CROHN’S DISEASE & THE PALEO DIET

LOREN CORDAIN, PH.D.
CROHN’S DISEASE

Q: Can you comment on any reported results in curbing the symptoms of Crohn’s Disease with the Paleo Diet. As I am a sufferer, I would love to know.

Thank you,
Shannon

A: Dear Shannon,

Indeed, inflammatory bowel disease (Ulcerative Colitis & Crohn’s Disease) patients usually do very well with The Paleo Diet, as nutrients are one of the main environmental triggers of this condition. Crohn’s disease is an autoimmune disease where the immune system mounts an attack against its own tissues - in this case the cells lining the intestine.

For an autoimmune disease to occur we need a genetic predisposition and an environmental trigger. The genetic predisposition depends on genes coding for the Human Leukocyte Antigen (HLA) system. One of the environmental triggers may be nutrition, besides infections, geography (vitamin D deficiency), physical trauma or vaccination.

One of the key points in this process is increased intestinal permeability. This means that the gut barrier allows increased passage of bacterial or food proteins (antigens) into peripheral circulation, skipping a process known as oral tolerance. Once antigens come in contact with the immune system located in the gut associated lymphoid tissue, they may elicit a T-cell mediated immune response against those antigens.

If the molecular structure of the dietary or bacterial antigens is similar to that of the HLA system (part of the immune system representing cellular mechanisms), chances are that a cross reaction between foreign antigens and self antigens (produced by T-cells) occur. This is termed molecular mimicry, and leads to self injury by the adaptive immune system.

Hence, decreasing intestinal permeability is one of the treatment targets. There are several nutrients known to increase intestinal permeability that you may want to avoid, at least until symptoms subside. Here is a list, with the noxious substances in parentheses:

• Cereal grains (lectins and gliadin)
• Legumes, including soya and peanuts (lectins and saponins)
• Tomato (tomato lectin and alpha-tomatin)
• Potato (lectins and saponins)
• Chili (capsaicin)
• Quillaja (foaming substance)
• Quinoa (saponins)
• Egg white (lysozyme)
• Alfalfa sprouts (saponins)
• Amaranth (saponins)
• Alcohol

Moreover, some nutrients exert an adjuvant-like activity (they stimulate the immune system), which is something you don’t want to if you are suffering from an autoimmune disease. Nutrients containing adjuvants:

• Quillaja extract, found in root beer
• Tomato alpha-tomatine

Dairy products and vegetable oils also have deleterious effects upon your immune system. I hope this helps.

Maelán Fontes, MS Ph.D.
**LICHEN SCLEROSIS**

Q: Hi there - I have been following a Paleo Diet for a few weeks now and there is no doubt that I feel much better for it. I did not need to lose weight and I always regarded myself as pretty fit and healthy. However, a little while back I developed a troublesome skin condition called Lichen Sclerosis. Have you ever been asked about this condition and suggested dietary changes? I think part of the problem is that the etiology is not fully understood but many doctors seem to think it has an autoimmune component though I have read recent research that suggests oxidative damage plays a part and that antioxidant therapy may be useful in treatment. This condition is supposedly incurable (though manageable with potent steroids) but I'm sure it would give a great many people some comfort if simple dietary changes could help. Would be really great to hear your thoughts.

Simon

A: Dear Simon,

The available evidence indicates that an autoimmune component likely occurs with Lichen Sclerosis (LS). With all autoimmune diseases, an autoantigen (self protein) exists and represents the target protein being attacked by the immune system. About 75% of LS patients maintain an IgG autoantibody to Extra Cellular Matrix Protein 1 (ECM1).1 Acceleration of ECM1 deposition in dermal (skin) blood vessels may underlie the disease symptoms.2, 3 So the question now arises, what causes an accelerated deposition of ECM1 in dermal blood vessels in LS patients? The available evidence indicates that increased concentrations of a ubiquitous enzyme in the body called tissue transglutaminase (TG2) is primarily responsible for excessive ECM1 accumulation3. In medical terms, an increase in a concentration of a substance in the bloodstream by another substance is called “upregulation”.

So, in LS patients, an upregulation of TG2 causes an upregulation and increased deposition of ECM1 in the skin blood vessels in the affected area of the body. The next question to be posed is, what event or events trigger an upregulation of TG2? When we answer this question, then dietary recommendations advocated by the Paleo Diet will make sense. A storage protein called gliadin which is found in wheat, rye, barley and oats is known to upregulate TG2.4-7 Hence grain free diets may prove to be therapeutic for LS patients, although no current randomized controlled trials of this intervention strategy have yet been conducted.

Cordially,

*Loren Cordain, Ph.D., Professor Emeritus*

For sources see References: Section I

**STEVIA**

Q: Is Stevia Paleo? I have attempted to find an answer for this and the information I’ve found is conflicting at best. Please advise!!

Jeff

A: Dear Jeff,

There’s some scientific evidence to support the notion that Stevia is safe, even in type 2 diabetes patients.1,2 Furthermore, it has been demonstrated to have antihypertensive properties, as shown by Chan et al.3 and a long-term study.4 Having said this, I am not aware of any study examining the potential antinutrient (lectins or saponins) content of the plant, hence we do not know the possible adverse effect of consuming this plant on a daily basis. Hunter-gatherers
used to consume a wide range of plants, thereby minimizing the amount of a single bioactive compound ingested and its toxicity. It is known that rotating the kind of plants consumed is a good strategy in order to decrease food allergy and intolerance.

From an evolutionary standpoint, we should look at nutrition as “whole food” rather than nutrients per se. The bottom line is that Stevia seems to be safe, but we need more research to rule out possible side effects.

I hope this is helpful,

Maelán Fontes, MS Ph.D.

For sources see References: Section II

CHIA SEEDS

Loren Cordain, Ph.D., Professor Emeritus

Q: Are there any negative effects associated with chia seeds which would make them inappropriate in The Paleo Diet?

Thank you.

A: Good question. I would imagine that many of our readers have never even heard of chia seeds much less eaten them. Chia seeds (Salvia hispanica L.) are a member of the Labiatae plant family and are native to southern Mexico and northern Guatemala. The seeds are small, oval shaped; either black or white colored and resemble sesame seeds. These seeds were cultivated as a food crop for thousands of years in this region by the Aztecs and other native cultures. Chia seeds can be consumed in a variety of ways including roasting and grinding the seeds into a flour known as Chianpinolli which can then become incorporated into tortillas, tamales, and various beverages. The roasted ground seeds were traditionally consumed as a semi-fluid mucilaginous gruel (Pinole) when water is added to the flour. In post-Columbian times the most popular

Table 1. Nutrient profile for chia seeds (Salvia hispanica L.), 100 gram portion.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Amount</th>
<th>%DRI</th>
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<tbody>
<tr>
<td>Kilocalories</td>
<td>490</td>
<td>25</td>
</tr>
<tr>
<td>Protein</td>
<td>15.6 g</td>
<td>31</td>
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<tr>
<td>Carbohydrate</td>
<td>43.9 g</td>
<td>15</td>
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<tr>
<td>Fat</td>
<td>30.8 g</td>
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<tr>
<td>Saturated Fat</td>
<td>3.2 g</td>
<td>6</td>
</tr>
<tr>
<td>Monounsaturated Fat</td>
<td>2.9 g</td>
<td>na</td>
</tr>
<tr>
<td>Polyunsaturated Fat</td>
<td>23.3 g</td>
<td>na</td>
</tr>
<tr>
<td>18:1 oleic acid</td>
<td>2.0 g</td>
<td>na</td>
</tr>
<tr>
<td>18:2n6 linoleic acid</td>
<td>5.8 g</td>
<td>na</td>
</tr>
<tr>
<td>18:3n3 alpha linolenic acid</td>
<td>17.6 g</td>
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</tr>
<tr>
<td>Fiber</td>
<td>37.7 g</td>
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</tr>
<tr>
<td>Vitamin A</td>
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<tr>
<td>Vitamin D</td>
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<td></td>
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<tr>
<td>Vitamin E</td>
<td>na</td>
<td></td>
</tr>
<tr>
<td>Vitamin K</td>
<td>na</td>
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</tr>
<tr>
<td>Vitamin B1</td>
<td>0.87 mg</td>
<td>58</td>
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<tr>
<td>Vitamin B2</td>
<td>0.17 mg</td>
<td>10</td>
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<tr>
<td>Vitamin B3</td>
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<tr>
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<td>0</td>
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<td>Folate</td>
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<td>Pantothenic acid</td>
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<tr>
<td>Biotin</td>
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<tr>
<td>Vitamin C</td>
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</tr>
<tr>
<td>Sodium</td>
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<tr>
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<tr>
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<tr>
<td>Manganese</td>
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</tr>
<tr>
<td>Zinc</td>
<td>3.5 mg</td>
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use of chia flour was to make a refreshing beverage in which the ratio of seeds to water is decreased, thereby resulting in a less gelatinous consistency to which lemon, sugar or fruit juice are added. The sticky consistency of chia seed Pinole or chia beverages comes from a clear mucilaginous, polysaccharide gel that remains tightly bound to the seeds. This sticky gel forms a physical barrier which may impair digestion and absorption of fat from the seed while also causing a low protein digestibility.

In the past 20 years a revival of interest in chia seeds has occurred primarily because of their high fat content of about 25-39% by weight, of which 50-57% is the therapeutic omega 3 fatty acid and alpha linolenic acid (ALA). In the past 10 years chia seeds have been used as a foodstuff for animals to enrich their eggs and meat with omega 3 fatty acids. So I wholeheartedly approve of feeding chia seeds to animals and then eating the omega 3 fatty acid enriched meat or eggs of these animals.

How about feeding chia seeds to humans – should we consume chia seeds because of their high omega 3 fatty acid (ALA) content? The Table below shows the entire nutrient profile of chia seeds. At least on paper, it would appear that chia seeds are a nutritious food that is not only high in ALA, but also is a good source of protein, fiber, certain B vitamins, calcium, iron and manganese.

Unfortunately, the devil is always in the details, and as is the case with many other plant seeds (e.g. cereal grains, legumes) a frequent evolutionary strategy to prevent predation by animals and microorganisms is the natural selection by the plant for toxic compounds known as antinutrients. As I previously mentioned, the thick mucilaginous gel which is tightly bound to chia seeds may impair fat absorption in animals which, along with their high fiber content, causes the available protein to be poorly absorbed. Another anti-nutrient found in chia seeds (~2,000 mg/100 g) is phytate or phytic acid, which impairs absorption of all divalent ions (calcium, iron, zinc, magnesium, manganese, etc) in a dose-dependent manner. Meaning that once in your body (in vivo), the available calcium, iron, zinc, magnesium and manganese from chia seeds are poorly absorbed, hence making chia seeds a poor dietary source for these minerals. Although Table 1 suggests that chia seeds may be good sources of vitamin B6, the bioavailability of B6 from plant foods tends to be low, whereas bioavailability of B6 from animal products is generally quite - high approaching 100%.

A number of chia seed supplementation studies in rats and experimental animals have demonstrated certain favorable health effects including improvements in blood lipids, and insulin metabolism. However, these effects could not be replicated in a recent, well controlled study in humans, who consumed 50 grams of chia seeds per day for 12 weeks. In fact, despite an increase in blood ALA concentrations, overweight men and women experienced no changes in body weight, blood pressure, blood lipids or inflammatory blood markers. A recent review of all human chia supplementation studies concluded: “There is limited evidence supporting the efficacy of Salvia hispanica for any indication; thus far, only two clinical studies have examined the effects of Salvia hispanica on cardiovascular disease (CVD) risk factors (including body weight). One study showed some effects on some CVD risk factors, while the other did not. Neither study showed any effects of Salvia hispanica on weight loss.”

One of the outcomes of the Nieman et al. study that will require further scrutiny suggests that chia seed consumption may contain one or more antinutrients which may promote chronic low level inflammation – not a good thing. If you look at the data carefully, both men and women experienced increases in a blood inflammatory marker called interleukin 6 (IL-6). After 12 weeks of eating chia seeds the men's
blood levels of IL-6 increased 10.2% and the women’s increased 10.1%. Additionally another inflammatory marker called monocyte chemotactic protein (MCP) increased 6.9% in men, and 6.1% in women. Although the authors deemed these increases to be statistically insignificant, the large standard deviations for the measurements suggest that confounding extraneous factors may have influenced the results. In support of the notion that chia seed consumption may adversely affect the immune system and promote inflammation is a rat study showing that a one-month high-chia seed diet increased blood levels of IgE by 112.8%. IgE is an immunoglobulin that is a marker for allergenic food proteins that are processed through the gut.

Just how chia seed consumption may promote chronic low-level systemic inflammation via their presence in the gastrointestinal tract is unclear. Although many species of Salvia have a high lectin content, which may adversely affect the gut by increasing intestinal permeability, Salvia hispanica or chia seeds do not contain any known lectins. Consequently, it is possible that other antinutrients found in chia seeds may adversely affect gut tissue, including saponins, which are frequently found in Salvia species, and which cause a “leaky gut”. To date, the saponin content of chia has not been measured. The thick mucilaginous gel which is tightly bound to chia seeds is a complex polysaccharide, and these types of polysaccharide gums are known to adversely alter small intestinal cell function - including increased mucosal cell production, which could increase intestinal permeability.

When the gut becomes “leaky” it is not a good thing, as the gut contents may then have access to the immune system, which in turn becomes activated, and thereby causes chronic low-level systemic inflammation. In particular, a component of the cell walls of gut gram negative bacteria called lipopolysaccharide (LPS) is highly inflammatory. Any LPS which gets past the gut barrier is immediately engulfed by two types of immune system cells (macrophages and dendritic cells). Once engulfed by these cells, LPS binds to Toll Like Receptor 4, which in turn causes an immediate immune system response including increases in blood levels of IL-6 as shown in the Nieman et al study. Until further human studies are conducted, I would be cautious in recommending chia seeds for human consumption, particularly in people with food allergies or known autoimmune diseases.

For sources see References: Section III
PRIMAL IN THE KITCHEN

PALEO TUNA NIÇOISE

4 4-oz tuna steaks
2 Tb. chopped fresh rosemary
1 garlic clove, crushed
2 Tb. red wine
2 Tb. extra virgin olive oil
4 cups mache (lamb’s lettuce)
2 hard boiled eggs, quartered
8 cherry tomatoes
Freshly ground pepper, to taste

Place tuna in an oiled glass baking dish. Combine rosemary, garlic, red wine, and 1 tablespoon of the olive oil in a jar and shake well. Pour over tuna. Cover and refrigerate for thirty minutes.

Preheat oven to broil. Remove tuna from refrigerator. Broil for twenty minutes, turning at the halfway point. Remove from oven and set aside to cool for ten minutes.

Combine lettuce and remaining tablespoon of olive oil in a large bowl and toss well. Arrange lettuce with eggs and cherry tomatoes. Layer with tuna steaks and season with freshly ground black pepper.

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REFERENCES: SECTION I


REFERENCES: SECTION II


REFERENCES: SECTION III


