

With summer ramping up, many of us are taking advantage of the warm temps by firing up the BBQ grill. Nothing compares with the savory taste of seared meat, seafood, or poultry. Or corn on the cob, baked potatoes, grilled vegetables like peppers, endives and fennel, and even fruits like pineapple and peaches.

But, alas, this method of food preparation can place a burden on our bodies, generating harmful byproducts.



Advanced glycation end products—AGEs—are associated with progressive tissue damage. They are formed when proteins come in contact with sugars. Heat accelerates this chemical process, called browning, or more specifically the Maillard reaction, first described by French chemist Louis-Camille Maillard in 1912.

The desirable toasty or charred flavors of favorites like seared steaks, baked goods, and caramel are derived from the Maillard reaction. We actually deliberately promote the formation of AGEs when we grill meats with BBQ sauces containing sugar, honey, or blackstrap molasses.

The body naturally produces AGEs, especially when blood sugar runs high. In fact, the commonly used diabetes test hemoglobin A1c relies on a measurement of the degree of AGE formation when the protein hemoglobin in red blood cells is “browned” upon contact with high levels of blood sugar. The damage is not contained to the blood cells; rather, the results extend to wherever proteins are found in human tissues. Arteries, brain, nerves, the retina of the eye, skin, and kidneys take the brunt of glycosylation which renders proteins cross-linked and dysfunctional. Heart attacks, diabetes, strokes, dementia, Parkinson’s Disease, macular degeneration, kidney failure, peripheral neuropathy and premature skin wrinkling are but some of the consequences.

We can partially rein in the AGEing process by keeping our hemoglobin A1c low via a low glycemic, low carbohydrate diet, exercise, and supplements which reduce insulin resistance.

But now researchers are confirming another pathway to harmful AGEing: via the consumption of excess dietary AGEs. While it was once thought that AGEs in foods were poorly absorbed and didn’t add much to our AGE burden, new research confirms that our modern heat-processed diets contribute significantly to the levels in our bodies. Furthermore, excess dietary AGEs have been conclusively linked to conditions like kidney disease and endothelial damage.

A [pioneering study in 2010](#) established a [handy database of AGE values](#) of commonly consumed foods. Use it to plan your personal anti-AGEing diet.

As might be expected, broiled, deep-fried or grilled animal proteins are high in AGEs, but there are some

surprises here. Certain cheeses and butter rank high in AGE scores, as do many baked goods, especially cookies, crackers and chips.

It's a no-brainer that bacon might rank high, but so, too, do pizza, roasted nuts and "healthy" granola bars. And cola beverages—sugared or diet—contribute mightily to Americans' AGE burdens.

Is there evidence that reduced intake of dietary AGEs can have significant health benefits? In fact, [a recent study](#) showed that just four weeks of a diet low in AGEs significantly improved insulin sensitivity in overweight women.

So, does that mean you've got to put that new \$4,000 grill with infra-red searing capabilities up on eBay? Or, alternatively, settle for water-poached chicken breasts and have boiled potatoes instead of French fries? Not necessarily, according to experts.

While slow-cooking, say, in a crock pot or steamer is ideal, you can still mitigate some of the problems associated with AGEs by marinating meat, fish or seafood in acidic liquids like lemon juice or balsamic vinegar before BBQing. Alternatively, [new studies](#) suggest that beer-basting significantly reduces the formation of a toxic cousin of AGEs—polycyclic aromatic hydrocarbons (PAHs)—in grilled foods. But there's a catch—it has to be dark beer!

Then there's the advice to add ground tart cherries to your hamburger meat prior to grilling. The antioxidant polyphenols in berries obviate the damage caused by carcinogenic heterocyclic amines (HCAs) generated by charring. A garlic marinade, rich in sulfur compounds, will also combat HCAs, as will a rich sprinkling of herbs like rosemary, thyme and oregano.

And, needless to say, we can fortify our bulwarks against the effects of AGEs by balancing our intake of summer mixed grill with antioxidant-rich fresh fruits and vegetables, as well as spices, tea, chocolate and coffee (due to roasting, the latter three are relatively high in AGEs, but are offset by a generous content of healthy polyphenols).

Additionally, there are supplements which counter AGEs; they include [Kyolic Aged Garlic Extract](#), [curcumin](#), [EGCG](#), [quercetin](#), resveratrol, and sulforaphane, as well as mixed carotenoids, [selenium](#), alpha lipoic acid, [C](#), and [gamma tocopherol E](#).

Here's to safe grilling and summer fun . . . enjoy it while it lasts!

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