

Balancing Seafood Risks

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Presentation Overview

- Benefits of Eating Fish
- Mercury
- PCBs
- Deep Water Horizon-BP Oil Spill
- 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

Harvard School of Public Health

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

Dariusz Mozaffarian, MD, DrPH

Eric B. Rimm, ScD

SINCE THE PUBLICATION OF PIO-

Context Fish (finfish or shellfish) may have health benefits and also contain contaminants, resulting in confusion over the role of fish consumption in a healthy diet.

Evidence Acquisition We searched MEDLINE, governmental reports, and meta-analyses, supplemented by hand reviews of references and direct investigations.

“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.

ents.²⁻²⁰ DHA also appears important for neurodevelopment during gestation and infancy.²¹⁻²⁶ Conversely, concern has arisen over p
cury, dioxin
biphenyls (P
species.²⁷⁻³⁴

seemingly conflicting reports on the risks and benefits of fish intake, resulting in controversy and confusion over the role of fish consumption in a healthy diet.^{35,36} To elucidate the relative risks

are not clearly established; methylmercury may modestly decrease the cardiovascular benefits of fish intake. A variety of seafood should be consumed; individuals with very high consumption (≥ 5 servings/wk) should limit intake of species highest in mercury

120,000 lives saved each year !!!

Conclusions For major health outcomes among adults, based on both the strength of the evidence and the potential magnitudes of effect, the benefits of fish intake exceed the potential risks. For women of childbearing age, benefits of modest fish intake, excepting a few selected species, also outweigh risks.

JAMA. 2006;296:1885-1899

www.jama.com

Rush Institute for Healthy Aging

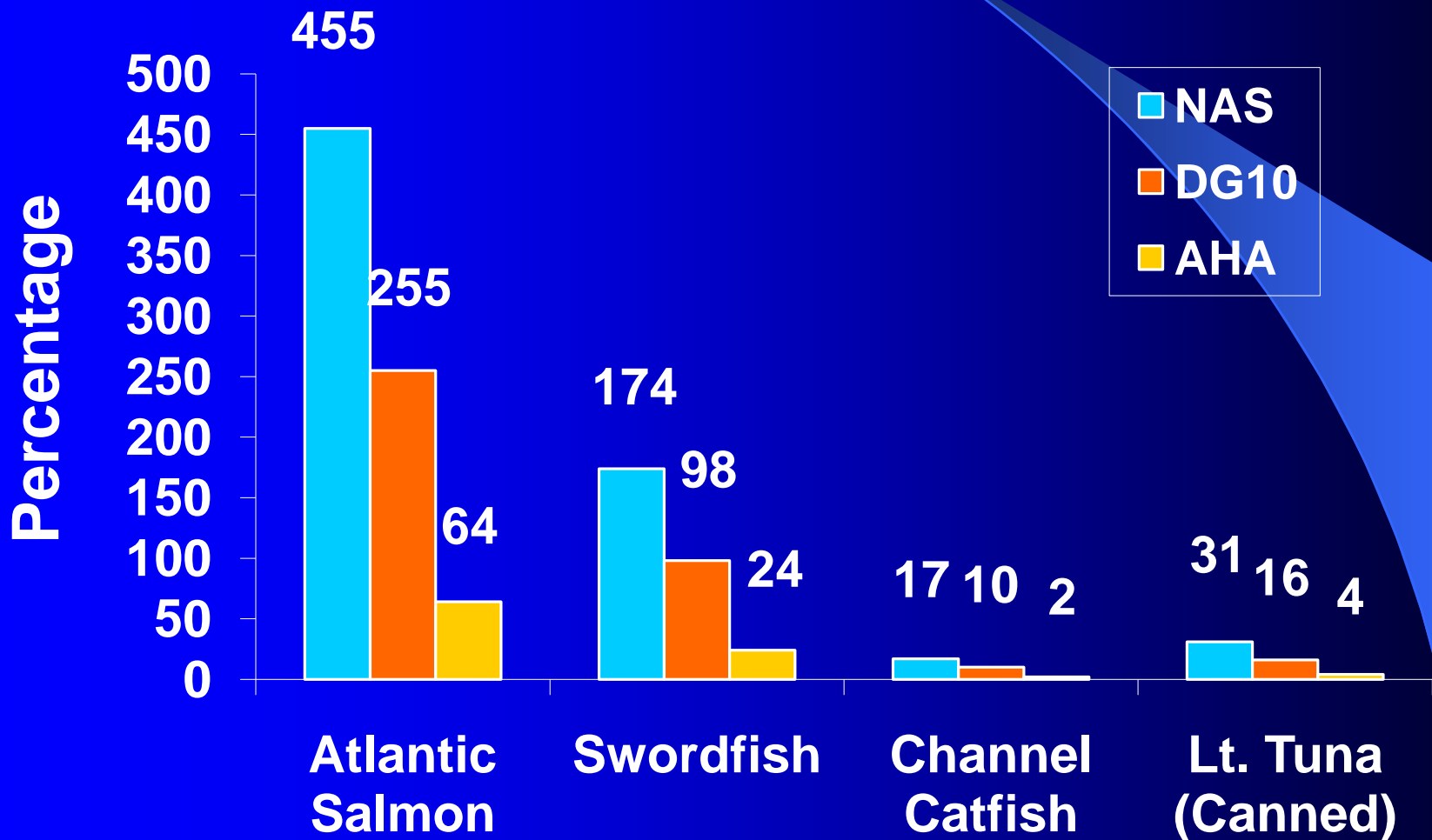
- Six year follow-up of subjects (≥ 65 yrs of age)
- Subjects (3,718) that consumed fish:
 - 1 meal/week had 10% slower cognitive decline
 - 2 meals/week had 13% slower cognitive decline

Morris et al. 2005. Fish consumption and cognitive decline with age in a large community. Arch. Neurology. 62: 1-5.

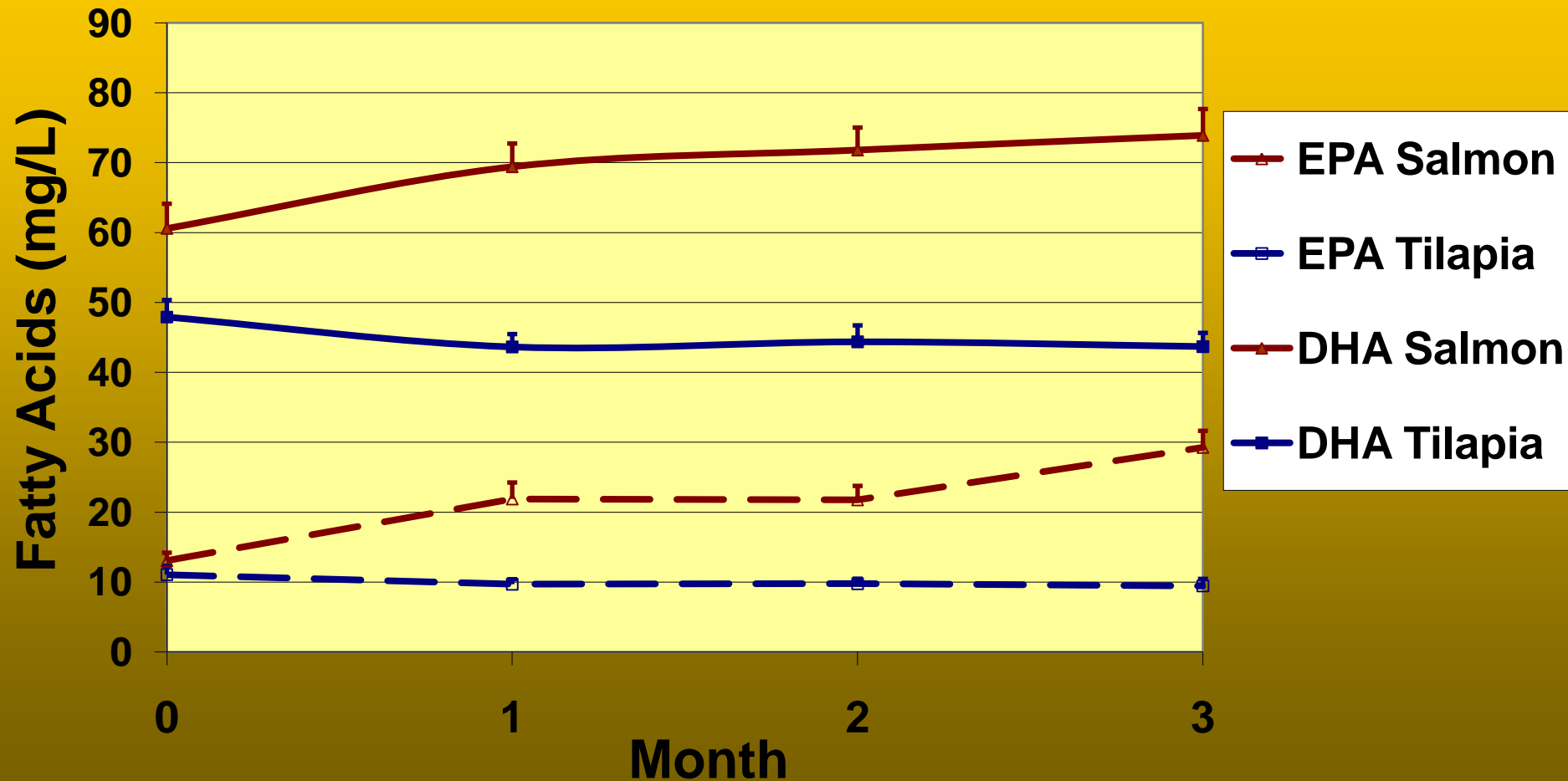
Dietary Recommendations

- National Academy of Sciences (NAS) - 2002
 - EPA + DHA = 140 mg/d (nursing/pregnant)
- Dietary Guidelines for Americans - 2010
 - 8-12 oz fish/wk (EPA + DHA = 250 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)

If you consume 8 oz/wk (raw weight),
what % of recommended EPA + DHA
levels do you get?



Effects of Fish on Omega-3 Status



Mercury

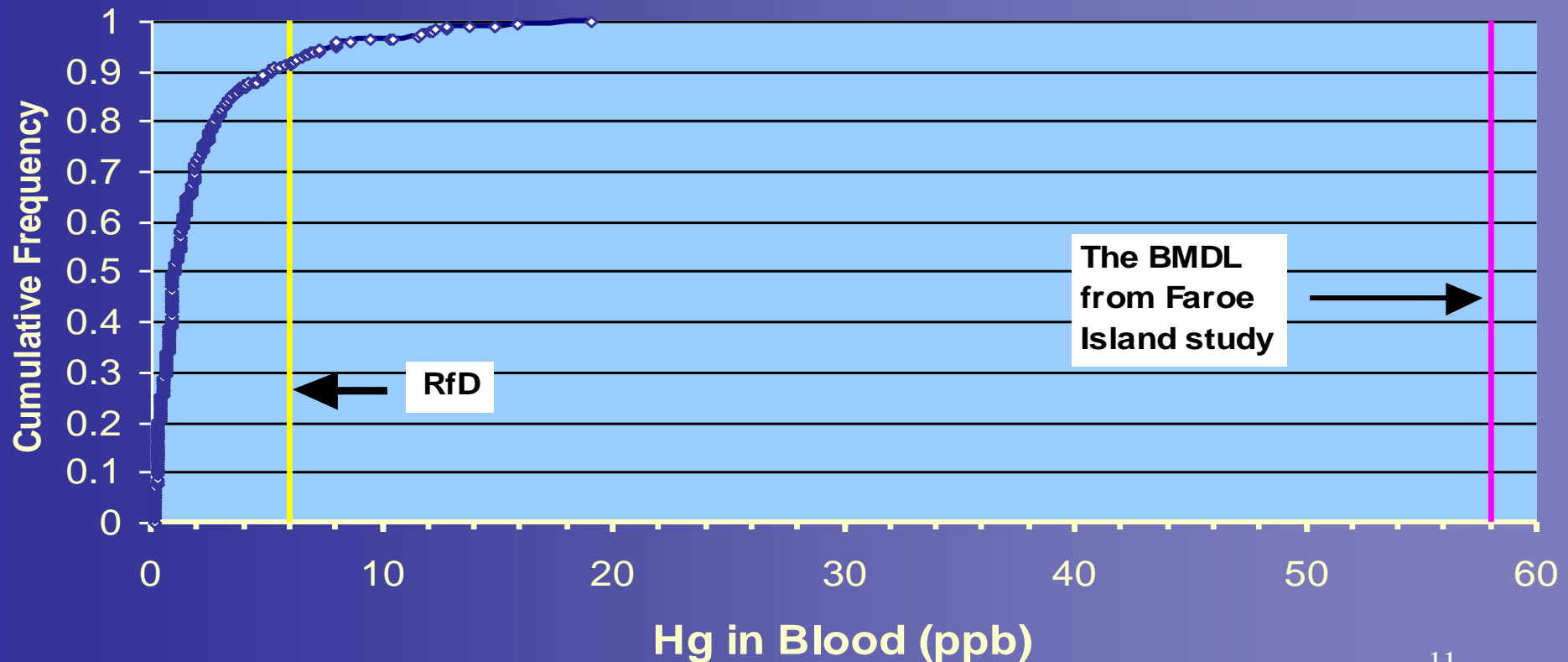
- Crosses placenta; Enters breast milk
- Clearance from body ~1 year
- Risk to fetuses and infants exposed at high levels incl. abnormalities in memory, attention, and language skills
- FDA's Action Level (AL) = 1,000 ppb
- EPA's RfD is 20-25% of the FDA's AL

NHANES (1999-2002) - Mercury

- 5.7% of U.S. women (16-49 yrs.) have levels of mercury in their blood that exceeds the RfD ($>5.8 \mu\text{g/L}$)

CDC. 2004.

NHANES Blood Mercury Levels



EPA Projection

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

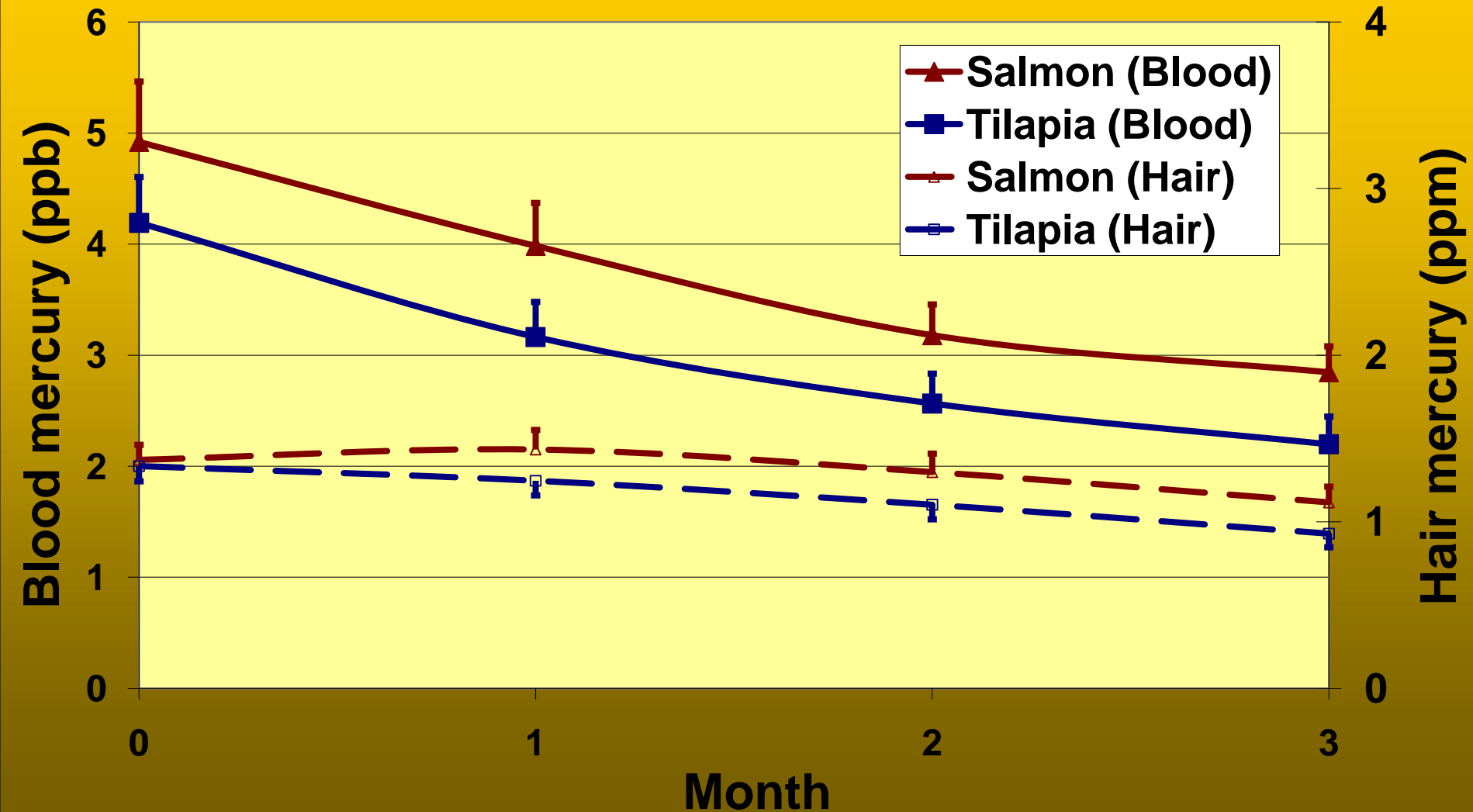
Mahaffey, EPA 2005

Mercury Toxicity in Adults

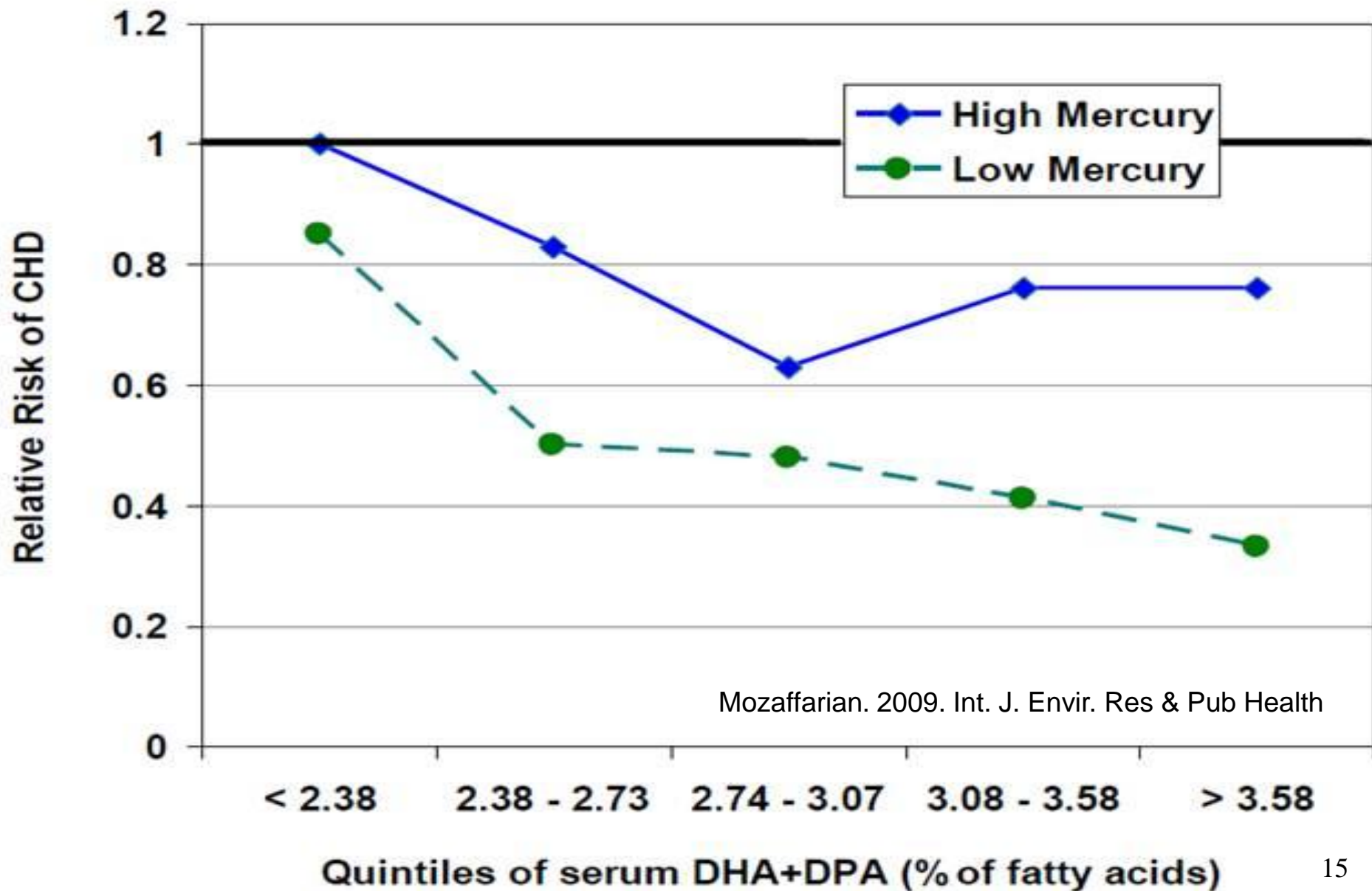
- Patients living in San Francisco
- Consumers of higher Hg fish
- Symptoms including fatigue, headache, decreased memory, decreased concentration, muscle and joint pain
- Symptoms gone after diet change

Hightower and Moore, 2003

Effects of Fish on Mercury Status



Mercury and CHD



Mercury Residues - Swordfish

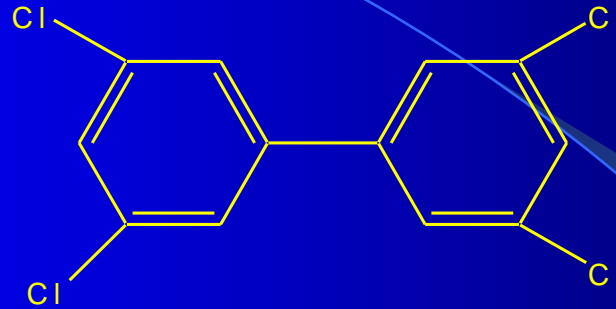
<u>Size (lbs)</u>	<u>Mercury (ppb)</u>
100-150	650
150-200	845
200-250	851
250-300	926
300-400	1636

Unpublished, Sustainable Seafood Forum, 2007

Selenium

- “Many....imagine that selenium ‘protects’ against mercury toxicity.... Selenium is not a ‘tonic’ that counteracts some undefined toxic mechanism of mercury....selenium is the target of mercury toxicity.” N. Ralston, 2011 (personal communication)
- Exciting research but at the rodent level
- Fate of mercuro-seleno complex?

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

Farmed salmon...risk?

From eating 8 oz of farmed salmon every week for 70 years (13x current 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 estimated 12,000 cancers over 70 years

Deep Water Horizon-BP Oil Spill

- NOAA, FDA, State Agencies tested crab, finfish, oysters, and shrimp for agents:
 - Dioctyl sodium sulfate (dispersant)
 - Polycyclic aromatic hydrocarbons
- 1,730 samples – 13 positive DOSS but well below the 100 ppm limit for finfish and 500 ppm limit for shrimp, crab and oysters

Fish Advisories

Possible Options for Advising Sensitive Populations

1. No recommendation
2. Recommend seafood consumption with no further advice
3. Recommend avoidance of higher mercury species
4. Recommend consumption of 8-12 oz/wk of seafood; while avoiding higher mercury species; and including species that provide omega-3 fatty acids

Option 2 – Recommend seafood consumption with no further advice

- How will this option affect mercury and omega-3 fatty acids (EPA & DHA) intake?

U.S. Fish Consumption - 2009

● Shrimp	4.1 lbs/person
● Canned Tuna	2.5
● Salmon	2.0
● Pollock	1.5
● Tilapia	1.2
● Catfish	0.9
● Crab	0.6
● Cod	0.4
● Flatfish	0.4
● Clams	<u>0.4</u>
Per capita	15.8

Option 3 - 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

Option 4 – Recommend seafood consumption along with mercury and omega-3 fa advice

- “...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

Why Eat Fish?

Pregnant or nursing women who eat fish that is high in omega-3 fatty acids will pass these nutrients to their babies and support healthy brain and eye development.

How Much Fish to Eat?

Health experts recommend that women eat 8-12 ounces/week and children (ages 2-6) eat 2 ounces/week. Three ounces of fish is about the size of a deck of cards.

Before Eating Fish That You Catch

Check with your State's Health Department for a fish consumption advisory for locally caught fish and avoid eating highly contaminated fish. Visit our website.

Do Not Eat Raw Fish

When pregnant, avoid eating raw oysters, raw fish (sushi) or refrigerated smoked fish. Do not feed raw fish to infants or children.

Learn More

For more information please visit our website:
fn.cfs.purdue.edu/fish4health/

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Fish for Your Health™



Advice for
Pregnant or Nursing
Women, Women Who
May Become Pregnant
& Children (2-6 years)

Justification

Why Eat Fish?

Fish provides many nutrients that are important for good health. Nutrients include: protein, vitamins (A, D), minerals (iodine, calcium, iron, selenium), omega-3 fatty acids (DHA and EPA) and antioxidants (astaxanthin). Fish is generally lower in saturated fats than meats. During pregnancy and nursing, many of these nutrients that the mother consumes are directly shared through the placenta to the developing fetus or through the milk to the nursing infant. The omega-3 fatty acid, DHA, is important for healthy brain and eye development in babies.

Advice for Pregnant or Nursing Women & Women Who May Become Pregnant

Best Choices Lowest in Mercury & Highest in Healthy Fats

herring
mackerel (Atlantic, jack, chub)
rainbow trout (farm raised)
salmon (wild or farm raised)
sardines
whitefish

Eating as little as 6 ounces per week of these fish provides the recommended amount of healthy omega-3 fatty acids.

Lowest Mercury 12 ounces per week

catfish (farm raised)
clams
cod
crab
flounder, plaice, sole
haddock
herring
mackerel (Atlantic, jack, chub)
mullet
oysters (cooked)
pollock
rainbow trout (farm raised)
salmon (wild or farm raised)
sardines
scallops
shrimp
squid
tilapia
tuna (Skipjack, Light, canned)
whitefish

Moderate Mercury 4 ounces per week

bass (saltwater, black)
buffalo fish
carp
freshwater perch
grouper
halibut
lobster (northern, Maine, Atlantic)
mahimahi (Dolphin-fish)
Pompano (Florida)
sablefish
sea trout (weakfish)
snapper
Spanish mackerel (S. Atlantic)
tilefish (Atlantic)
tuna (Albacore, Yellowfin, White, canned)
white croaker (Pacific)

High Mercury / PCB* Do Not Eat

bass (striped)*
bluefish*
Chilean sea bass
golden snapper
jack (Amberjack, Crevette)
king mackerel
marlin
orange roughy
shark
Spanish mackerel (Gulf of Mexico)
swordfish
tilefish (Gulf of Mexico)
tuna (all fresh or frozen)
walleye (Great Lakes)

*PCB (polychlorinated biphenyls) are higher in these species

Excessive mercury can pass through the placenta or mother's milk and harm your baby. Do not eat fish from the high mercury category. If you eat 4 ounces from the moderate category, don't eat any more fish from this category until the next week.

Wallet Card Focus Groups - URI

“Our focus groups (4) indicated that it is what consumers don't know about seafood that causes them to eat less seafood. In other words, consumers are badly misinformed about seafood, which causes them to be worried about what to buy. What they liked about your card is that it is complete – it covers many different kinds of species.”

--- Cathy Roheim, Professor

Seafood Restaurant Survey

Women (n=78) indicated that if they were pregnant, they would do the following based upon the wallet card:

92% would decrease their consumption of fish that is higher in mercury

77% would increase their consumption of fish that is higher in omega-3 fatty acids

83% said that they would use the card



Fish4Health.net

[YouTube Introduction](#)

[Wallet Card](#)

[iPhone Application](#)

[Mobile Websites](#)

- In English
- En Español

[Commercial Fish Advisories](#)

- In English
- En Español
- Kosher

[Risks from Contaminants](#)

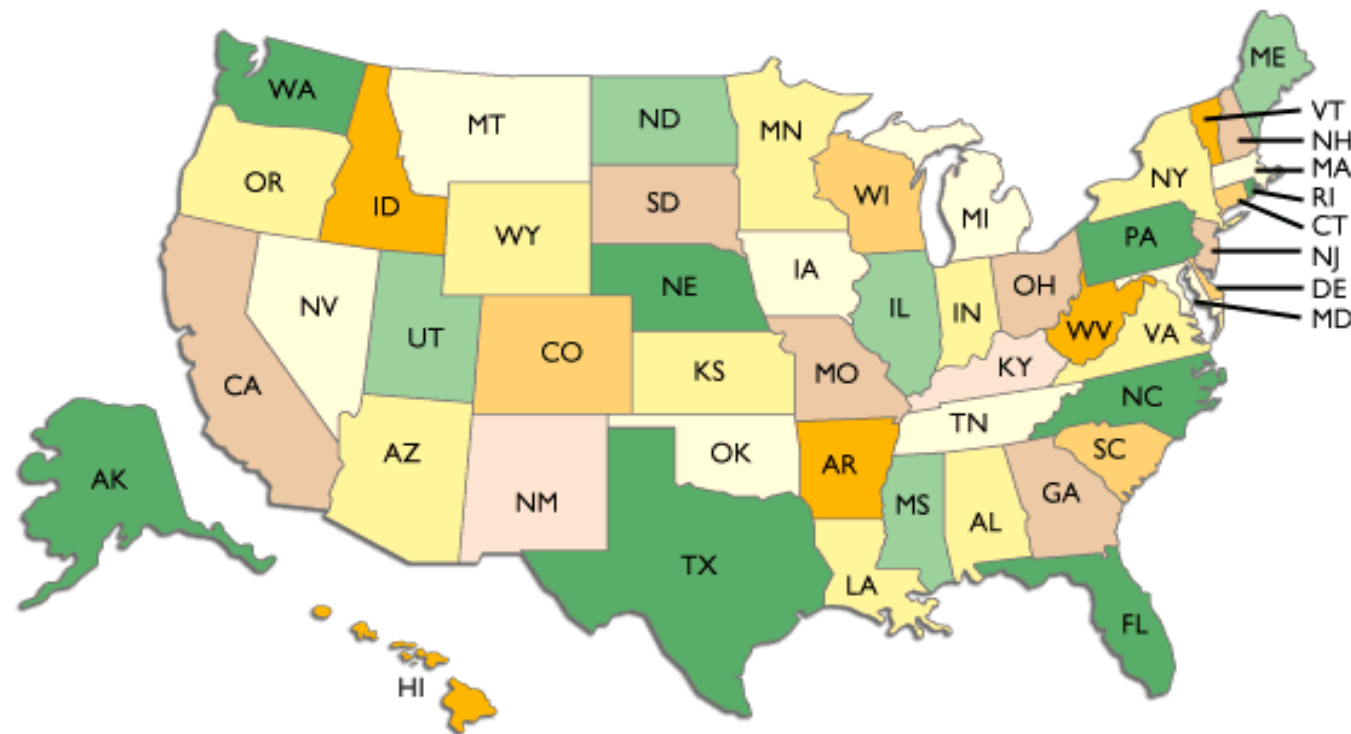
[Health Benefits](#)

[How to Clean Fish \(Video\)](#)

[Purdue Research](#)

[Contact Us](#)

Choose a State from the map or select one from the list to view local fish consumption advice.



--Choose a State--



GO

53,433

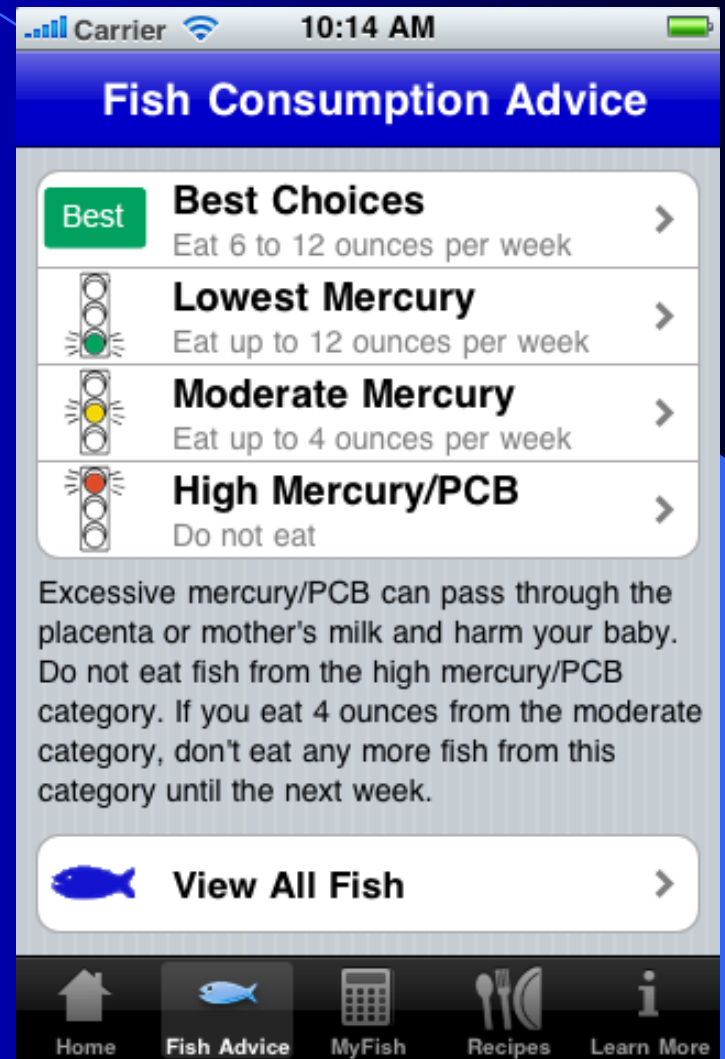
Other Sites:



AquaNIC

PURDUE
UNIVERSITY

iPhone app Fish4Health



MyLog Seafood Calculator

Carrier 1:42 PM

Cancel Settings Save

Body Weight: ⓘ

pounds kilograms

100

EPA + DHA Target Intake: ⓘ

140 mg/day 500 mg/day

Display Units for Report:

ounces grams

Daily Notifications: ⓘ

On Off

Carrier 1:37 PM

Back List of Fish

M

Best Mackerel, Atlantic

Best Mackerel, Chub

Mackerel, Spanish...

Mahi Mahi (Dolphin-...

Marlin

Monkfish

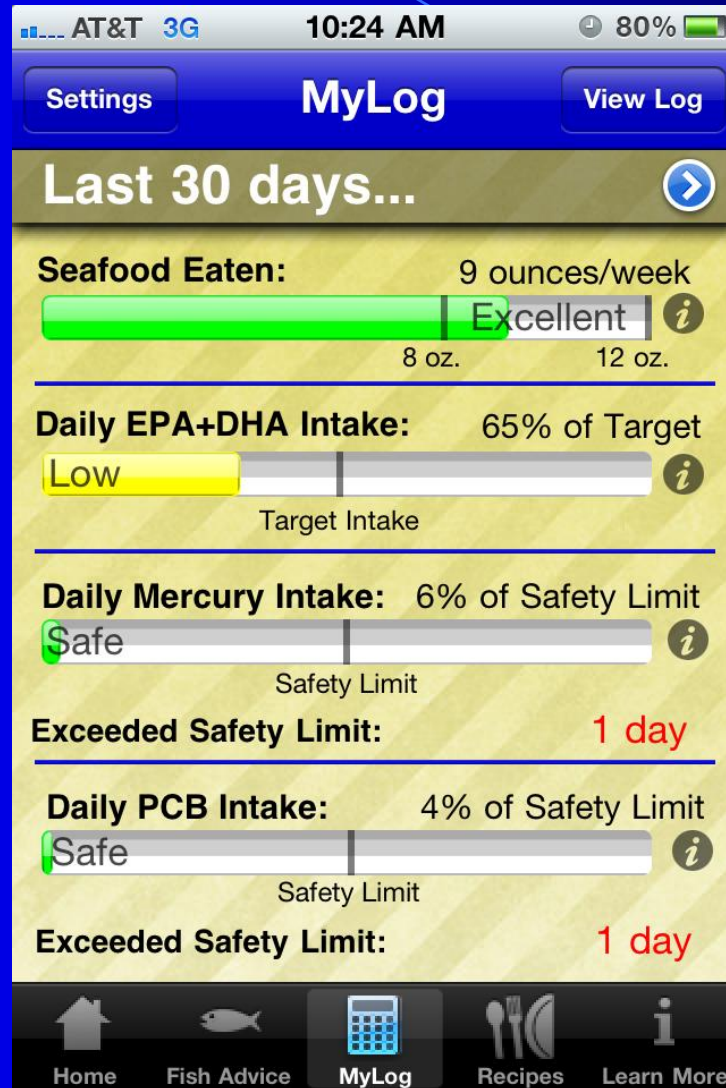
Mullet

N

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Home Fish Advice MyLog Recipes Learn More

iPhone app Fish4Health



IPHONE APPS FOR PREGNANCY



babble best



week-by-week



**planning,
organizing &
nesting**



**health and
fitness**



giving birth



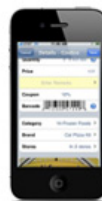
games and tools



what's your favorite?

Top 25 iPhone Apps For Pregnancy

Congratulations, you're pregnant! Now what? Well, there's an app for that. In addition to friends, family, and your doctor, your iPhone can be a great source of information. With everything from weekly updates on how your baby is developing to fun apps that pimp your ultrasound (yes, seriously!), here are the best pregnancy apps I found on the market. — *Nina Cutter*



**want
more?**

Here are the
best apps
for moms! »

12 Fish4Health

12 / 25



PREVIOUS ◀ ▶ NEXT

Tweet 1

like

FISH4HEALTH'S RANKINGS

#2 Health and Fitness
FREE

Pregnancy diet restrictions can be overwhelming and confusing. Can I eat shrimp? Is salmon safe? This app, developed by a scientist from Purdue University, sets the record straight and tells you what you can and cannot safely consume. Fish4Health also allows you to track your seafood consumption in a journal so that you know exactly how much omega-3 fatty acid, mercury, and PCB is in your system.

do i
detect
basil?

babies for yum!
CAPTION CONTEST

Write a caption,
you could win.

ENTER NOW

**A mom-must.
Get the Daily Babble.**

Enter email address here **GO!**

Sign up today!

TOP 25 IPHONE APPS FOR PREGNANCY

giving birth



1. **Perfect OB Wheel »**



2. **iContraction »**



3. **Stage 1 »**



4. **Stork CC »**

USDA, NIFA, NIFSI Grant

Partners: University of Rhode Island Sea Grant; Aquarium of the Pacific; Washington State Sea Grant; Illinois-Indiana Sea Grant; Florida Department of Health?

- Test locally-important commercial fish for mercury and omega-3 fatty acids
- Modify the wallet card for 5 regions
- Conduct educational intervention with 220 pregnant or nursing women from 5 regions divided among 3 treatments: FDA/EPA Advisory, wallet card, or wallet card with added info

Option 4 - Best Recommendation for Sensitive Populations

- Women that are pregnant or nursing:
 - eat 8-12 oz/wk of seafood
 - avoid seafood that is higher in pollutants
 - eat seafood that provides healthy nutrients

Why has seafood consumption recently declined in the U.S.?

1. Canned tuna, swordfish - mercury
2. Farmed salmon – PCB controversy, and production difficulties in Chile
3. Gulf seafood – Imports, Katrina, BP oil spill, and reduced tourism
4. General seafood consumption – economic downturn, reduction in restaurant servings, and confusion about contaminants