

Beware of the BBQ

By Jacob Schor, ND

Grilling meat is an inherently dumb thing to do. Here's why: Cooking animal flesh over a hot open flame triggers a series of chemical reactions that yield a meal loaded with carcinogens. Scientists have been warning us about this danger for two decades. Cancer-causing compounds known as heterocyclic amines (HCAs) can form, particularly when cooking animal flesh over high heat, which is common when barbecuing. These chemicals – the same chemicals that are found in cigarette smoke – have been shown to cause cancer.

For example, in a Harvard study by Erin Richman and colleagues, results of which were published in March 2010 in the *American Journal of Clinical Nutrition*, men who ate cooked chicken at high heat with the skin on had twice the risk of having their previously diagnosed prostate cancer return or get worse than those who ate skinless chicken. The researchers' theory to explain these chicken skin findings: The HCAs formed in chicken skin during cooking were the culprit of the cancer relapse.



Is there a solution; a way to avoid filling your body with HCAs? Don't grill your meat (or don't eat meat at all, since research suggests grilling vegetables does not generate HCAs). The trouble with that "solution" is that we've been cooking dinner over open fires for two

million years. Taking pleasure in grilling meat over a fire is so deeply ingrained in our blood that most people aren't about to change.

That said, researchers studying the production of heterocyclic amines during the cooking process have discovered a number of "tricks" that may reduce the risks posed while barbecuing, either by interfering with the creation of HCAs or inactivating them once they're formed. For example, precooking a hamburger patty for two minutes in a microwave before barbecuing reduces heterocyclic amines by a whopping 90 percent, according to research. Adding vitamin antioxidants to the meat or marinating it in antioxidant-rich spices before cooking appears to work almost as well.

When it comes to marinades, there are also important things to know. First, not just any marinade seems to work – old-style tomato-based barbecue sauces actually increase heterocyclic amine production, while marinades like teriyaki sauce reduce heterocyclic amines produced during cooking by half. Those packets of store-bought powder marinades that you add oil and vinegar to also seem to be surprisingly effective.

A 2008 study published in the *Journal of Food Science* measured heterocyclic amine levels in pan-fried steaks that had been marinated in one of three popular store-bought products. They found "Caribbean Blend" to be the best choice, reducing levels by 88 percent. "Herb Blend" came in second, reducing heterocyclic amines by 72 percent, and "Southwest Blend" came in third, but still lowered levels by 57 percent.



This isn't product promotion: there's nothing special in any of these mixtures that you can't get just about anywhere. It turns out that many common spices have strong antioxidant effects. Rosemary is particularly effective at reducing production of HCAs, suggests a 2010 study. Marinating chicken in red wine also may reduce production of some heterocyclic amines. Ray Pleva, a Michigan butcher, is famous for adding cherries to his sausage meat. Adding cherry pulp to meat not only makes the burgers juicier, but the fruit also acts as an antioxidant. The cherries prevent heterocyclic amines

from being formed, reducing levels by 90 percent. Vitamin E works as well; a single 400 IU capsule is enough to treat 10 pounds of hamburger.

There is also another approach to reducing the harm caused by heterocyclic amines. A number of foods have been identified that neutralize heterocyclic amines in the intestine and prevent them from causing DNA damage. For example, several studies suggest that the *Lactobacilli* strains in yogurt do this, so serving yogurt on or with meat meals provides additional protection because it actually reduces the harmful effects of these chemicals.

Certain alcoholic beverages also neutralize heterocyclic amines. Sake, brandy, white wine and stout ale have all been shown to prevent heterocyclic amines from causing DNA damage. Ale was the most effective. And though few people will choose this method, freeze-dried beer powder also works.

It would be great if the marinade manufacturers specifically designed meat and chicken marinades to lower production of these chemicals even further. Of course, they would be stuck. Under current law, they would be prohibited from making any health claims on the labels about the product's benefits regarding HCA neutralization.

The bottom line for anyone who wants to cook meat, whether chicken, beef, pork or anything else on the grill is simple – make sure to marinate all meats before cooking. When cooking ground beef, knead in herbs and/or vitamin E. Stick with skinless chicken if cooking poultry. Always accompany barbecued meat with a yogurt dish and a little alcohol, preferably stout ale; and use a yogurt salad dressing or even something as simple as frozen yogurt for dessert. And, remember that you can cook vegetables on the grill without the danger of heterocyclic amine formation – and increase the nutritional content of your meal at the same time. Talk to your doctor for more information.

BBQ the Safer Way

Here are some of the best way to ensure you enjoy the summer BBQ season without risking consumption of cancer-causing heterocyclic amines, formed when meat is cooked at high temperature:



Go meatless: Heating any animal's flesh forms HCAs, but evidence suggests grilled vegetables *do not make HCAs*. Add vegetables to the menu so you eat less meat. Think of grilled corn, grilled asparagus, grilled mushrooms, etc. You'll be adding vegetables to your meal while reducing consumption of HCAs at the same time.

Turn down the heat: Temperature is the most significant determinant of HCA formation; the higher the temperature, the more HCAs. A hot barbecue makes more HCAs than any other cooking method.

Turn the meat often. Flip those burgers, chicken breasts and other meats. Frequent flipping prevents the meat from reaching as high a temperature and lowers the amount of HCAs formed. Lowering cooking temperature by 100 degrees cuts HCA formation by two-thirds.

Try new ingredients: Cherries, prunes, apples, elderberries, pineapple, garlic, vitamin E and rosemary are some of the ingredients that significantly reduce HCAs in meat while cooking.

Marinate any meat before grilling: Marinating beef steaks overnight with a teriyaki or turmeric-garlic sauce cut HCA by 60 percent in one study. Avoid high sugar and especially fructose-sweetened marinades, as they may triple HCA production. The simplest marinade: red wine; a red wine marinade for chicken breasts reduced HCA formation by 88 percent.

Go skinless: Removing poultry skin cuts risk of prostate recurrence by half, so it's probably a good idea for the rest of us.

Choose the right side dishes: It's not just beer that prevents HCAs from causing genetic damage. Chose side dishes that include any of these foods: green tea, black, and rooibos (red) tea; red wine, blueberries, blackberries, red grapes, kiwi, watermelon, parsley, and spinach greens.

Eat cruciferous vegetables: Broccoli, cauliflower, cabbage and other members of the cruciferous family contain a chemical called sulforaphane that appears to neutralize HCAs' cancer-causing action.

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