

Diet and Orbital Inflammation

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“We are what we eat.” That old adage is particularly true when thinking about inflammatory disorders, such as Graves Disease, Orbital Inflammation, Sjogren’s, Lupus, Sarcoid, Wegener’s, Rheumatoid Arthritis and other inflammatory conditions. Why is that?

The human digestive tract contains billions of bacteria, and the respiratory tract and skin contain billions more, which collectively form the microbiome of a human body. The interactions between the gut microbiome and the food that passes through the gut are absolutely essential to food absorption as well as to the overall health of the immune system. Disease-causing microbes from outside the body have only a few ways to get into the body and cause disease: through contact with the skin or mucous membrane around the eye (conjunctiva), through the gut, or through the respiratory tract. Everything else in the body is enclosed – walled off. So our immune system is focused on detecting and fighting potential invaders at these specific locations. Detecting potential invaders is the job of specific cells in our immune system with receptors for locating disease-causing microbes and their signature molecules. A healthy gut microbiome is also important to protect us from these disease-causing microbes, as “gut friendly” or “good” bacteria protect us from “gut unfriendly” or “bad” bacteria, so it is very important to maintain a healthy gut to protect our overall health.

Creating and preserving the right balance of bacteria in our gut is essential to good health. Such balance is damaged by the common use of antibiotics, including antibiotics used in dairy, poultry and beef farming. In order to maintain a healthy gut microbiome, we recommend avoiding the unnecessary use of broad-spectrum antibiotics whenever possible and limiting conventionally farmed poultry and beef.

When we eat food containing unnatural chemicals, like artificial sweeteners, we poison the detector cells and good bacteria. Diets unnaturally high in carbohydrates, especially simple sugars, and saturated fats likewise damage the detector cells by damaging their membranes and altering their hormonal signals. Therefore, we recommend avoiding artificial sweeteners, and limiting simple sugars and saturated fats as much as possible.

Furthermore, diets that are high in mimetic proteins – foreign proteins that look like or “mimic” human proteins – can stimulate immune cells to react and be turned against our own proteins – auto-immunity. For example, foods like cow’s milk or beef (red meat) are rich in bovine albumin. Mature bovine albumin is made up of 583 amino acids and weighs 66.4 kilo daltons. Mature human albumin is made up of 585 amino acids and weighs 66.5 kilo daltons. The sequence identity between human and cow albumin is >75%. Antibodies that react against one also react against the other. Hence, a diet rich in cow albumin, e.g. milk, will continuously stimulate the human gut to produce antibodies that may then attack proteins in our own bodies, causing auto-immunity and inflammation. On the other hand, diets that are rich in omega-3 fatty acids – short mono-unsaturated fats – and low to moderate in complex carbohydrates and plant proteins that do not mimic human proteins will promote a healthy immune cell environment and a healthier gut.

Diets that are high in carbohydrates and protein stimulate insulin production, which is also pro-inflammatory. While we need insulin to survive, excess production is harmful and inflammatory. Therefore, anyone suffering from an autoimmune disease should attempt to limit insulin production as much as possible, whether or not they suffer from diabetes. In patients with diabetes, a dietary reduction in carbohydrates should be done under the direct guidance of a primary care physician or endocrinologist, as insulin requirements will decrease and medications may need to be adjusted.

Patients with thyroid eye disease (TED) should be especially mindful of their insulin levels. A new medication to treat TED, Teprotumumab (Tepezza, Horizon Therapeutics), is an insulin-like growth factor-1 (IGF-1) receptor inhibitor. The drug blocks the inflammatory/autoimmune cascade that underlies TED. Insulin is likely a major controller of insulin/IGF-1 action, although the exact relationship is not fully understood. When insulin binds to its receptor, some of its downstream effects are similar to the effects seen with stimulation of the IGF-1 receptor. Therefore, it is by this mechanism that limiting insulin, and IGF-1, can potentially have positive effects in patients with TED. Insulin secretion is mainly stimulated by consumption of carbohydrates and proteins. IGF-1 levels are also elevated in response to carbohydrate and protein intake. Interestingly, consumption of dairy is specifically associated with elevated IGF-1 production. Consequently, in patients suffering from thyroid eye disease, a healthy, anti-inflammatory diet should limit intake of carbohydrates, especially simple sugars, dairy and protein as much as possible.

A good anti-inflammatory diet should avoid simple sugars/carbohydrates and processed foods. Grains, including breads and pasta, should be as minimally processed as possible to maintain their fiber content and reduce their sugar content. Grain consumption should be also be limited to prevent insulin secretion and IGF-1 production. Dairy should be minimized, and milk in particular should be avoided. Diets high in protein should also be avoided to minimize insulin production. Conversely, tree nuts, such as almonds, pecans and walnuts, however, are a staple of the anti-inflammatory diet. Ray-finned fish (*Actinopterygii* class of bony fishes), such as tuna, cod, halibut, salmon, perch, bass and trout (but not shellfish), are also an excellent source of non-mimetic proteins as well as omega-3 fatty acids. Consumption of healthy fats is encouraged. Finally, foods should be fresh, avoiding unnatural chemicals and dangerous preservatives.

By eating a healthier diet, your body will reestablish its balance, restore the health of its immune system, and improve digestion and absorption of important nutrients. The modern industrialization of food production and processing has brought millions out of hunger and malnutrition, but the pendulum has swung too far. It is up to each of us to put the right things into our bodies – fresh, natural, balanced and healthy.