&lt;= 6.0 mM/g</td>
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<tr>
<td>Vegetable Fibers</td>
<td>Rare</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None-Few</td>
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<tr>
<td>LCFAs</td>
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<td>10.1</td>
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<td>Cholesterol</td>
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<td>98</td>
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<td>&lt;= 154 mg/dL</td>
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</table>

UC** = Unable to Calculate
Follow-up

• Able to D/C Prednisone
• Gained Weight
• Had a period

• “You are amazing! A miracle worker! In one day I felt better! Cried on my way to work because my stomach didn’t hurt. Still not on prednisone.”

• Two years later: Just had her first child and is healthy
Why it matters

• The science supports it
• Its treatable
• It allows us to engage not only in treatment but prevention
• The market dictates it
• Patients are encouraged and required to engage in their health
• Wholesome patient first profit center