

MOTHERISK UPDATE

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Eating fish during pregnancy

Risk of exposure to toxic levels of methylmercury

ABSTRACT

QUESTION One of my pregnant patients consumes four cans of tuna a week. She became very concerned when she read that tuna contains methylmercury, which is toxic to the fetal brain. How should I advise her?

ANSWER Fresh tuna might contain toxic levels of methylmercury, but levels are much lower in canned tuna. Reassure your patient that eating canned tuna will not harm her or her baby.

RÉSUMÉ

QUESTION Une de mes patientes enceintes consomme quatre boîtes de thon en conserve chaque semaine. Elle s'est vivement inquiétée lorsqu'elle a lu que le thon contenait du méthylmercure, qui est toxique pour le cerveau fœtal. Quel conseil devrais-je lui donner?

RÉPONSE Le thon frais peut contenir des niveaux toxiques de méthylmercure, mais ces niveaux sont beaucoup moins élevés dans le thon en conserve. Vous pouvez rassurer votre patiente que le fait de manger du thon en conserve ne nuira ni à elle, ni à son bébé.

Mercury is a known neurotoxin. Inorganic mercury pollutes air, water, and soil through natural deposits, industrial and household disposal of wastes containing mercury, and use of fungicides that contain mercury.

When mercury is combined with carbon, organic mercury compounds are produced. The most common organic mercury is methylmercury (MeHg). Unlike inorganic mercury, organic mercury is readily absorbed through the gut. Methylmercury can contaminate seafood, and this raises concerns about whether it is safe for pregnant women to eat fish.

When there is mercury in the water, MeHg forms as a result of interaction with bacteria and subsequently builds up in the tissue of fish and

other marine organisms. The most commonly used quantitative unit for measuring mercury concentration is parts per million (ppm), although micrograms per gram ($\mu\text{g/g}$) is sometimes used. Mercury intake is measured by μg of mercury ingested per kilogram of body weight ($\mu\text{g/kg}$). The nervous system is the main target of toxic doses of MeHg. Sensory, visual, and auditory function, and coordination are most commonly affected.¹

Benefits and drawbacks of seafood

Seafood is an important source of essential nutrients, including ω -3 polyunsaturated fatty acids and selenium. Essential fatty acids are necessary for optimal neurologic development, and they probably modify the effects of neurotoxins.

In Minamata, Japan, seafood heavily contaminated with MeHg caused an outbreak of congenital poisoning that resulted in a condition resembling spastic paresis.² In Iraq, an increase in the number of neurologic abnormalities was observed in infants whose mothers consumed mercury-poisoned grains and whose mothers' hair was found to have concentrations of mercury exceeding 10 ppm.^{3,4}

Clinically, the extent of abnormalities is dose

Do you have questions about the safety of drugs, chemicals, radiation, or infections in women who are pregnant or breastfeeding? We invite you to submit them to the Motherisk Program by fax at (416) 813-7562; they will be addressed in future Motherisk Updates. Published Motherisk Updates are available on the College of Family Physicians of Canada website (www.cfp.ca). Some articles are published in *The Motherisk Newsletter* and on the Motherisk website (www.motherisk.org) also.

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dependent. Infants exposed to high levels of MeHg in their mothers' blood can present with cerebral palsy that is indistinguishable from the cerebral palsy caused by other factors. Microcephaly, hyperreflexia, and gross motor and mental impairment, sometimes associated with blindness or deafness, is the main pattern of abnormalities.⁵ Milder degrees of affliction are difficult to diagnose during the first few months of life, but they become obvious as time goes on. Patients mainly appear to have psychomotor difficulties and persistently impaired reflexes.^{4,6,7}

In 1971, a Swedish Expert Group conducted the first extensive evaluation of the health risks to humans of MeHg in fish.⁸ They concluded that the lowest level toxic to adults was 50 ppm (measured in the hair). A World Health Organization (WHO) expert group⁹ subsequently reaffirmed the Swedish conclusions and applied a safety factor of 10 to cover risk to the most sensitive subgroup of the population, which they assumed to be babies in the womb. Thus, 5 ppm was adopted as the international standard for the upper tolerable level of mercury (measured in mothers' hair).

The WHO set guidelines for intake of mercury at 0.47 µg/kg daily. In 1996, the United States Environmental Protection Agency (EPA) set a new reference dose for MeHg at 0.1 µg/kg daily, which was only one fifth of the WHO dose. If the EPA's dose were followed, fish and seafood consumption would be drastically reduced.

Effects of MeHg on two island populations

Some recent cohort studies have reported on MeHg consumption and developmental outcomes among children exposed to MeHg both before and after birth. Davidson et al¹⁰ studied children on one of the main Seychelles islands at 66 months old. Results of their study strongly supported findings in the same cohort

at a younger age.^{11,12} These children had no neurodevelopmental deficits even though their mothers' hair contained mean mercury concentrations of 6.8 ppm (standard deviation 4.5; range <3 to 26.7) during pregnancy.

In the Faroe Islands, where MeHg exposure occurs primarily through consumption of pilot whale meat,¹³⁻¹⁶ analyses of 917 children at 7 years old found no clinical or neurophysiologic abnormalities related to mercury exposure. Subtle decreases in performance on neuropsychologic tests over time, however, were associated with prenatal levels of MeHg of <10 ppm in hair. Interestingly, the Faroese children had excellent visual contrast sensitivity that could be attributable to an ample supply of fish-borne ω-3 fatty acids.

Important differences between the two populations, such as nutritional practices, housing, and lifestyle, could explain the different outcomes, but the main difference was source of exposure. Ocean fish are the source of MeHg in the Seychelles, whereas pilot whales that contain a much higher level of MeHg (approximately 10 times higher) are the predominant source in the Faroe Islands. The latest study done on 182 newborns in the Faroe Islands¹⁷ shows that prenatal exposure to higher levels of MeHg from contaminated seafood is associated with higher risk of neurodevelopmental deficits.

A great deal of uncertainty still exists over the risks and potential health benefits associated with seafood consumption. Current fish consumption advisories should be carefully reexamined in light of new data as they become available.

Recommendations

Current (1998) US federal guidelines and Ontario Ministry of the Environment advice (1999) for pregnant women, women of childbearing age, and children under 15 recommend:

- eating only those fish designated with a clear fish symbol in the most recent provincial guide for eating sport fish and consuming no more than four meals of such fish each month;
- not eating any other categories of fish caught in provincial lakes;
- consuming no more than one meal of fresh shark, swordfish, or tuna each month;
- not consuming sport fish if you are already a regular consumer of shark, swordfish, or fresh tuna; and
- that eating canned tuna is allowed because mercury levels in canned tuna are much lower than guideline levels. ❖

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