

## Consuming Aquaculture and Wild-Caught Fish: Risks and Benefits

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Foods and Nutrition

## Presentation Overview

- Benefits of Eating Fish
- Risks of Eating Fish
  - Mercury
  - Pesticides
  - PCBs
- Fish Advisories

## Seafood Choices: Benefits

- **Fetus**  
Duration of gestation & Birth weight ++
- **Infant/Child**  
Visual acuity and sensory motor development ++  
Cognitive development ++  
Sleep patterns +  
Allergy/Asthma 0  
ADHD 0

IOM, 2006

## Harvard School of Public Health

### Fish Intake, Contaminants, and Human Health Evaluating the Risks and the Benefits

Harvard Medical School, MD, DrPH  
Karin B. Broome, PhD  
OUT THE PUBLICATION OF EPA-  
CONSUME: Fish intake or seafood may have health benefits and also contain contaminants, resulting in confusion over the role of fish consumption in a healthy diet.  
Behavioral Regulation: We searched MEDLINE, governmental reports, and other

“Modest fish consumption (e.g., 1-2 servings per wk), especially species higher in [EPA and DHA], reduces risk of coronary death by 36% and total mortality by 17%.... Intake of 250 mg/d of EPA and DHA appears sufficient for primary protection.”

JAMA 2006; 296(15): 1885-1899.

EPA and DHA... are not clearly established... methylmercury may modestly decrease the cardiovascular benefits of fish intake. A variety of seafood should be consumed, including wild and farmed fish containing low mercury levels. High mercury fish should be avoided. Species highest in mercury include shark, swordfish, king mackerel, tilefish, and certain species of tuna.

**120,000 lives saved each year !!!**

...regularly administered... the risk and benefits of fish intake... in coronary and cardiovascular... the role of fish consumption in healthy diet... the evidence and the potential magnitude of effect... the benefits of fish intake... the potential risks... the benefits of modest fish intake... eating a few selected species, also eat high mercury fish.

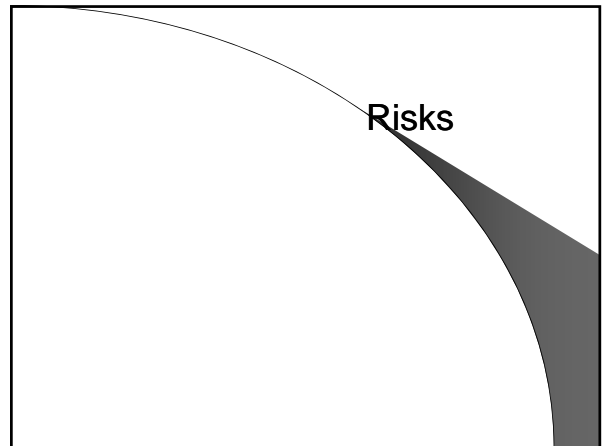
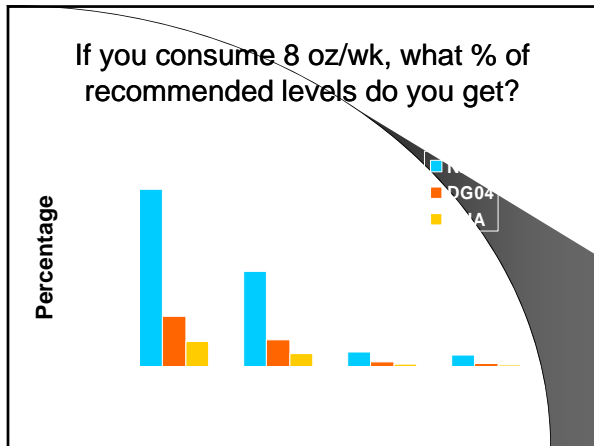
## U.S. Fish Consumption - 2008

● Shrimp	4.1 lbs/person
● Canned Tuna	2.8
● Salmon	1.8
● Pollock	1.3
● Tilapia	1.2
● Catfish	0.9
● Crab	0.6
● Cod	0.4
● Flatfish	0.4
● Clams	0.4
<b>Per capita</b>	<b>16.0</b>

NFI, 2009

## Dietary Recommendations

- National Academy of Sciences (NAS) - 2002
  - EPA + DHA = 140 mg/d (nursing/pregnant)
- Dietary Guidelines Advisory Committee Report - 2004
  - 8 oz fish/wk (EPA + DHA = 500 mg/d)
- American Heart Association (AHA)
  - 2 servings (2-3 oz per serving) of fatty fish/week
  - EPA + DHA = 1,000 mg/d (heart disease patients)



### Mercury

- Crosses placenta; Enters breast milk
- Clearance from body ~1 year
- Fetuses and infants exposed at high levels to this developmental toxicant
  - abnormalities in memory, attention, and language skills

### Mercury Toxicity in Adults

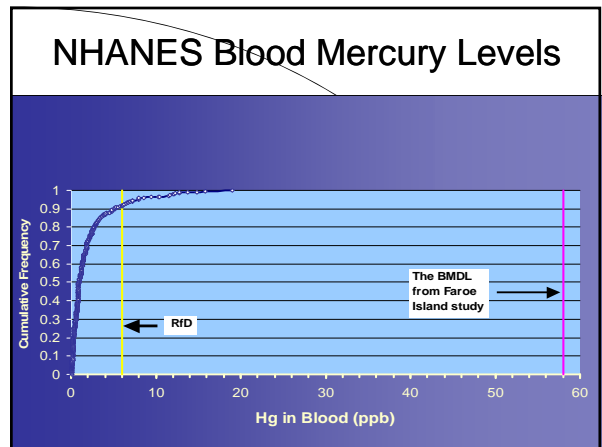
- Patients living in San Francisco
- High-end consumers of higher Hg fish
- Symptoms including fatigue, headache, decreased memory, decreased concentration, muscle and joint pain
- Symptoms gone after diet change

Hightower and Moore, 2003

### NHANES (1999-2002) - Mercury

- 5.7% of U.S. women (16-49 yrs.) have levels of mercury in their blood that exceeds the RfD (>5.8 µg/L)

CDC. 2004.



## EPA Projection

- 10% (~400,000 babies of the 4 million born annually) may be exposed to excessive mercury when in the womb

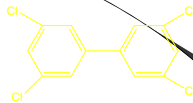
Mahaffey, EPA 2005

## Pesticides

- Farm-raised channel catfish, rainbow trout and red swamp crayfish had much lower levels of pesticides and metals than their wild counterparts
- Since farmed-fish are raised in controlled environments and fed a commercial feed, they have less exposure to contaminants

Santerre et al., 1999, 2000

## PCBs






- Cross placenta; enter breast milk
- 6-yr to clear from the body
- Infants exposed at high levels:
  - have altered postnatal development, lower birth weight, smaller head circumference, poorer short-term memory

Safe, 1992; EPA/823-R-93-003, 1993

## Commercial fish...what is the risk...

- ... from eating 8 oz of farmed salmon every week for 70 years (13x current consumption rate)
  - Cancer risk increases by 4 in 100,000 (current cancer rate is 25,000 in 100,000)
  - For 300 million people, this is an additional 12,000 cancers over 70 years
- Ignores PCB reductions during cooking (30-50%)

## Fish Advisories

    
Advice For Women Who Are Pregnant, Or Who Might Become Pregnant, and Nursing Mothers, About Avoiding Harm To Your Baby Or Young Child From Mercury in Fish

- Do not eat Shark, Swordfish, King Mackerel or Tilefish
- Eat up to 12 oz (2 average meals) of a variety of fish and shellfish that are lower in mercury.
- For recreationally-caught fish....check local advisory.
- Eat up to 6 oz of Albacore/white tuna per week

FDA/EPA, 2004

## Harvard Center for Risk Analysis

- "...if pregnant women were to... replace fish high in mercury with fish low in mercury [and higher in omega-3 fatty acids], cognitive development benefits...could be achieved with virtually no nutritional losses."

Harvard School of Public Health

## www.fish4health.net Wallet Card

## iPhone app Fish4Health

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## Conclusions

- Women that are pregnant or nursing should:
  - eat 8-12 oz/wk of seafood
  - avoid seafood that is higher in pollutants
  - eat seafood that provides healthy nutrients
- Communicating a multi-pronged message can be difficult
- Effective communication strategies can help to minimize unintended consequences