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○アブストラクトデータ

**Methylmercury exposure in humans from the United States: A meta-analysis and synthesis**

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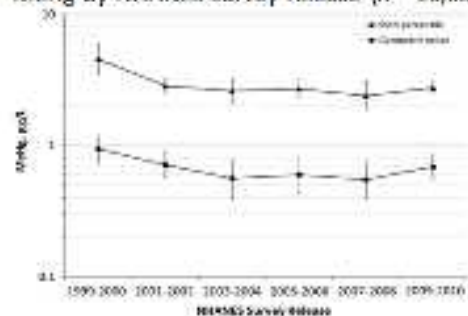
Methylmercury exposure in humans continues to be a public health issue of great concern. In the United States fish consumption is a major exposure route of methylmercury to humans. Here we assess exposure in different human sample matrices, including blood and hair in women and children, to evaluate spatial and temporal trends in methylmercury exposure in the United States. Using a meta-analysis approach we utilized the National Health and Nutrition Examination Survey (NHANES) and other published works, from 1999 to present, to identify and model predictors of mercury levels in humans, including fish consumption, age, race, and ethnicity. We identified and evaluated unique populations and communities that may be at disproportional risk from methylmercury exposure, including communities that depend on locally caught fish for subsistence, indigenous people, and high end fish consumers inhabiting urban environments. In addition to synthesizing data on methylmercury exposure in humans from the United States, we also summarize and evaluate the effectiveness of government fish consumption advisories designed to protect human health.



## The National Health and Nutrition Examination Survey (NHANES)

- Nationally representative data of women of reproductive age (16-49) in USA
- Not representative of highest exposure groups

## Geometric mean and 90th percentile of blood MeHg by NHANES survey release (n = 10,087)



Joffe-Bach et al. 2014

## Spatial Distribution of Mercury Exposure: The Importance of Region and Geography



Mackley et al. 2009

## MeHg Exposure Study Limitations

- Fish Hg concentration data and human consumption amounts may be the most uncertain components
- Recall bias in survey data is always an issue
- Often NHANES does not capture groups with greatest exposure
- Synergistic effects of metal exposures in this population are unknown

## Temporal Results

- Few changes in fish and mercury intake over the study period were documented
- No decrease in the amount of fish consumed by women of reproductive age was found
- Decreasing trend in the ratio of mercury intake to fish consumed ( $p = 0.035$ ), suggesting that women may be shifting their consumption to fish with lower mercury concentrations

Joffe-Bach et al. 2014

## Synthesis and Main Findings

- Mean blood Hg and %  $>5.8 \mu\text{g/l}$  in 1999-2000 significantly higher than the mean of the subsequent NHANES releases (2001-2010)
- There was a significant relationship between mercury intake from fish consumption and blood mercury

Wernicke et al. 2010

## Synthesis and Main Findings

- NHANES is designed to be representative of the general US population and thus studies targeted at high risk groups may be needed
- Certain populations may need special attention (coastal inhabitants, subsistence and commercial fishermen and families, island populations, in Puerto Rico, wealthy sushi loving urbanites, and other sub-populations)
- Probabilistic methods may serve as an addition to fish advisories to assist with targeting the public with public health information related to MeHg exposure

## Synthesis and Main Findings

- Reproducibility is important. The best practice here needs to be evaluated carefully. Most environmental contaminant research is NOT REPRODUCIBLE
- Fish is good for you but all fish are not good (only 30% are safe to eat)
- Asian women in USA continue to have very high exposure (i.e.  $\geq 25$  meals per month - several cases a month)
- Asian Women  $\geq 50$  years of age and of increasing time from MeHg Me. In USA (NHANES 2011-2012, Buchanan et al. 2015)
- More widespread use and evaluation of probabilistic methods
- High risk groups need special attention

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