Very hot grills may inflame cancer risks

Women who consistently eat their meat very well done—with a crispy, blackened crust—face almost five times the breast-cancer risk of those who eat rare- or medium-cooked meats, a new study finds. However, even well-done meats without char may contain the chemicals being linked to this cancer risk, a pair of related analyses indicates.

The new studies suggest that how people cook meats can have major health implications.

For years, scientists have been investigating the conditions under which a family of carcinogens known as heterocyclic amines (HCAs) develop in cooked meats. Test-tube studies have shown that several HCAs can bind to DNA in breast cells, forming molecular structures called adducts, a first step in cancer development. Whether such adducts appear and provoke cancer in people, however, has remained uncertain.

Now, a group from two midwestern universities and the National Cancer Institute in Bethesda, Md., find strong support for the link between HCAs and cancer. They compared the eating habits of 273 participants in the Iowa Women's Health Study who developed breast cancer between 1992 and 1994 with the preferences of 657 women who remained cancerfree. Women who consistently ate meats very well done proved 4.6 times as likely to have the cancer as those who ate meats rare or medium.

Even accounting for other cancer risks, such as a family history of this disease, use of hormone supplements, or a high waist-to-hip ratio, meat-doneness preference remained an independent predisposing factor, the scientists report in the Nov. 18 JOURNAL OF THE NATIONAL CANCER INSTITUTE. These data "strongly suggest that HCAs and possibly other compounds formed during high-temperature cooking may be breast carcinogens in humans," they conclude.

"If these findings are confirmed," says study leader Wei Zheng, an epidemiologist now at the University of South Carolina School of Public Health in Columbia, "this could be very important for breast-cancer prevention" by pointing to an easily modified dietary risk.

Exploring conditions that foster HCAs, researchers at Lawrence Livermore (Calif.) National Laboratory (LLNL) showed that meats must be subjected to high temperatures for relatively long periods (SN: 4/23/94, p. 264). That's why blackening the exterior of a rare steak with a flash searing leaves meat relatively free of HCAs, as does precooking it at relatively low temperatures in the microwave and then browning the surface quickly in a broiler.

In a new analysis, the LLNL team quantified HCAs in spare ribs, steaks, hamburgers, and chicken cooked to order in sit-down restaurants. In the November JOURNAL OF AGRICULTURAL AND FOOD CHEMISTRY, they report that in general, the more well done the meat, the more HCAs it contains.

In the samples that were the most well done, HCAs laced beef at 5 to 10 parts per billion. This was almost 10 times the concentrations seen in meats cooked to the same doneness in the researchers' lab, observes study leader Mark G. Knize, and more than 100 times those found 3 years ago in fast-food burgers.

J. Scott Smith and Basira G. Abdulkarim of Kansas State University in Manhattan present related data in the same issue. They compared HCAs in processed meats, like bologna and smoked sausage, with those in fresh-cooked beef. They found no detectable HCAs in most of the sausages—until they were fried. "And that's not surprising," Smith says, because such meats are manufactured at low temperatures.

Fat content can also prove important. When fried under the same conditions, hamburgers that started with 5 percent fat developed up to five times the concentrations of HCAs as burgers starting with 15 percent fat. The reason, Smith suspects, is that the fat has an insulating effect.

Fattier burgers cooked up fewer carcinogens in Kansas study.

While the new data offer health-conscious cooks some food for thought, they also are prompting a genetic probe. Not all people make equal amounts of the enzymes that activate HCAs. Zheng plans to study whether those who make the greatest amounts of enzymes face the highest cancer risks from well-done meats. —*J. Raloff*

Brain chemical affects alcohol sensitivity

Concentrations of a natural chemical in the brain may influence how the body handles alcohol consumption, a new study shows.

Mice genetically engineered to lack neuropeptide Y, or NPY, a modulator of brain activity, shrug off the sedative effects of alcohol faster than normal mice and are apt to drink more of it when given the chance, researchers at the University of Washington in Seattle report in the Nov. 26 NATURE. Conversely, mice with an overabundance of NPY in their systems recover from alcohol's effects more slowly and aren't as inclined to drink it.

People also produce NPY. The characteristics of NPY-deficient mice bear a provocative resemblance to behavior seen in alcoholics, says study coauthor Todd E. Thiele.

"It's far too soon to make conclusions, [but] it's a very interesting possibility that in human alcoholics, low NPY levels in the brain may—at least in part—contribute to alcoholism," he says.

"It's a stretch, but an unavoidable one," agrees Enoch Gordis, director of the National Institute on Alcohol Abuse and Alcoholism in Bethesda, Md. Previous research has found that college-age drinkers who aren't very sensitive to alcohol's effects have a higher incidence of alcoholism at age 30. "Reduced sensitivity to alcohol . . . is pretty well established as a risk factor," he says. "We really don't know why."

Thiele and his colleagues gave 11 NPY-deficient mice and 11 normal mice access to two spigots—one dispensing water and the other water plus alcohol. With 10 or 20 percent alcohol mixes available, the NPY-deficient mice drank 30 to 50 percent more alcohol as did the normal mice. With a 6 percent mixture, the NPY-deficient mice drank twice as much alcohol as the control animals. Mice genetically engineered to have extra NPY drank less alcohol than did the controls.

In another test, the researchers injected seven NPY-deficient mice and seven of their normal littermates with a dose of alcohol large enough to put them to sleep for up to an hour. The deficient mice woke up and righted themselves on average 15 minutes sooner than the controls. Mice with additional NPY awoke later than normal mice.

The neuropeptide plays a role in appetite and anxiety. In this study, while no appetite difference appeared, mice lacking NPY tended to exhibit more anxiety, hiding out in dead-end corners of a maze, Thiele says. "One possibility is that these mice drink more alcohol to sort of self-medicate to help deal with anxiety levels that are high," he speculates.

"That cannot be ruled out," says Luis de Lecea, a molecular neurobiologist at the Scripps Research Institute in La Jolla, Calif. However, he notes that in the study mice having an overabundance of NPY didn't show unusually low anxiety.

"The important aspect of this study is that it opens up a new class of compounds in relation to alcohol—the peptide system," Gordis says. "This is an area [of research] which may be very productive." —*N. Seppa*