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Mercury surprise: Rice can be risky

Millions in China are at risk, and potentially elsewhere as well

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Ask toxicologists how best to avoid mercury poisoning and they'll almost certainly advise against eating too much of the wrong types of fish. (Never mind that there's considerable confusion about what the wrong types are.) But a new study out of China shows that for millions of people at risk of eating toxic amounts of mercury-laced food, fish isn't the problem. Rice is.

And that's bad news because in their part of the world rice is the dietary staple

A team of Chinese and Norwegian researchers investigated dietary mercury contamination in rural, inland China — a region where few people eat fish. They focused on Guizhou province, which they describe as the “mercury capital of China.” The area is home to 12 large mercury-mining and smelting operations, not to mention other heavy coal-powered industry. All of these industrial operations belch out tons of air- and water pollution laced with substantial quantities of mercury.

Hua Zhang and Xinbing Feng of the Chinese Academy of Sciences' Graduate University in Beijing and their coauthors measured mercury in the air, water and in all major foods from local markets. Then they modeled likely ingestion rates of these foods for residents of various communities across the province. These included a village located inside a nature preserve, a region downwind of a major coal plant, people living near a defunct zinc smelter and a community whose air was polluted by mercury-mining operations.

In an upcoming issue of *Environmental Health Perspectives*, the researchers report that although mercury exposures for these communities varied dramatically, in every one of them “rice accounted for 94 to 96 percent of the probable daily intake of methylmercury” — the most neurotoxic and readily absorbed form of mercury. Methylmercury poisoning has been linked with diminishing the IQ of children exposed in the womb and with raising blood pressure and other heart-disease risks among adults.

Guizhou's heavy cereal contamination traces in large part, the study says, to the fact that rice paddies harbor the types of bacteria that can convert inorganic mercury to its more toxic, methylated form. Moreover, in Guizhou, more than 70 percent (27 million people) live

in rural areas — impoverished communities where the annual household income averages less than the U.S. equivalent of \$300.

Not surprisingly, these rural families derive a large share of their calories from rice. And locally grown rice had high total mercury levels. It varied by region, with the highest contamination in Wanshan, the mercury-mining region.

More importantly, some 11 percent of the mercury in the grain they sampled in Wanshan was methylated. It averaged 9.3 micrograms of this especially toxic mercury per kilogram of rice in an area where people down an average of more than a half-kilogram of the grain each day.

Meat, on a per-kilogram basis, contained even more total mercury than rice — an average of 220 micrograms versus 78 μg . However, meat contained a far smaller share that was methylated than in rice, just 0.85 $\mu\text{g}/\text{kg}$.

Ironically, even though people don't eat much fish in Guizhou, area fish have relatively low methylmercury concentrations — 0.06 milligrams per kilogram, about one-tenth of China's recommended limit for dietary items.

Bottom line: Guizhou diners probably don't face huge risks except from rice subjected to mercury-laced mega-fallout from Wanshan-type mercury-mining and –smelting. But in such communities, tainted rice could contribute more mercury in a typical year than will fish in coastal Japan or in Norway, the researchers observe. That said, intake of the methylated form of mercury in Guizhou still would be “much lower” than among heavy consumers of fish in coastal Asia and in many Western nations.

The big question, of course, is whether mercury contamination of rice is unique to Guizhou. The authors suspect it isn't, but note that follow-up studies will be needed to confirm that. And, of course, any tainted rice may not stay put in our increasingly global economy.