Mercury Exposure from Fish Consumption among Recreational Fishers in the Grand Lake Watershed

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Abstract

The described project determined mercury exposure in recreational anglers in northeastern Oklahoma, centered around Grand Lake. The project had three major components: a survey of mercury concentrations in commonly-consumed types of fish throughout the watershed; a study of mercury exposure among fish consumers, including quarterly collection of food frequency questionnaires (FFQs) and hair samples as biomarkers of mercury exposure; and the establishment of on-going community education and outreach programs and partnerships with state and regional agencies.

The mercury level in the majority of fish (97%) was below the EPA guideline of 300 ng/g and most was in the form of methyl mercury. Flathead catfish were most likely to have mercury levels above this guideline (24%), followed by drum (10%), largemouth bass (1%), and blue catfish (2%). Mercury levels were generally directly related to fish size. No significant differences in mercury concentration were seen in different zones of Grand Lake.

During the study, 152 volunteers participated by keeping a diary of fish consumption and providing hair samples for mercury analysis. Among volunteers, 75% reported eating fish 2 to 4 times per month. Catfish was the most commonly consumed type of fish (43%) followed by crappie (11%) and various bass species (5%). Non-local (e.g. saltwater fish) accounted for approximately 31% of fish consumption but contributed 38% to total mercury intake from fish. Hair mercury values were less than the EPA guideline for children and women of child-bearing age in 95% of participant samples, with a median hair mercury level of 0.15 µg/g. Consumption of catfish contributed 44% of dietary mercury exposure, followed by tuna (29%), and bass (4%).

The results indicate that consumption of local fish at levels demonstrated by project volunteers infrequently results in mercury exposures above health-based guideline values; however, mercury from non-local fish represents a significant exposure source and should also be considered when assessing total risk. Mercury levels in many other Oklahoma lakes are much higher than Grand Lake and present a greater risk to consumers. Given that 5% of participants in this study of a “low” mercury lake had elevated levels of hair mercury, it is anticipated that a far greater percentage of fish consumers from other lakes would have mercury levels exceeding the accepted reference dose.