

A.G.E.S.

James H. Carraway, M.D.
Eastern Virginia Medical School

If you are old enough to know what it's like to wake up in the morning with slightly stiff joints and tightness in your muscles, then you should be learning about what can cause this to become worse or improve. A.G.E.S. denotes Advanced Glycation End Products which occur in your body when you have eaten sugars, proteins, and fat of certain types in your diet. One of the most common sources of these is fried brown foods or grilled meat which tastes good, but builds up higher levels of these compounds in your body. The A.G.E.S. level in American foods has gone up remarkably over the past years and is a prominent part of the American daily diet.

A.G.E.S. have been linked to arthritis, heart disease, diabetes, Alzheimer's, and other types of inflammatory conditions such as AMD (macular degeneration). These compounds may accumulate in blood vessel walls and cause the blood vessels to stiffen, which contributes to arteriosclerosis. It also helps bad cholesterol (LDL) wreck havoc on blood vessel walls as well.

Although we think of the conditions mentioned as occurring mostly in older people, some studies recently have shown that age was not the only determining factor of your A.G.E.S. levels. In fact, because of the diet in this country, many young people have this as well. It is associated with an elevated C-reactive protein level elevation which is also a marker for impending heart disease and arthritis. A.G.E.S. are formed outside the body by cooking sugar with fats and proteins. This is what you would find on the "glaze" of a ham, and this is the type of compound that is manufactured in the body when the dietary intake lends itself to this. In certain conditions such as elevated blood sugar with diabetes, A.G.E.S. formation can be increased to above normal levels. In this way, they can create the inflammatory problems that lead to complications of diabetes and the other diseases mentioned above.

The chemical pathway to A.G.E.S. formation has to do with a complex chain of events which alter the normal metabolic pathways of sugar and protein in the body, but which leads to increased production of A.G.E.S. Continued abnormalities of this have been implicated in the worsening of age-related diseases. The reduced muscle function seen with high levels of A.G.E.S. is due to a process of cross-linking of the sugar and protein compounds found in the muscles. Fructose is a simple sugar that is found in combination with table sugar as part of the molecule. It is also seen in high levels in a common additive to foods these days called high-fructose corn syrup. When table sugar breaks down or when corn syrup is metabolized, it increases the level of fructose which has a high tendency towards glycation and formation of A.G.E.S.

The body is able to get rid of some of the A.G.E.S. peptides, with some of them being excreted directly into the urinary system and other compounds having to undergo

breakdown either by enzymes or specific cells in the body. If the proteins are too large, they must be broken down in the liver. In diabetics who have increased A.G.E.S. production, this compounds the kidney damage and impedes removal of amounts of A.G.E.S. in the body, further increasing the potential for damage from these. One study in 1997 concluded that adding sugar to egg whites caused diabetics to be 200 times more A.G.E.S. immuno-reactive. This combination is found in most baked goods such as cakes, cookies, or custards.

In practical terms, this means that eating a high level of sugar, particularly table sugar and high fructose corn syrup, can increase the level of A.G.E.S. in your body. Eating excess protein as we all do in the US accelerates this chemical process. If you talk to anyone who has been an advocate of the “raw foods” diet which is low on protein and almost absent in sugar, they routinely note that they have lost the stiffness in their joints and the stiffness in their muscles. This is probably because the body has cleared itself of the A.G.E.S. with this particular diet.

Of commonly consumed foods in the US, the A.G.E.S. levels were highest in pizza, fast food hamburger, and “out of sight” in a boiled hotdog. Foods highest in fat were highest in A.G.E.S. content, while lower values were found in fruits and vegetables. An apple contained 18 kilo units of A.G.E.S., while a hotdog contained 10,143. French fried potatoes contained 1,522 kilo units, potato chips twice as much, and a baked potato only 218. Eating smaller quantities of better selected foods can dramatically reduce your A.G.E.S. intake.

By avoiding any type of fried food with batter such as fried chicken or oysters, you can lower your potential A.G.E.S. level. This is especially important for seniors because it becomes more difficult to clear these compounds from the body when the liver and kidneys are not functioning as effectively as they did in more youthful times.

Again, we advocate a diet which is low or absent in baked foods, flour and wheat based foods, table sugar, high fructose corn syrup, and related compounds. The more fruits and vegetables you eat combined with the best sources of protein with lower levels of fat, the lower will be the level of A.G.E.S. in your body. Protein intake should be reduced to about 12% of total caloric intake as well. Advanced glycation end products are part of the whole picture of more rapid aging and more inflammatory diseases in susceptible people who are careless of their diet and ingest a high level of these precursors to A.G.E.S. The best advice to be offered in this is to stay on a diet such as the Zone diet, which emphasizes a combination of carbohydrates, proteins, and fat in a balanced manner every meal and which emphasizes low glycemic carbohydrates, lean protein, and non-hydrogenated or trans-fat products.