

EPA Response to NFPA Analysis of "At-Risk" Children from Mercury

November 17, 2000

Background

This report was prepared for the National Food Processors Association (NFPA) by a consultant to evaluate the statement in the NAS report that "over 60,000 children are born each year at risk for adverse neurodevelopmental effects due to *in utero* exposure to MeHg". It concludes that "this estimate appears to grossly overstate the potential risk to newborns of maternal fish consumption."

Briefly, the argument is as follows:

- The basis for the estimate is unclear. However, they accept the explanation that the estimate is based on the number of women of child-bearing age who eat 100 gm or more of fish per day.
- The estimate is based on the Faroes Island study, which had problems of co-exposure to PCBs and other issues.
- The NAS "disregards" the results of the Seychelles study, which was negative.
- The 95th percentile of fish consumption for women of child-bearing age is 46 gm/day, not 100 gm/day.
- The RfD is not appropriate for use in assessing risk to children since the uncertainty factors include allowances for potential impact on adults.

EPA staff response

Estimates of Mercury Exposure

It is no longer necessary to estimate mercury from levels of fish consumption in surveys. We now have a direct empirical measure of the distribution of mercury exposures to women of child-bearing age. The NHANES data show that 15% of these women have blood methylmercury levels greater than the RfD, which is about twice the number estimated in the Report to Congress. The data is not yet robust enough to support estimates of higher percentiles, but it seems very likely that the number exposed to more than 3.5 times the RfD is at least as large as the 1% estimated in the Report to Congress.

If we assume that these women have about the same birth rate as others (and there is no reason to think they do not), then 15% of the 4 million children born each year, or about 600,000 children, were exposed above the RfD *in utero*, and 40,000 children per year are born with prenatal exposure above 3.5 times the RfD. This level is getting into the range where the Faroes and New Zealand studies starting actually seeing effects.

However one cuts the data, it is clear that tens of thousands of children per year are born with prenatal mercury exposures which are of concern if one accepts the NAS assessment of the health impact.

Basis for the NAS estimate

While the NAS Report does not state the basis for the estimate of 60,000 children per year at risk, subsequent information indicate the estimate appears to be based on the estimate in the Mercury Study Report to Congress of the number of children born to women who eat 100 gm/day or more of fish.

NFPA critique of NAS risk assessment

The rehash of the Faroes-vs.-Seychelles arguments is beside the point, since the NAS considered precisely that issue in great depth and concluded that the RfD should be based on the Faroes study. Briefly, the reasons are as follows:

- The New Zealand study confirmed the Faroes results. The exposures in New Zealand did not have the features that formed the basis for criticism of the Faroes study: PCB exposures were low, and the population did not have episodic exposure to very high levels through whale meat.
- Additional analysis of the Faroes data strengthened the conclusion that the results seen were due to mercury, not PCBs. In particular, the same relation was observed in the portion of the population that had the lowest PCB exposure.

In addition, recent data suggests that the Seychelles study is also subject to confounding, in this case in a way that masks any effect of mercury. That data, which is not yet published but has been mentioned by the authors in print, shows a systematic beneficial effect of mercury exposure *in utero*.

Use of uncertainty factors in the RfD

The NFPA analysis questions the use of the RfD in connection with neurodevelopmental effects since

the RfD contained an additional uncertainty factor for adverse effects other than neurodevelopmental toxicity. It is inappropriate to apply an uncertainty factor for toxic effects other than neurodevelopmental toxicity to estimate the risk of neurodevelopmental toxicity.

This is a strange argument, since it would lead to allowing *greater* exposure to fetuses than to adults even though almost everyone agrees that the fetus is particularly sensitive to the toxic effects of methylmercury.

- In fact, the NAS recommended an uncertainty factor of 3 to allow for missing data or emerging data on a number of issues, including *but not limited to* potential reproductive, immunological, and cardiovascular effects. Other areas of uncertainty include variability of individuals in their sensitivity to the effects of methylmercury as well as uncertainty about long-term effects of prenatal exposure in adults and the elderly. The reproductive effects, if proven, obviously affect children, and there is no reason to believe that fetuses and children would be less sensitive than adults to the other effects. [In fact, recent data from the Faroes show that *prenatal* exposure to mercury leads to increases in blood pressure at age 7.]
- It is also important to realize that the Benchmark Dose used in the NAS analysis (the point of departure for applying uncertainty factors) is not a no-effect level but a level at which there is a doubling of the rate of abnormal performance. The Faroes study observed a gradient of performance as prenatal methylmercury exposure increased from 2 times to 10 times the RfD. And the New Zealand study showed effects at lower doses than the Faroes study.