

# Systemic Inflammation & Dietary AGEs

*"Patients exposing their gut to foreign molecules such as AGEs are inadvertently ramping up their immune system."*

Dr. Alex Vasquez was lecturing about "autoimmunity" and factors that will increase systemic inflammation and he mentioned something I wasn't applying with my patients, "dietary AGEs." AGEs are advanced glycation end products. More specifically, AGEs are the end-products of glycation reactions, in which a sugar molecule bonds to either a protein or lipid molecule without an enzyme to control the reaction.

Most of us have heard of the term AGEs with diabetes and understand that proteins and lipids become bonded to sugar molecules internally due to blood sugar dysregulation. In my mind, when I think of AGEs I think of caramelized proteins that are unable to function in their normal capacity due to the sugar cross linkages. This cross linking is what causes intracellular damage and apoptosis.

In diabetes, advanced glycation end products are well known for their destructive



activities and contribute to vascular disease, kidney failure, eye damage, and other kinds of dysfunction, including the nerve damage known as diabetic peripheral neuropathy. But I didn't understand how dietary AGEs cause inflammation.

The food industry however has been interested in this area for years, because the combination of sugar and protein or sugar and fat under high temperatures add desirable color and taste to foods. Yes, we are talking about some family favorites: marinades, barbecued meats, dark crusts on bread, pizza,

cookies, pretzels, chips of all kinds, French fries, and breaded deep fried meats. Any food that is treated or soaked with sweeteners for taste and then cooked is on the list. It's kind of a big list.

Dr. Vasquez explained that this sugar/protein or sugar/fat complex is foreign to our immune system and when we consume these foods the immune system in our gut is activated. Why? AGE molecules are perceived as foreign molecules, much like microbes and therefore must be attacked. Cytokines are activated, inflammation is increased.

Human studies have demonstrated that intake of dietary AGEs by people with Type 1 and Type 2 diabetes promotes the formation of pro-inflammatory mediators, leading to tissue injury. On the other hand when the intake of AGEs was reduced, reduced levels of inflammatory molecules such as tumor necrosis factor-alpha (TNF $\alpha$ ) and high sensitivity C-reactive protein (hsCRP) were observed. Restriction of dietary intake of AGEs and exercise has been shown to safely reduce circulating AGEs, with further reduction in oxidative stress and inflammatory markers.

As a side note: Fructose and galactose undergo glycation at about 10 times the rate that glucose does. And since most sweeteners are approximately 50% fructose, we can see one more reason why inflammatory diseases and other "diseases of aging" (arthritis, diabetes, heart disease, Alzheimer's, etc.) are on the rise.

Before we get too excited, just because we consume AGEs doesn't mean we will all increase serum AGEs. There is a natural biological breakdown process of these products. However the more we consume and the more we tax our body's ability to modify these AGEs, the more they can impair our biological systems.

Dr. Vasquez's point was if we see patients that are struggling with inflammation especially autoimmunity, we have to focus on "healing the gut." But if our patients are exposing their gut to foreign molecules such as AGEs, they are inadvertently ramping up the immune system, not cooling it down. Dr. Vasquez shared that green tea has been shown to inhibit AGE formation.

Some studies have also shown optimal levels of thiamine have been helpful to reduce AGEs. So using the cocarboxylated form of B1

would be advised especially if the patient has an anion gap of 13 or greater. I use Bio- 3B-G by Biotics Research, 3 tablets, 4 times a day for 30 days.

Dr. Mark Houston developed a formula called VasculoSirt to support vascular integrity which is one of the main factors affected by serum AGEs. His formula VasculoSirt contains therapeutic levels of green tea extract, lipoic acid, trans-resveratrol, K2 as menaquinone -7, Acetyl-L-Carnitine, Coenzyme Q10 as well as other Krebs cycle nutrients to support mitochondrial repair. Interestingly, VasculoSirt contains the primary ingredients to combat the effects of AGEs.

Practical steps to avoid glycation would be to keep blood sugar low by consuming as little processed food as possible. The more we process the food, the more we strip fiber, kill enzymes and add flavoring agents to excite taste buds.

Eat vegetables and fruits that are raw, boiled or steamed. Remember, it's generally the high temperature that causes the problems. Of course we want to avoid processed foods that are browned or caramelized. In terms of meat: low temperature, slow cooked is best; higher temperatures produce more AGEs. Rare and medium-rare meats will have fewer AGEs than fully cooked meats, like well done steaks.

Based on this conversation you can see why the "3-Step Detox" diet has been so effective in reducing inflammation of all kinds. It's exciting to see how nutritional principles REALLY DO add up. And when applied consistently, these principles can enhance productivity and extend quality of life.

Thanks for reading this week's edition. I'll see you next Tuesday.