

Probing Question: Is grilling dangerous to your health?

July 16 2009, By Alexa Stevenson



Image: Sara P. Brennen

For many people, summer festivities would be terribly un-festive without the sizzle, the smoke, and the tantalizing smell of meat being barbecued. In the summer, many gatherings revolve around the grill, and there are shelves of cookbooks devoted to the art of cooking over an open flame.

But is that tasty hot dog or burger a cancer risk, as a recent spate of news articles suggests? Probably not, says Joshua Muscat, professor of [Public Health](#) Sciences at Penn State's Hershey College of Medicine.

Cooking meat at high temperatures produces heterocyclic amines—or HCAs—which are mutagenic substances, shown to be largely carcinogenic in laboratory animal studies. However, said Muscat, “we don’t yet know if they produce cancer in humans. It’s unlikely that

consuming grilled foods occasionally is dangerous.”

It’s not just grilling that produces HCAs, Muscat said. Frying and broiling can also do it. In contrast, “baking, roasting, boiling and stewing produce very low levels of HCA,” he said. Cooking temperature and degree of ‘doneness’ are the key factors.

Worse than HCAs, Muscat said, are the polycyclic aromatic hydrocarbons (PAH) present in high concentration in char-broiled foods.

“These hydrocarbons are known cancer-causing agents also found in tobacco smoke.”

This may sound like bad news for barbecue enthusiasts, but Muscat offered some perspective.

“Frequently consuming grilled or fried meats may increase your [cancer risk](#), but it is uncertain how often you would have to eat them for this to occur -- perhaps several times a week for decades. And they may raise the risk for some cancers but not others.”

Since the digestive tract is directly exposed to the food we eat, it is likely that the risk from grilling would be highest for colorectal cancers, he said. A current Penn State study is looking at the coal-mining region of northeast Pennsylvania, where a heavily Eastern European population tends to consume large amounts of meat and also to have a high rate of this type of cancer. “We are currently exploring whether grilled meat consumption might be responsible.”

Investigators elsewhere are looking at possible links between char-broiling and breast, prostate, lung, and pancreatic cancers. The results of previous studies have been contradictory.

“There may be individual differences in susceptibility,” Muscat said. “Some people may be better metabolizers of HCA and PAH than others. This is one area where we can truly say that more work is needed.”

To reduce possible health risks of grilling, Muscat said ditch the charcoal and try pre-cooking meat in the microwave, which reduces HCA precursors. It may also help to choose meats that produce lower concentrations of HCA: red meats generally contain the largest amount, while white meats like pork, poultry, and fish contain less. However, these broad categories don’t always hold up, he said. A well-done boneless skinless chicken breast, partially because it lacks the insulation of fat and skin, may contain several times the HCA of a piece of beef.

Your diet as a whole is far more likely than grilling to influence whether you get cancer, Muscat said.

“Five servings a day of fruits and vegetables is a good rule of thumb, and reduces the risk of many diseases.” Many vegetables contain glucosinolates that actually inhibit HCAs, so maybe serving skewers of meat and cruciferous veggies at your next cookout is a better option than canceling it altogether.

“The best advice, as for anything else, is probably moderation,” Muscat said.

Source: By Alexa Stevenson, Research/Penn State

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