



Diet and Inflammation in Dermatology



Many patients with inflammatory skin diseases, such as psoriasis, are interested in diet modification in conjunction with traditional therapies.

BY RONALD PRUSSICK, MD

>> In the practice of dermatology we see a variety of skin diseases that are inflammatory in nature. For many years we have known that patients with dermatitis herpetiformis respond to a gluten-free diet, but only after many months. More recently, studies have shown that dietary changes can impact other diseases, such as psoriasis, atopic dermatitis, and acne vulgaris. Many of our patients are interested in diet modification in conjunction with traditional therapies. This review highlights known dietary changes that can reduce inflammation.

HIGH GLYCEMIC INDEX FOODS

The glycemic index refers to a value assigned to a food based on how quickly it raises blood glucose. The glycemic load gives a better idea of a food's impact on blood sugar, as it also incorporates the grams of carbohydrates in the food portion. Elevated blood sugar results in production of insulin, which is the hormone of fat storage. Elevated insulin levels can eventually result in insulin and leptin resistance, along with reduced adiponectin levels. Fat storage increases the risk of nonalcoholic fatty liver disease (NAFLD) and visceral fat production. Visceral fat or central obesity is a major criterion for metabolic syndrome. Visceral fat has greater metabolic activity than fat elsewhere, producing inflammatory cytokines, such as leptin, resistin, TNF-alpha, IL-6 and monocyte chemoattractant protein-1.¹ Visceral fat also reduces adiponectin production and triggers insulin resistance.

For these reasons, patients with inflammatory skin diseases should reduce intake of high GI foods, including wheat, which, due to amylopectin A, has a glycemic index of approximately 71, resulting in more insulin production than many other foods. It is best to avoid fructose consumption without the fiber, such as in fruit juices. Fructose consumed in small amounts is acceptable, as it is slowly absorbed when eaten with fiber in fruit. High fructose corn syrup (HFCS)

contains up to 90 percent fructose, and after consumption it is delivered to the liver and converted via lipogenesis to triglycerides and small dense LDL. HFCS promotes visceral fat, NAFLD, and, some believe, "leaky gut syndrome."

Epidemiologic studies have shown a correlation between milk and acne. These studies show skim and low fat milk can cause significantly more acne than whole milk.² With skim milk there is faster absorption and higher spikes of insulin than with whole milk. Insulin-like growth factor-1 (IGF-1) has also been shown to increase acne. Skim milk also has higher levels of casein protein, which contains a protease that prevents IGF-1 degradation, thereby increasing its absorption and triggering acne.

ADVANCED GLYCATION END PRODUCTS

Advanced glycation end products (AGEs) are macromolecules formed by non-enzymatic glycation (sugar binding) of proteins, lipids, and nucleic acids. Diabetics have high endogenous AGE levels measured by Hemoglobin A1C. Exogenous AGEs are formed when food is cooked at high temperatures, such as when grilling, frying, or toasting or

Many patients with inflammatory skin diseases are interested in diet modification in conjunction with traditional therapies. The goal of an anti-inflammatory diet is to lower insulin production and subsequent visceral fat formation by avoiding high glycemic index foods. It is also recommended to avoid foods with pesticide exposure while eating fresh vegetables as a main source of carbohydrates and reducing the dietary omega 6:3 ratio.

the**bottom**line

High Glycemic Load Foods and Inflammation



via eating processed meats. AGE induces oxidative stress and inflammation by binding to RAGE receptors (receptor for advanced glycation end products) on endothelial cells, leucocytes, and many other cells. This binding upregulates the NF-kappa beta signaling pathways, resulting in increased TNF-alpha, IL-6, and CRP (C reactive protein).³ Aging of skin has been shown to be accelerated by glycation of collagen and elastin.⁴ In diabetics, reduction of blood sugar correlates with reduced skin collagen glycation.⁵

Preventing glycation in the skin is achieved by avoiding cooking with high heat and instead stewing, poaching, boiling, and steaming. Cooking with acids, such as vinegar or lemon juice, can reduce AGEs by 50 percent. Oxidation is needed for AGE formation and in vitro studies show ginger, cinnamon, cloves, rosemary, and tarragon inhibit glycation. In mice, oral green tea, vitamins C and E—all of which are antioxidants—can inhibit skin collagen glycation.⁶

GLUTEN

Dietary gluten is made of seed storage proteins found in wheat, rye, barley and oat. The term “gluten intolerance” may refer to three different disorders: autoimmune celiac disease, allergy to wheat, and non-celiac gluten sensitivity. Celiac disease is diagnosed with a finding of anti-gluten antibodies such as IgG antigliadin, IgG demidated gliadin peptides, IgA transglutaminase, or IgA endomesial antibodies. In gluten sensitivity (GS) the patient has the same symptoms but no antibodies and normal intestinal biopsies. GS, unlike celiac disease, is thought to be triggered by the innate as opposed to the adaptive immune system. Some also believe gluten, HFCS, and lectins in beans can damage gut epithelial lining, resulting in “leaky gut syndrome.” This “leaky” gut allows penetration and increased exposure of antigens to the immune system.

An open label study showed 73 percent of psoriasis patients with anti-gliadin antibodies had a significant decrease in PASI scores with a gluten-free diet versus psoriasis patients without antibodies.⁷

Case reports of improvement with gluten avoidance have been reported for many skin diseases including: linear IgA disease, alopecia areata, aphthous ulcers, urticaria, leucocytoclastic vasculitis, erythema nodosum, psoriasis, vitiligo, lichen

planus, dermatomyositis, pyoderma gangrenosum, acquired cutis laxa, and sarcoidosis.

Note however, that gluten-free foods are not necessarily healthy, as many replace gluten with rapidly absorbing carbohydrates that trigger insulin resistance and visceral fat formation. Patients should avoid gluten-free products that contain rice, corn, or other high GI starches.

OMEGA 6:3 RATIO

Eicosanoids derived from omega-6 polyunsaturated fatty acids (PUFAs) such as PGE2 (prostaglandin E2) and LTB4 (leukotriene B4) synthesized from arachidonic acid are more potent mediators of inflammation than PGE3 and LTB5 derived from omega-3 PUFA's synthesized from EPA (eicosapentaenoic acid) or DHA (docosahexaenoic acid). Up to 90 percent of North Americans are deficient in omega-3; this is believed to increase risk for developing depression and cardiovascular or inflammatory diseases.⁸

QUICK TIPS

1. Patients with inflammatory skin diseases should reduce high GI foods, including wheat, which, due to amylopectin A, has a glycemic index of approximately 71, resulting in more insulin production than many other foods.
2. Preventing glycation in the skin is achieved by avoiding cooking with high heat and instead stewing, poaching, boiling, and steaming. Cooking with acids, such as vinegar or lemon juice, can reduce AGEs by 50 percent.
3. Note that gluten-free foods are not necessarily healthy, as many replace gluten with rapidly absorbing carbohydrates that trigger insulin resistance and visceral fat formation.
4. Over three years, subjects on a Mediterranean diet had more weight loss, reduced insulin sensitivity, and a reduced inflammatory cytokine profile.

Good sources of omega-3 fatty acids are wild cold-water fish, grass-fed meat, or dairy products. Dairy from grass-fed cows has a 1:1 omega 6:3 ratio compared to grain/soy fed cows with a ratio of 7:1. Plant sources, such as flaxseed or walnuts contain ALA (alpha linolenic acid) but have only a 10 percent conversion rate to DHA and EPA. Vegetable oils, such as corn, canola, soy, and sunflower oils all are common sources of omega-6 fatty acids that should be minimized to reduce inflammation.

The omega 6:3 ratio was approximately 1:1 in prehistoric times but can now be found as high as 20:1 in patients who eat abundant processed foods, bread, corn, soy, or vegetable oils. It has been shown that a diet resulting in a decreased ratio of 3:1 reduced inflammation in rheumatoid arthritis. A 5:1 ratio improved but 10:1 ratio worsened asthma symptoms.⁹ A large randomized controlled study in Italy compared a Mediterranean diet rich in omega-3 fatty acids to a low-fat diet. Over three years, subjects on a Mediterranean diet had more weight loss, reduced insulin sensitivity, and a reduced inflammatory cytokine profile.¹⁰

PESTICIDES

Patients should avoid eating fruits and vegetables sprayed with pesticides as these products can increase inflammation. There is epidemiologic evidence implicating organophosphate pesticides and inflammatory diseases, Non-insulin-dependent diabetes mellitus (NIDDM), Parkinson's disease, and cancer. In laboratory studies, rats exposed to malathion or omethoate had increased expression of TNF-alpha, IL-1, IL-6 and IFN-gamma.¹¹ Pesticides also have been shown to increase insulin production and can produce insulin resistance via both increased inflammatory cytokines and oxidative stress.¹²

CONCLUSIONS

It is important to consider dietary changes to complement dermatologic treatments in patients with inflammatory skin diseases. Avoiding high GI foods to reduce insulin production and visceral fat formation has been shown to be beneficial. Bread should be eliminated or reduced as it has a high GI, is a source of gluten and can also contain sucrose, high fructose corn syrup (HFCS), and soy or vegetable oils.

"Fat" fruits, such as avocados, coconuts and olives are ideal in that they have a low GI and high levels of mono-unsaturated fatty acids. Avocado has more potassium than bananas with a lower GI. Berries are among the best fruits, as they have the lowest GI. Coconuts contain medium chain triglycerides and have been shown to burn fat and increase metabolism. Reducing the dietary omega 6:3 ratio is an important goal. This can be achieved by eating less bread, corn, and soy and avoiding cooking with vegetable



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oils. Avocado oil has a higher melting point than olive or coconut oils and is ideal for cooking.

A Mediterranean diet including olive oil, some meat or dairy from grass-fed animals, and abundant wild caught fish is beneficial. Avoid farmed fish, whose diet can be supplemented with grain or soy.

In summary, the goal of an anti-inflammatory diet is to lower insulin production and subsequent visceral fat formation by avoiding high glycemic index foods. It is also recommended to avoid foods with pesticide exposure while eating fresh vegetables as a main source of carbohydrates and reducing the dietary omega 6:3 ratio. ■

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