

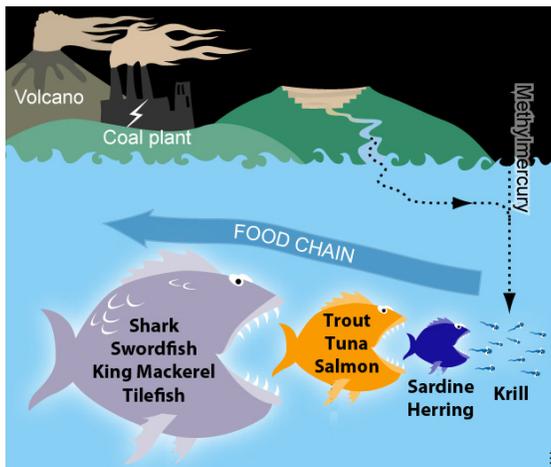
Research Summaries: Mercury and Autism



Based on the published work

Autism Spectrum Disorder Phenotypes and Prenatal Exposure to Methylmercury
Edwin van Wijngaarden, Philip W. Davidson, Tristram H. Smith, Katie Evans, Kelley Yost, Tanzy Love, Sally W. Thurston, Gene E. Watson, Grazyna Zareba, Christine M. Burns, Conrad F. Shamlaye, and Gary J. Myers
Epidemiology 24(5): 651-659 (2013)

Mercury is a chemical element, perhaps best known as the only metal that is a liquid at room temperature. At very high doses, mercury is known to affect the developing brain. This was brought to the world's attention in Minamata, Japan, when people ate fish that were highly contaminated with industrial waste that included a form of mercury, called methylmercury. While adults showed symptoms of poisoning at these high doses, fetuses were observed to be particularly sensitive to methylmercury; some mothers who showed no visible symptoms of poisoning nevertheless gave birth to children with neurodevelopmental problems. The connection between methylmercury exposure and impaired fetal development was clear at these high doses that came from a particularly grave case of industrial contamination. However, it is unclear whether consumption of fish contaminated with background levels of mercury also pose a risk to neurodevelopment.



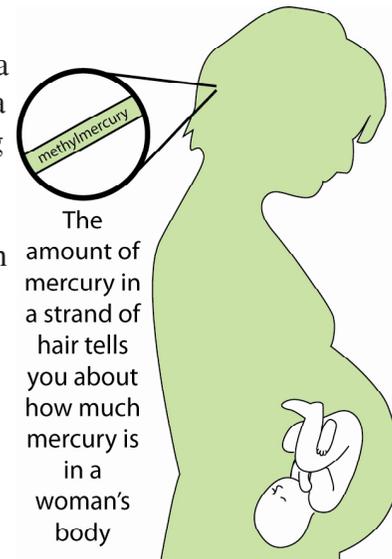
Nearly all fish contain some amount of methylmercury. Mercury gets into the atmosphere through manufacturing or coal burning, as well as from natural sources like volcanoes. It comes back to land and bodies of water when it rains. Bacteria in the water convert mercury into methylmercury. Fish eat bacteria, get methylmercury in their bodies, are then eaten by bigger fish, which are eaten by even bigger fish which end up with the highest levels of methylmercury (Bioaccumulation). The Food and Drug Administration recommends that women of child-bearing age and young children eat only 2 meals per week of small fish and shellfish, like salmon, pollock, and canned light tuna and to not eat shark, swordfish, king mackerel or tilefish because their flesh contains high amounts of methylmercury.

Autism Spectrum Disorders (ASDs) are a group of developmental brain disorders. The term “spectrum” refers to the wide range of symptoms, skills, and levels of impairment, or disability, that children with autism can have. Some children are mildly impaired, but others are severely disabled. In the late 1990's it was pointed out that the symptoms of mercury poisoning could be considered similar to the symptoms of ASDs (Bernard et al, 2001). The question of whether or not ASDs are among those neurodevelopmental problems that may result from methylmercury exposure was addressed in the study described here.



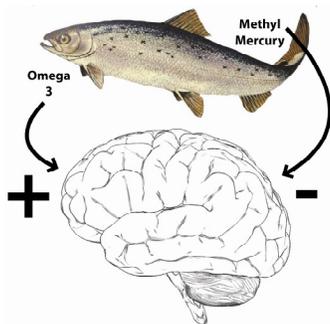
The study involved 1,784 children and parents living in the Republic of Seychelles, an island nation 1000 miles east of Kenya. Researchers at the URMC have been studying methylmercury in people in the Seychelles since the mid 1980s. People in the Seychelles have higher levels of methylmercury

in their bodies than people in the US because they tend to eat more fish – on average, up to 12 meals of fish a week. The amount of methylmercury that a fetus would have been exposed to in the mother’s womb was measured via a hair sample that the mother gave around the time of birth. As a hair is being formed, it is exposed to blood, which contains any methylmercury that the person has ingested. Therefore, if there is mercury in a person’s blood, it will be incorporated into hair. The amount of mercury in a hair is used as an indicator of how much methylmercury the fetus is being exposed to.



When the children were ages 7-24 years old, parents or caregivers were asked to answer questionnaires that are commonly used to detect autism-like behaviors. Researchers plotted the mercury levels they found in the mothers’ hair against scores from the questionnaires and used statistical models to look for trends. For example, there might be a linear trend in which autism-like behaviors increased with increasing prenatal mercury levels. Alternatively, there might be a trend where a specific amount of prenatal mercury, above which an increase in autism-like behaviors is observed but not below this specific amount. These trends would be called “dose response curves” and would indicate that autism-like behaviors are influenced by the dose of prenatal mercury.

Researchers found that women in the Seychelles measured as having on average about 8.4 parts per million (ppm) methylmercury in their hair. This is high compared to women in the US, who measure, on average, 0.5 ppm methylmercury in hair. The researchers did not find any trends between the amount of methylmercury that was present in the woman’s hair at birth, and the severity of autism-like behaviors. There was no connection between the dose of methylmercury that a fetus was exposed to and increasing autism-like behaviors in childhood. In one group of women they actually found a slight trend that suggested higher levels of methylmercury were associated with a decreased number of autism-like behaviors. This trend probably has less to do with mercury and more to do with eating fish rich in omega-3-fatty-acids, which are an important to the developing brain.



This finding suggests that the amount of fish you should try to eat is a balance between pluses and minuses. On the plus side, fish is low in saturated fats, and high in good fats like omega 3. On the minus side, mercury is found in all fish and it is clear that high doses of mercury can have negative effects on the nervous system. While this study suggests that methylmercury exposure derived from consuming up to 12 fish meals a week does not influence ASDs, some other studies have suggested that prenatal

methylmercury exposure from consumption of seafood may result in neurodevelopmental problems. To be on the safe side, choose smaller fish that are low in mercury like salmon and pollock. Limit the amount of fish that are higher in mercury like shark and swordfish. This way, you’ll get the benefits of omega-3-fatty-acids with the least amount of methylmercury.



For more information about mercury in fish and shellfish, go to <http://www.fda.gov/food/resourcesforyou/consumers/ucm110591.htm>

Produced by the University of Rochester Medical Center, Environmental Health Sciences Center’s Community Outreach and Education Core. Last revised 12/3/2013