Balancing Seafood Risks vs. Benefits

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Presentation Overview

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

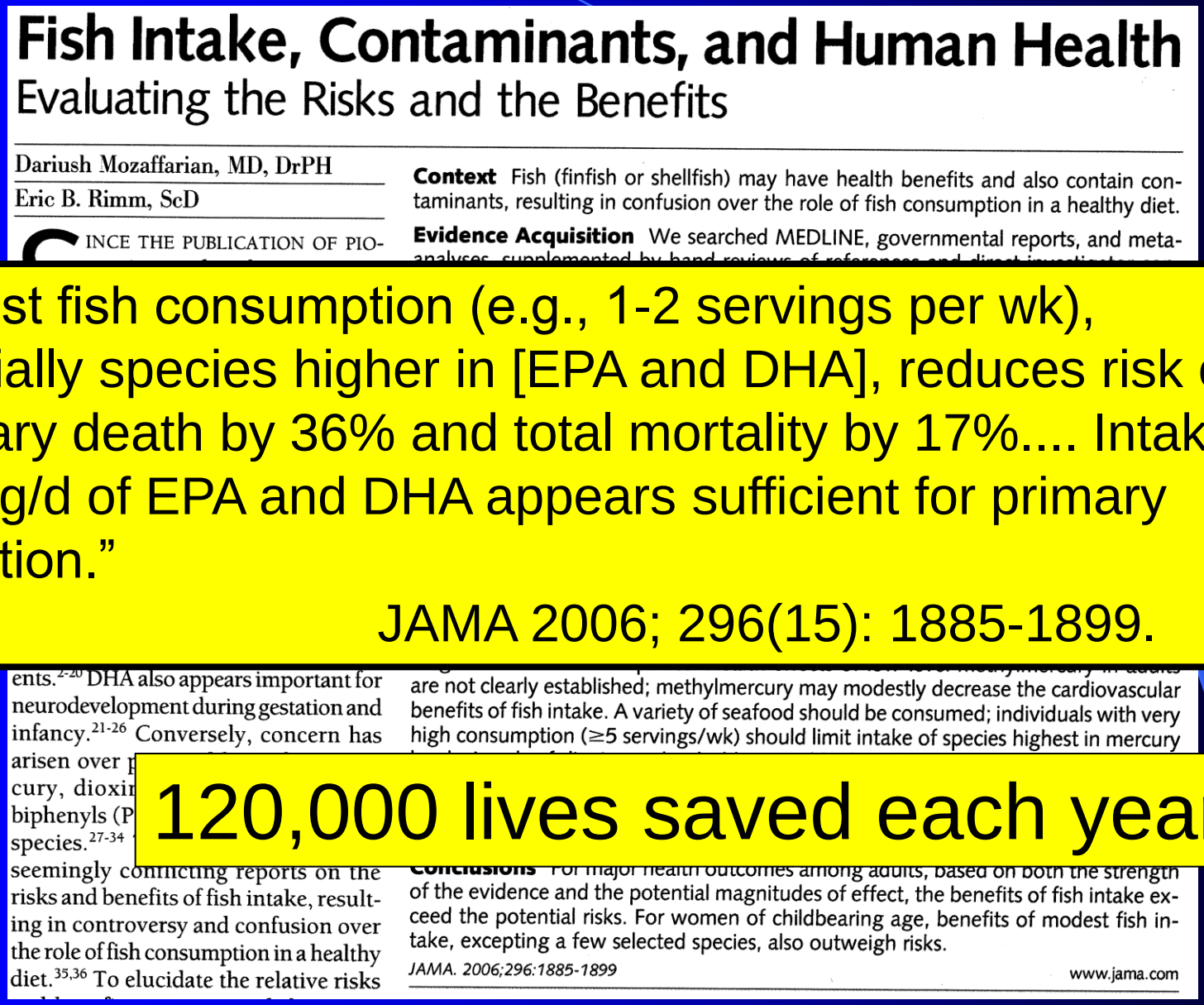
Seafood Choices: Benefits

- **Fetus**
  Duration of gestation & Birth weight +?

- **Infant/Child**
  Visual acuity and sensory motor development ++
  Cognitive development ++
  Sleep patterns +
  Allergy/Asthma 0
  ADHD 0

IOM, 2006

Harvard School of Public Health



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

Dariush Mozaffarian, MD, DrPH
Eric B. Rimm, ScD

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-

"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, dioxi
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

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.

120,000 lives saved each year !!!

Rush Institute for Healthy Aging

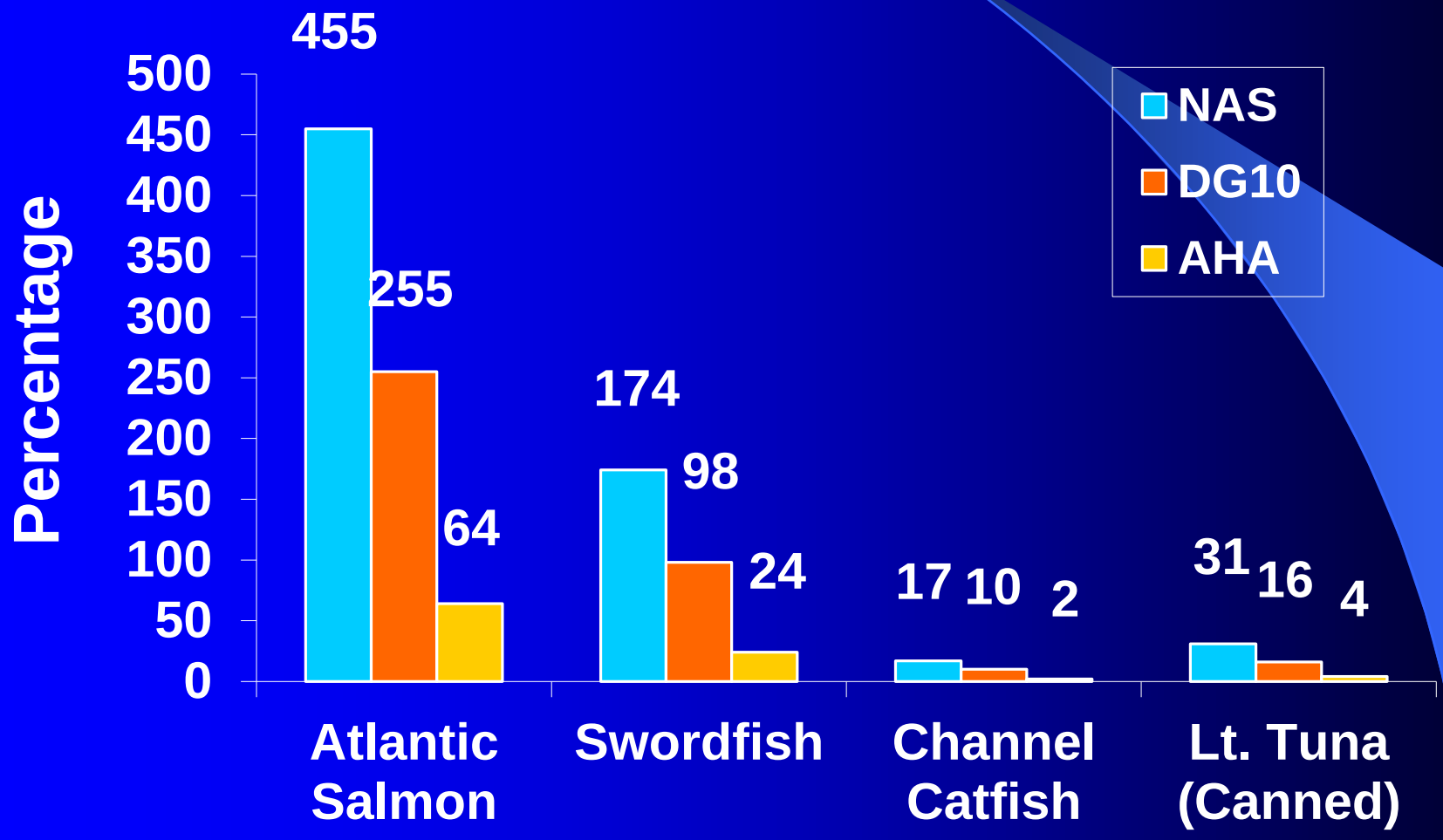
- Six year follow-up of subjects (≥65 yrs of age)
- Subjects (3,718) that consumed fish:
  - 1 meal/week had 10% slower cognitive decline
  - 2 meals/week had 13% slower cognitive decline

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?

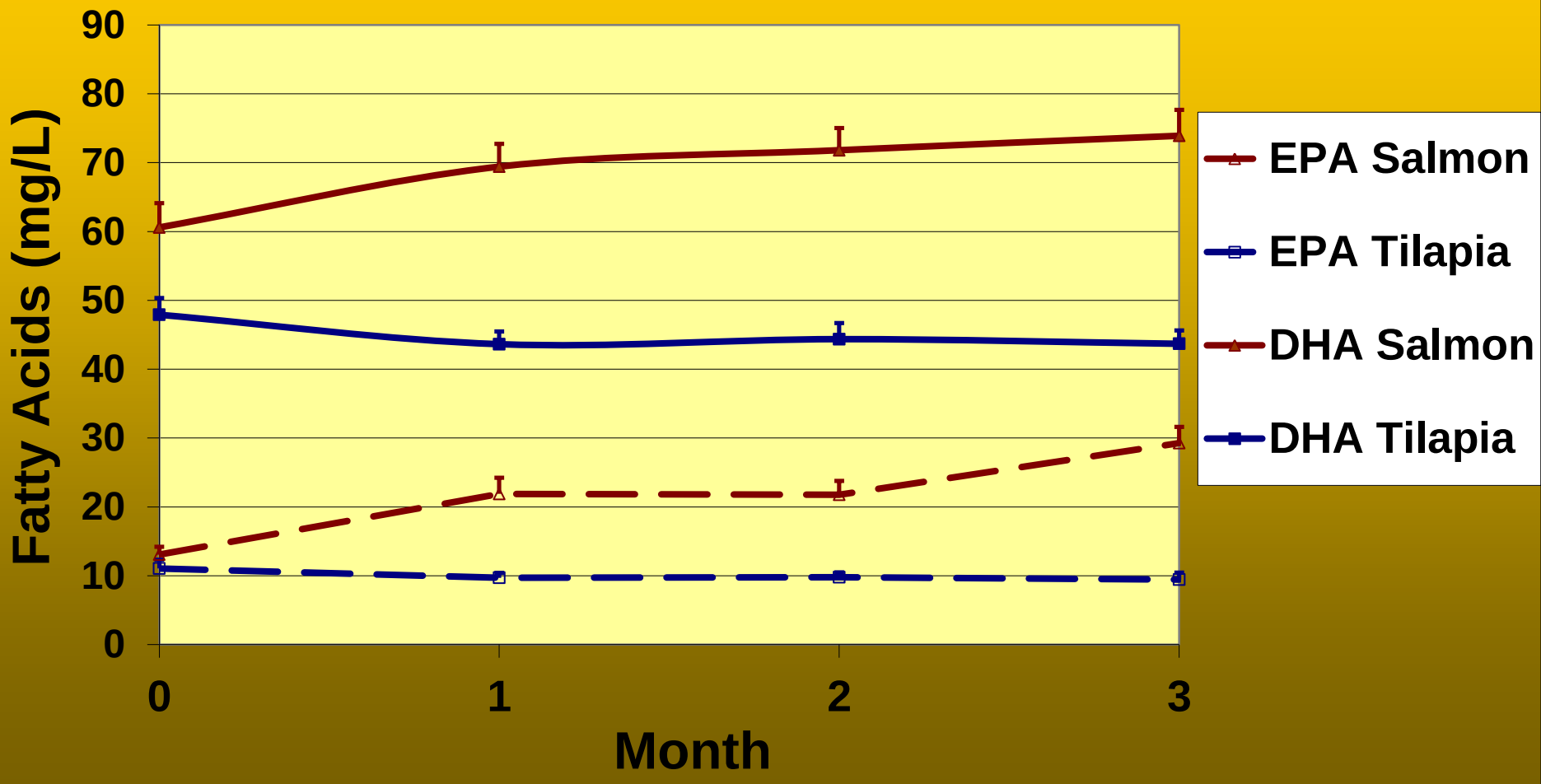


U.S. Fish Consumption - 2009

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	**0.4**
Per capita	**15.8**

NFI, 2010

Effects of Fish on Omega-3 Status



Mercury

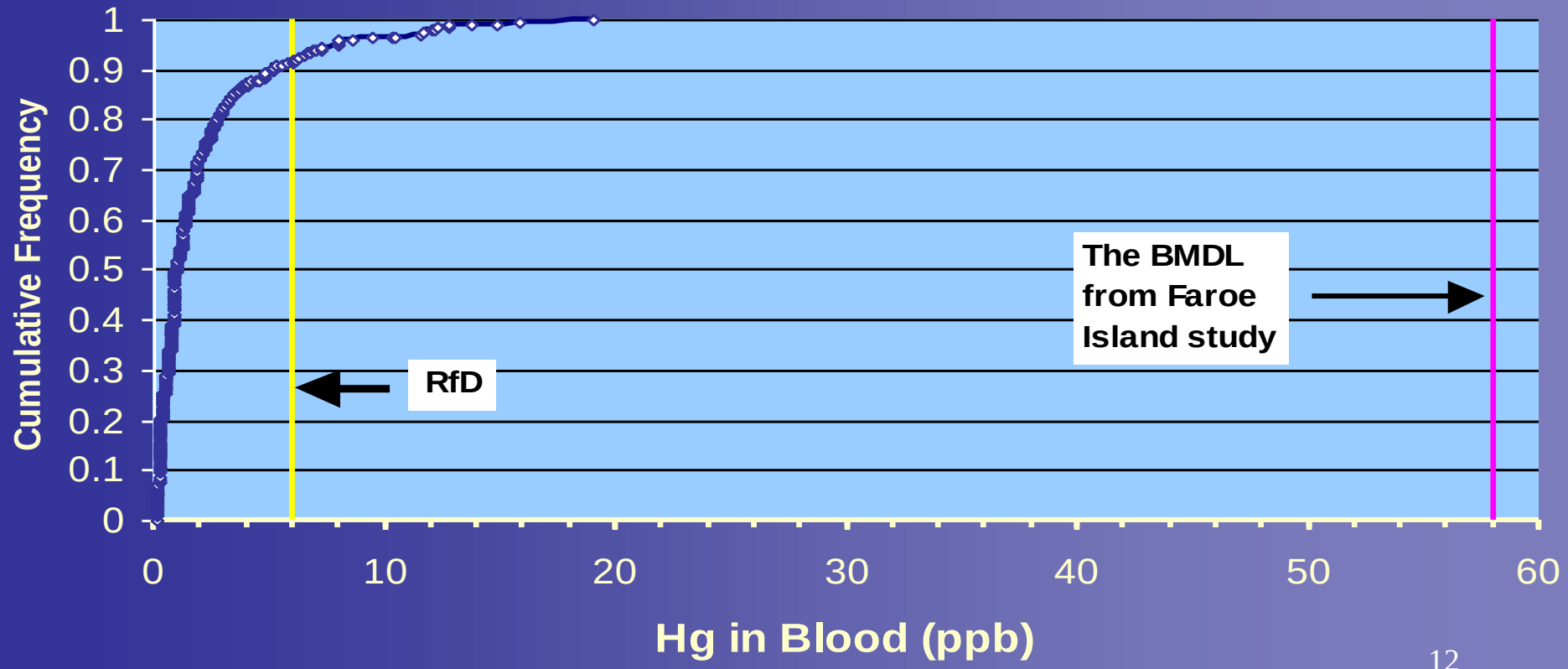
- Crosses placenta; Enters breast milk
- Clearance from body ~1 year
- Risk to fetuses and infants exposed at high levels incl. abnormalities in memory, attention, and language skills
- FDA's Action Level (AL) = 1,000 ppb
- EPA's RfD is 20-25% of the FDA's AL

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 µg/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

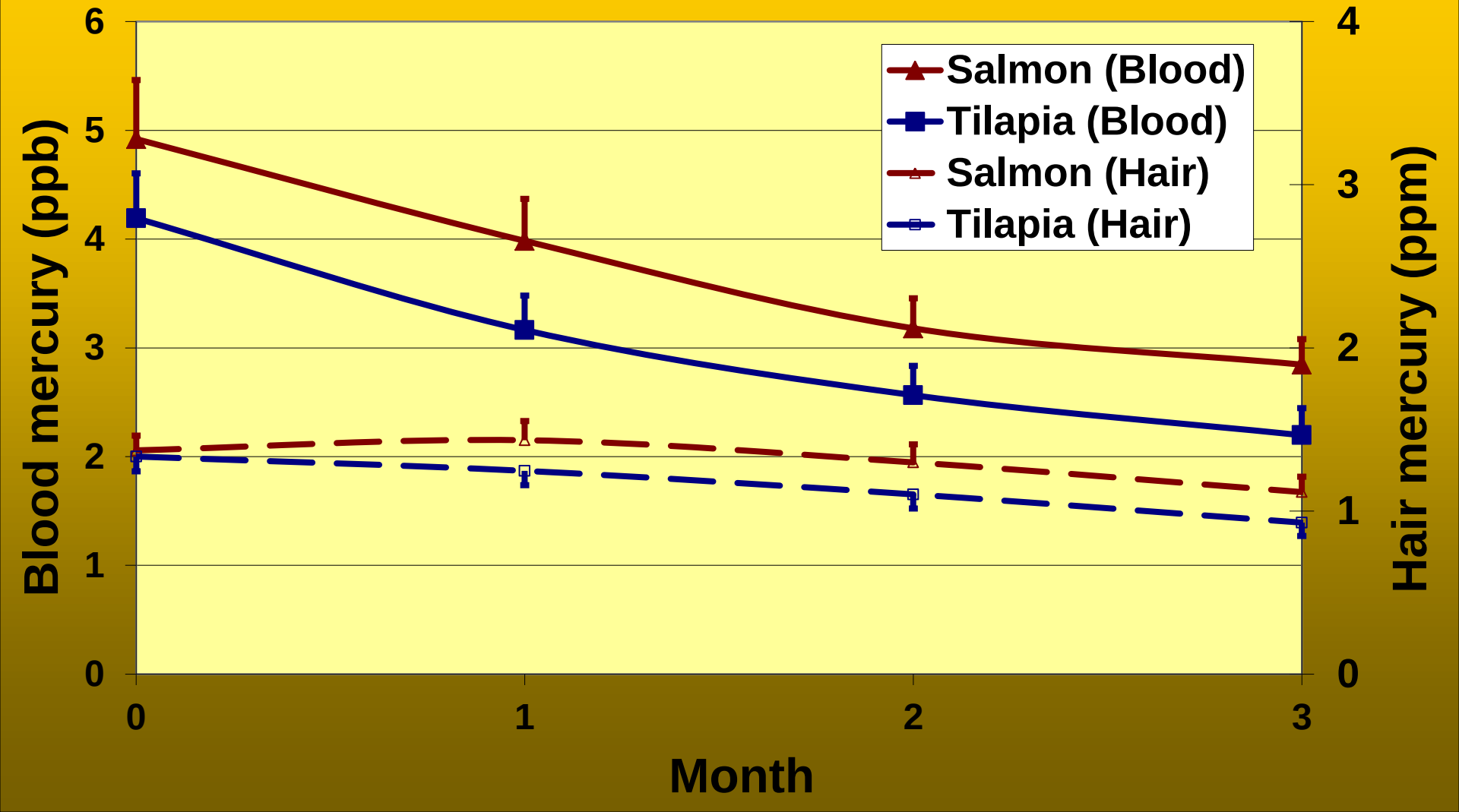
Mahaffey, EPA 2005

Mercury Toxicity in Adults

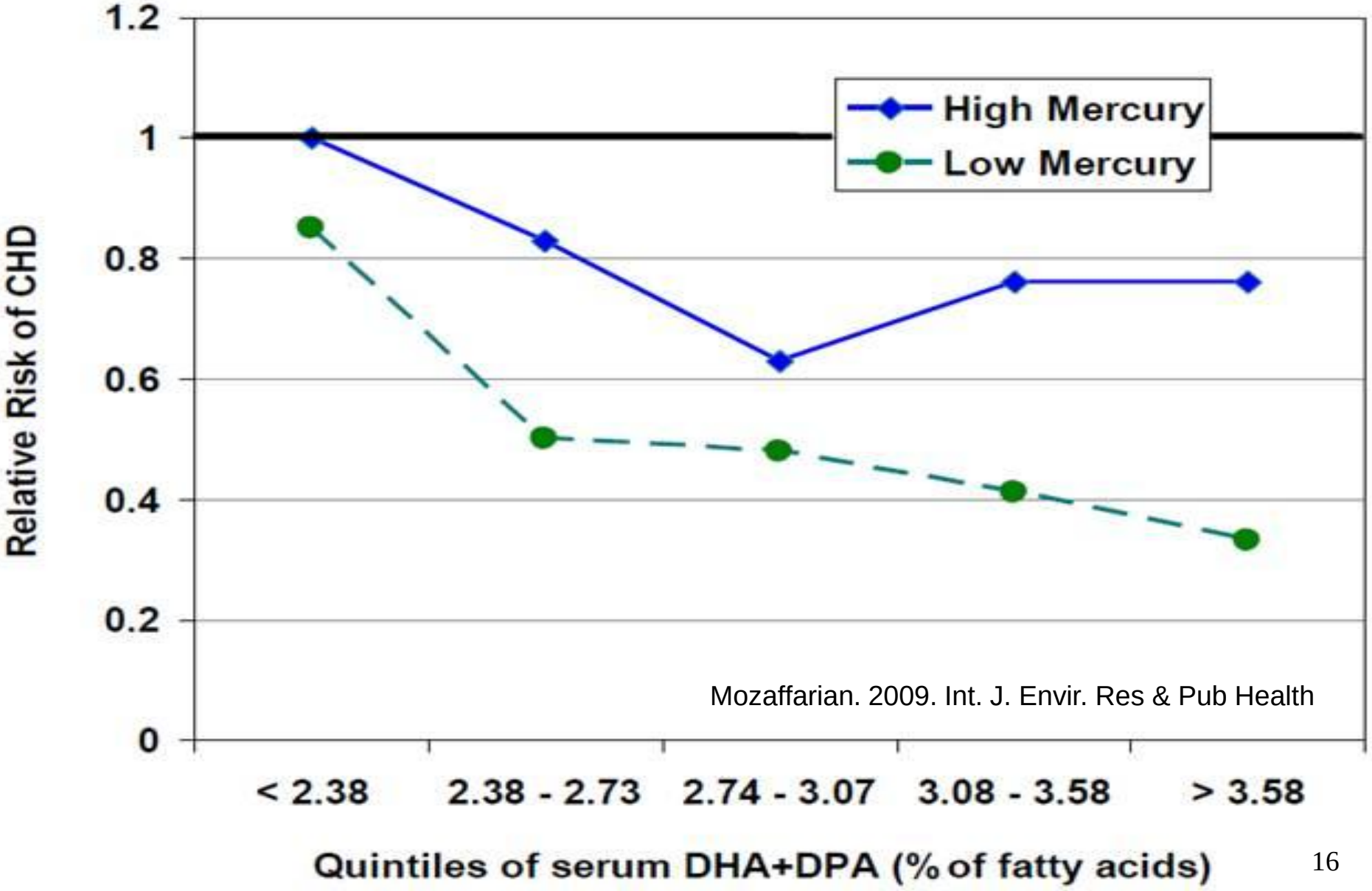
- Patients living in San Francisco
- Consumers of higher Hg fish
- Symptoms including fatigue, headache, decreased memory, decreased concentration, muscle and joint pain
- Symptoms gone after diet change

Hightower and Moore, 2003

Effects of Fish on Mercury Status



Mercury and CHD



Mercury Residues - Swordfish

Size (lbs)	Mercury (ppb)
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?

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
- 6,817 mi^2 closed (2.8%) to recreational and commercial fishing (5/2/11)

Fish Advisories

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

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)

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

Best Choices Lowest in Mercury & Highest in Healthy Fats	Lowest Mercury 12 ounces per week	Moderate Mercury 4 ounces per week	High Mercury / PCB* Do Not Eat
herring mackerel (Atlantic, jack, chub) rainbow trout (farm raised) salmon (wild or farm raised) sardines whitefish	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	bass (saltwater, black) buffalo fish carp freshwater perch grouper halibut lobster(northern, Maine, Atlantic) mahi mahi (Dolphin-fish) Pompano (Florida) sablefish sea trout (weakfish) snapper Spanish mackerel (S. Atlantic) tilefish (Atlantic) tuna (Albacore, Yellowfin, White, canned) white croaker (Pacific)	bass (striped)* bluefish* Chilean sea bass golden snapper jack (Amberjack, Crevalle) king mackerel marlin orange roughy shark Spanish mackerel (Gulf of Mexico) swordfish tilefish (Gulf of Mexico) tuna (all fresh or frozen) walleye (Great Lakes)

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

*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.

Justification

Why Eat Fish?

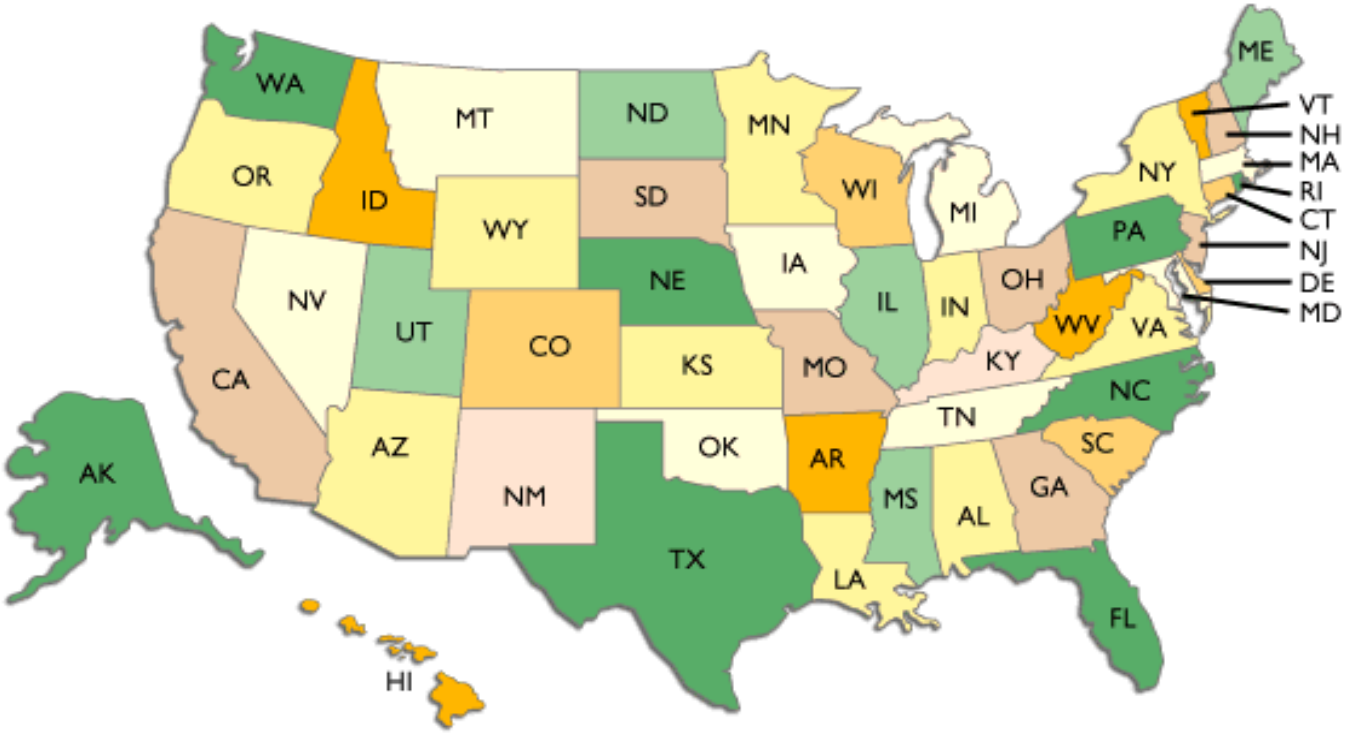
Fish provides many nutrients that are important for good health. Nutrients include: protein, vitamins (A, D), minerals (iodine, calcium, iron, selenium), omega-3 fatty acids (DHA and EPA) and antioxidants (astaxanthin). Fish is generally lower in saturated fats than meats. During pregnancy and nursing, 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.

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

PURDUE UNIVERSITY

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



--Choose a State-- GO

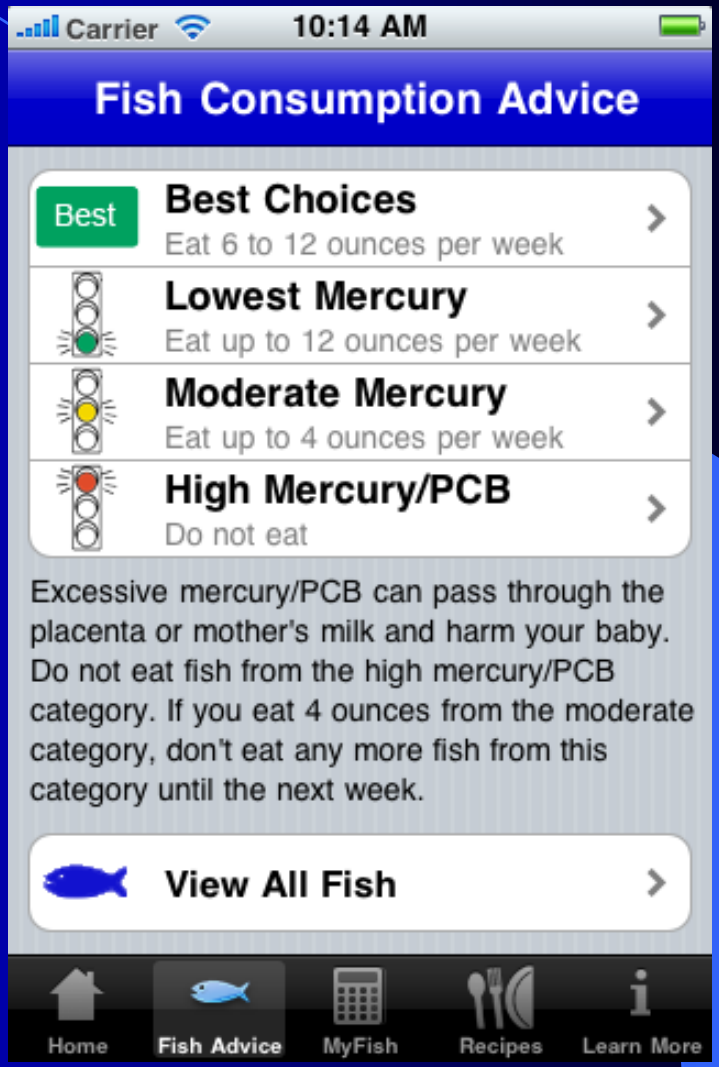
53,433

Other Sites:

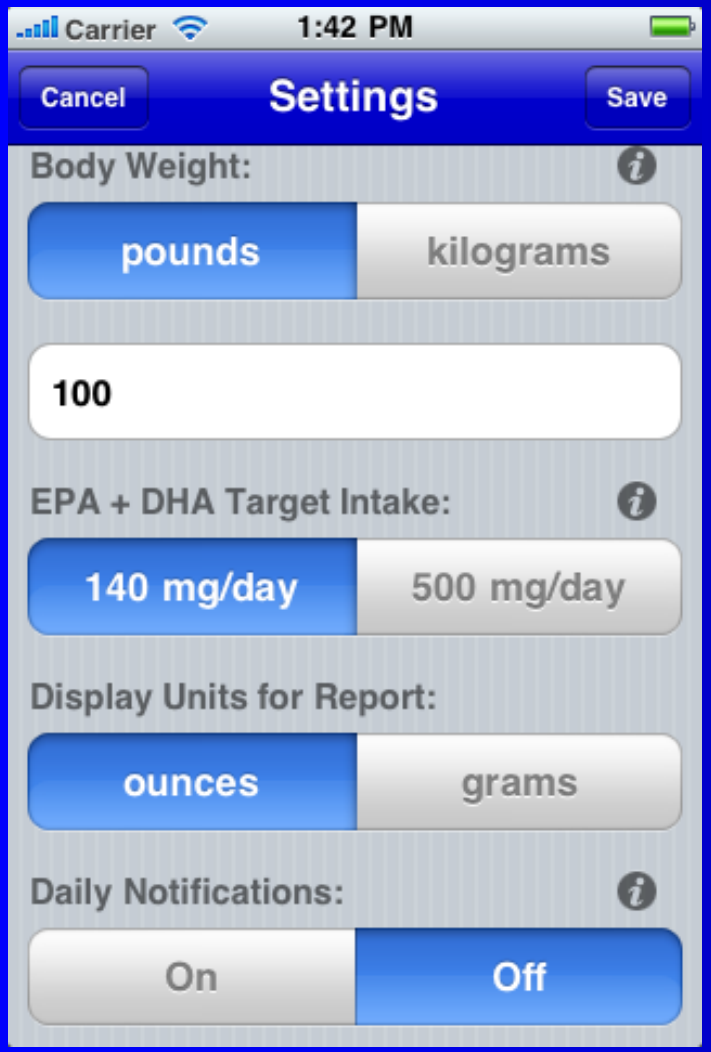
FDA

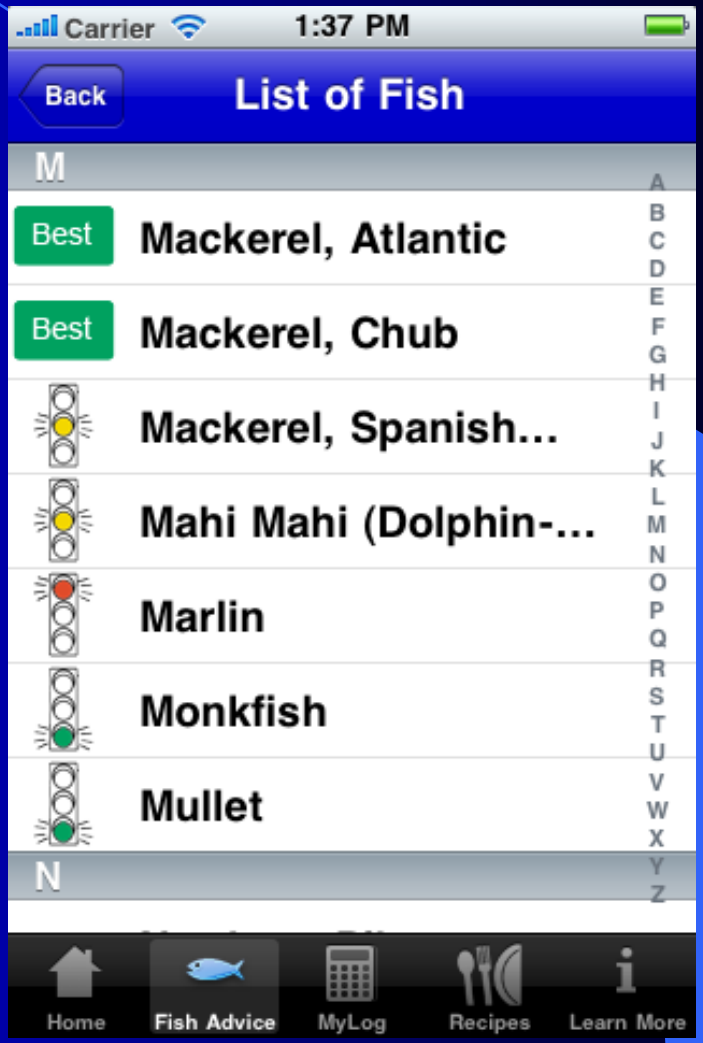
AquaNIC

iPhone app Fish4Health

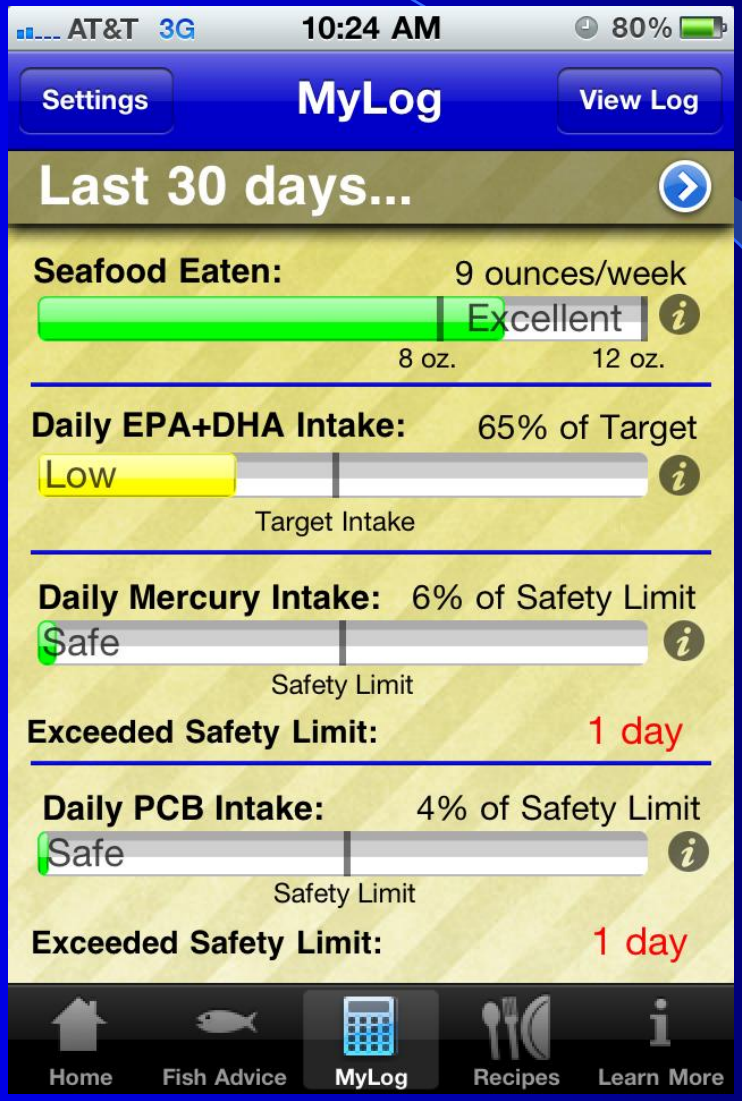


MyLog Seafood Calculator





iPhone app Fish4Health



Conclusions

- 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
- For the general population (including men and post-menopausal women):
  - eat 8-12 oz/wk of seafood
  - eat seafood that provides healthy nutrients
  - use some caution to limit pollutants