

# BIOMONITORING CALIFORNIA

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**What is  
biomonitoring?**

A way to measure the chemicals in a person's body.

Scientists usually test for chemicals in samples of blood and urine.

# What You Can and Can't Learn From Biomonitoring

# What can you learn from Biomonitoring?

- About whether or not certain chemicals are in your body
- How much of these chemicals are in your body

# What you can't learn?

- Where the chemicals came from
- How much of a given chemical can cause health problems

# Biomonitoring California Goals

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Senators Perata, Ortiz, Gov. Schwarzenegger

# Organizational Structure

**Scientific Guidance Panel**

**California  
Department of  
Public Health**

**Department of  
Toxic Substances  
Control**

**Office of  
Environmental  
Health Hazard  
Assessment**

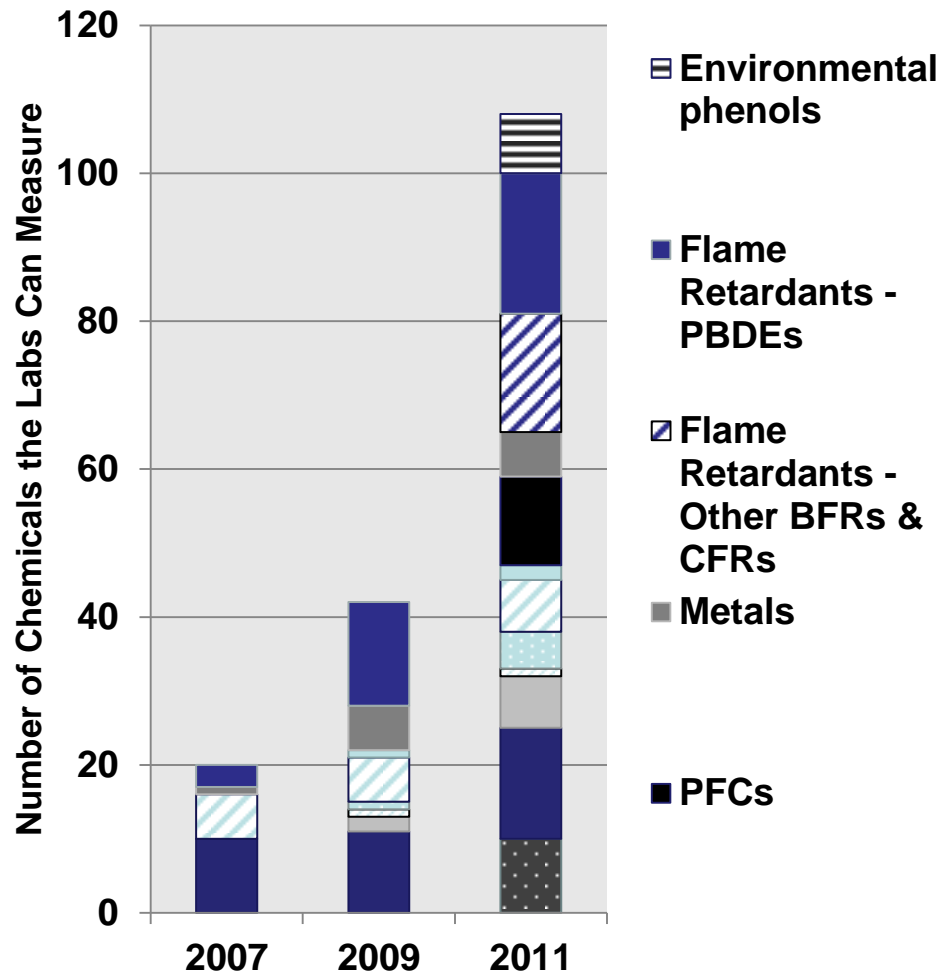
**Public Participation**

**Centers for Disease Control and Prevention**

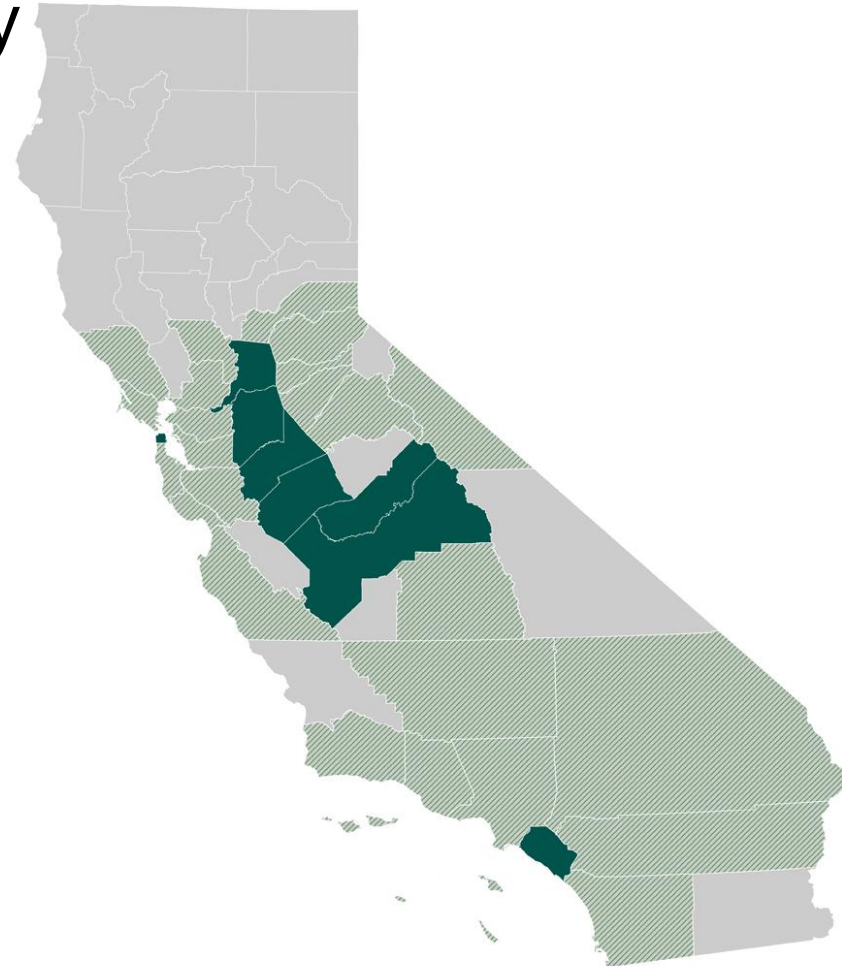


# Current Activities of Biomonitoring California

**Figure 1: Chemicals that Biomonitoring California Laboratories Can Measure - Progress, 2007-2011**



# Biomonitoring California Project Collaboration Progress By County as of May 2012



## LEGEND

-  Samples from Biomonitoring California full project collaborations
-  Samples from Biomonitoring California laboratory collaborations

# Reporting Individual Test Results to Participants



## Opportunities

- Raise awareness
- Increase healthy behaviors of individuals

## Challenges

- Little is known about many chemicals
- Time consuming

# Your Mercury Lab Results

Part 1: Metals in Blood

We tested your blood for mercury. Mercury is a metal found in nature. Mercury that gets into the environment from coal burning, some industries, and past use in California gold mining can build up in certain types of fish.

Your level of mercury micrograms per liter ( $\mu\text{g/L}$ )	Range of levels for firefighters in this study ( $\mu\text{g/L}$ )	National levels ( $\mu\text{g/L}$ )		Level of concern for men ( $\mu\text{g/L}$ )
		Median	95 <sup>th</sup> percentile	
1.00	0.60 to 8.23	0.9	5.3	10 and above

## Was there mercury in my blood?

Yes. Your mercury level was 1.00  $\mu\text{g/L}$ .

## What can I compare my level to?

You can use the table above and the graph of your mercury results to compare your mercury level to:

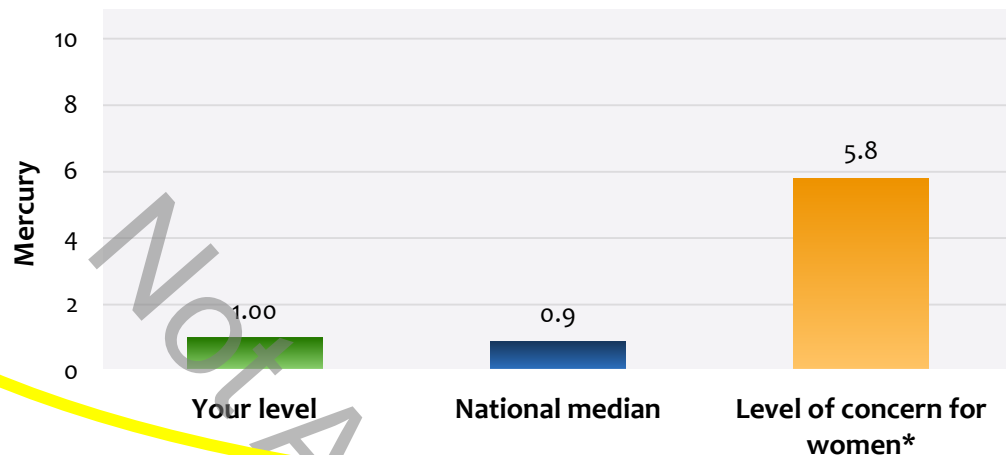
- **Other firefighters in this study.** We found mercury in all firefighters tested. The levels ranged from 0.60 to 8.23  $\mu\text{g/L}$ .
- **National levels**
  - **Median** — Half the adults tested in the U.S. had a level above the median and half below.
  - **95<sup>th</sup> percentile** — 95% of adults tested in the U.S. had a level below this number.

People who live on the East or West coasts tend to eat more fish and have higher levels of mercury compared to those who live in the rest of the U.S. The national median and 95<sup>th</sup> percentile do not tell us anything about what level might be a health concern. They are just another way for you to compare your results with others.

- **Level of concern** — Your mercury level was below the level of concern. If an adult man has a mercury level of 10  $\mu\text{g/L}$  or above, we notify him of his results early and provide advice on choosing lower-mercury fish. There are no proven health problems associated with this level of mercury. However, we provide advice as a precaution.

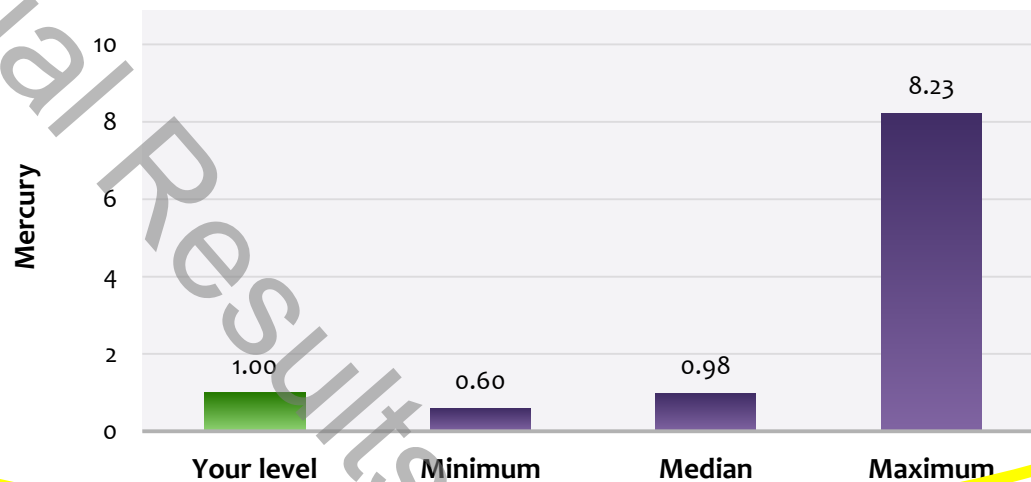
# Your Mercury Results

Your mercury level compared to the national median and level of concern



\* The level of concern for adult men is 10 micrograms per liter

Your mercury level compared to the other OCFA firefighters in FOX



Levels for all firefighters in FOX

# Frequently Asked Questions about Mercury

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## Where is mercury found?

- Certain types of fish and seafood – this is the most common source of exposure to mercury
- Some imported face creams used for skin lightening, anti-aging, or acne
- Silver-colored dental fillings
- Glass thermometers, and older barometers and blood pressure gauges
- Fluorescent light bulbs such as compact fluorescent light bulbs (CFL bulbs)

## Can mercury harm people's health?

- Mercury can affect brain development and cause learning and behavior problems in children and in babies exposed in the womb.
- Mercury can harm the nervous system and kidneys in adults.
- Mercury may affect the heart.

## What can I do?





- Choose fish that are lower in mercury. Examples include: salmon, tilapia, trout, canned light tuna, sardines, anchovies, and oysters.
- Avoid fish that are high in mercury. Examples include: shark, swordfish, orange roughy, and bluefin and bigeye tuna.
  - Do not use imported creams for skin lightening, acne treatment, or anti-aging unless you are certain that they do not contain mercury.
  - Properly clean up any mercury spills, such as from broken thermometers or CFL bulbs (<http://www.epa.gov/mercury/spills/>). Do not let children play with the silver liquid from these items.

## For more information:

- Choosing fish that are lower in mercury: [http://www.oehha.ca.gov/fish/pdf/2011CommFishGuide\\_color.pdf](http://www.oehha.ca.gov/fish/pdf/2011CommFishGuide_color.pdf)
- Advice on mercury in fish that you catch: <http://www.oehha.ca.gov/fish.hg.index.html> or call (510) 622-3170
- Concerns about mercury exposure: call the California Poison Action Line, 1-800-222-1222, or go to <http://calpoison.org/home.html>




# Chemicals Measured in Biomonitoring California studies

(red = chemicals that may be found in fish)

Metals in blood (cadmium, lead, <b>mercury</b> )	
Perfluorinated compounds (PFCs)—12	
Polybrominated diphenyl ethers ( <b>PBDEs</b> )	
Polychlorinated biphenyls ( <b>PCBs</b> )	
Organochlorine pesticides ( <b>DDTs, chlordane</b> )	
Selected brominated flame retardants (BFRs)	
Phthalates	
Pyrethroid and Organophosphate (OP) metabolites	
Bisphenol A (BPA), triclosan	
Metals in urine (arsenic, <b>mercury</b> )	
Hydroxy polycyclic aromatic hydrocarbons (OH-PAHs)	



# Biomonitoring for Mercury

Chemical	Mercury		
Forms	elemental 	organic (methyl) 	inorganic 
“Best” biomonitoring test ?	blood urine	blood hair	urine
Biomonitoring Timeframe	blood- days urine – months	blood - days hair – months/yr	weeks

# Should we Measure Mercury in Blood or Urine?

- Total blood mercury levels increase with greater fish consumption

(Dewailly et al., 2001; Grandjean et al., 1995; Mahaffey et al., 2004; Sanzo et al., 2001; Schober et al.,



- Urine mercury levels increase as more occlusal surfaces of teeth are filled with mercury-containing amalgams (Becker et al., 2003)



# Biomonitoring Measures

## Exposures From All Sources of Mercury



Use other methods to identify likely sources:

- Questionnaires
  - Dietary history
    - Fish consumption
    - Drinking water sources
    - Herbal remedies
  - Personal care product use
    - Skin-lightening cream
  - Amalgam dental fillings
- Environmental sampling
  - Air, water, fish, sediment

# Maternal-Infant Environmental Exposure Project

- Collaborators: Biomonitoring California, UC San Francisco, UC Berkeley
- Measure and compare levels of chemicals in 92 pregnant women and their newborns
- Identify sources of exposure to a subset of chemicals through questionnaires
- Develop and test an approach to inform and educate participants about their results



# Example Fish Consumption Questions used by Biomonitoring California

(interviewer-administered questionnaire)

**How many times a day, week month or year do you eat:**

1. Fish from stores, markets or restaurants. This includes any fish that is fresh, frozen, smoked, dried, or canned, such as canned tuna or sardines.

2. Fish caught by you or someone you know. Please do not include fish that came from stores, markets, or restaurants.

3. Where are these fish caught?

# Biomonitoring identified High Mercury Exposure in a Mother and Infant

- Elevated blood mercury detected – San Francisco study
  - One mother-infant pair
  - Over twice the level that triggers early notification<sup>1</sup>
- Follow-up investigation with UCSF staff, county health department, and US EPA
- Source of mercury identified as face cream
- Health Alert developed following prior CDPH investigation disseminated to clinics

<sup>1</sup>The early notification level is 5.8 µg/Liter, and is based on the level set by The Centers for Disease Control and Prevention for pregnant women.



## WARNING: Mercury in Home Made Face Creams

In the past few months, several people in California were found to have mercury poisoning. All of these people had used a home made face cream made in Mexico. The face creams came in jars without labels and were used to:

- make their skin a lighter color
- fade age spots and freckles
- get rid of acne

These face creams can harm your health and the health of your children. If you have an unlabeled jar of face cream, **stop using it immediately**. Also, do not use any face cream if the label says: "mercury", "mercurio", "calomel", or another chemical with mercury, such as "mercurous chloride."

### How can mercury in face cream affect my health?

Mercury is a poison. Mercury in face cream can get into your body through your skin. The mercury can harm your brain, nerves, and kidneys. Mercury in your body may cause:

- Headaches, memory loss, difficulty concentrating, irritability (bad moods), nervousness, or depression
- Tremors (shaking) or weakness
- Tingling or numbness in hands and feet, and around the lips
- Fatigue (being very tired)
- Swollen or bleeding gums
- Painful and red fingertips



Examples of home made face cream jars from Mexico.

If you think the face cream might have made you or your children sick, contact your doctor or health clinic or call the California Poison Control System for advice at 1-800-222-1222.

### Can these face creams harm my children?

Mercury can harm how a child grows and learns, especially in infants, young children, and the fetus. Mercury in a pregnant woman's body can be passed to her baby. Mercury can also pass from a mother to nursing babies when they breast feed. Children can get mercury in their bodies when they are touched by family members who use home made face creams. Teens that use face creams with mercury to treat acne can also get poisoned.

### What should I do with unlabeled face creams?

Do not throw unlabeled home made face creams in the trash. Take unused home made face creams to a household hazardous waste collection site. For more information in English or Spanish, or to find a hazardous waste collection site in your community, call the Poison Control Center at 1-800-222-1222.

#### Where do these face creams come from?

People buy the face creams in Mexico and then bring them to the US. Some of these creams have been sold to people in Spanish-speaking communities in the US. So far, all of the face creams found in California were in small plastic jars without labels (see photo). Face creams that have mercury can also be ordered by phone and mailed to the US from Mexico or possibly other countries. It is illegal to sell these products in the United States.

May 2010



## ADVERTENCIA: Envenenamiento por Cremas Caseras Para la Cara Hechas en México

En los últimos meses, un gran número de personas fueron detectadas con envenenamiento de mercurio. Estas personas reportaron haber usado cremas para la cara (cremas faciales) hechas en México. Las cremas vienen en envases sin etiquetas y las usan para:

- adarar la piel
- desmanchar las pecas y manchas oscuras
- hacer desaparecer el acné

Estas cremas para la cara pueden dañar su salud y la salud de sus niños/as. Si usted tiene una crema para la cara en un envase sin etiqueta, **deje de usarla inmediatamente**. También, no utilice ninguna crema facial que en la etiqueta se mencione: "mercurio" o "mercury", "calomel", u otro químico que contenga mercurio, como el "Mercurous Chloride".

### ¿Como puede afectar a mi salud el mercurio que se encuentra en las cremas para la cara?

El mercurio es un veneno. El mercurio en las cremas faciales puede entrar a su cuerpo por medio de la piel. El mercurio daña su cerebro, sistema nervioso y riñones. El mercurio en su cuerpo puede causarle:

- Dolores de cabeza, pérdida de memoria, dificultad en concentración, irritación (mal humor), nerviosismo o depresión.
- Temblores y debilidad
- Sensación de hormigueo o entumecimiento en las manos y los pies y alrededor de los labios
- Fatiga (sentirse cansado)
- Encías hinchadas o sangrantes
- Punta de los dedos rojos y dolorosos



Ejemplos de envases de crema para la cara hechos en México

Si usted piensa que la crema para la cara le esta afectando su salud a usted o a sus hijos/as, llame inmediatamente a su doctor o clínica comunitaria o a la Línea de Acción para Intoxicaciones y Envenenamientos de California al 1-800-222-1222.

### ¿Pueden estas cremas para la cara dañar a mis niños/as?

El mercurio puede afectar el crecimiento y aprendizaje del niño, especialmente en bebés, niños, y fetos. El mercurio en el cuerpo de la mujer embarazada puede ser transmitido al bebé. La mamá puede pasar el mercurio al bebé a través de la leche materna. Los niños pueden envenenarse con mercurio cuando son tocados por familiares que usan estas cremas. También, los adolescentes que utilizan estas cremas con mercurio para tratar el acné pueden dañar su salud.

### ¿Que es lo que debo hacer con cremas para la cara que no tengan etiquetas?

No tire a la basura las cremas para la cara que no tengan etiqueta. Lleve el envase y lo que reste de la crema a un centro de colección para residuos de productos de casa peligrosos. Para más información en Inglés y Español, o para encontrar un centro de residuos para productos peligrosos en su comunidad, llame a la Línea de Acción para Intoxicaciones y Envenenamientos de California al 1-800-222-1222.

#### ¿De donde provienen estas cremas para la cara?

Las personas compran estas cremas faciales en México y luego las traen a los Estados Unidos. Algunas de estas cremas han sido vendidas en comunidades hispano-parlantes en los Estados Unidos. Las cremas faciales encontradas en California están en envases pequeños sin etiquetas (ver la foto). Estas cremas contienen mercurio y pueden también ser pedidos por medio de llamadas telefónicas a México o posiblemente a otros países, y ser enviadas por correo a los Estados Unidos. Es ilegal vender estos productos en los Estados Unidos.

May 2010

# Mercury Consumer Alert

**FDA** Consumer Health Information  
www.fda.gov/consumers

## Mercury Poisoning Linked to Skin Products

Federal health officials are warning consumers not to use skin creams, beauty and antiseptic soaps, or lotions that might contain mercury.

The products are marketed as skin lighteners and anti-aging treatments that remove age spots, freckles, blemishes and wrinkles, says Gary Coody, national health fraud coordinator in the Food and Drug Administration's Office of Regulatory Affairs. Adolescents also may use these products as acne treatments, adds Coody. Products with this toxic metal have been found in at least seven states.

The products are manufactured abroad and sold illegally in the United States—often in shops in Latino, Asian, African or Middle Eastern neighborhoods and online. Consumers may also have bought them in another country and brought them back to the U.S. for personal use.

"If you have a product that matches these descriptions (and other listed below), stop using it immediately," says Coody.

"Even though these products are promoted as cosmetics, they also may be unapproved new drugs under the law," says Linda Katz, M.D., director of FDA's Office of Cosmetics and Colors. FDA does not allow mercury in drugs or in cosmetics, except under very specific conditions, which these products do not meet.

"Sellers and distributors should not market these illegal products and may be subject to enforcement action, which could include seizure of the products and other legal sanctions," says attorney Brad Pace, J.D., of the Health Fraud and Consumer Outreach Branch within FDA's Center for Drug Evaluation and Research.

### Dangers of Mercury

"Exposure to mercury can have serious health consequences," says Charles Lee, M.D., a senior medical advisor at FDA. "It can damage the kidneys and the nervous system, and interfere with the



These skin creams manufactured in other countries are among the products found in recent years to contain mercury.

1 / FDA Consumer Health Information / U.S. Food and Drug Administration

MARCH 2011

<http://www.fda.gov/downloads/ForConsumers/ConsumerUpdates/UCM294876.pdf>



# Selected Results from Biomonitoring CA Studies and Collaborations to date\*

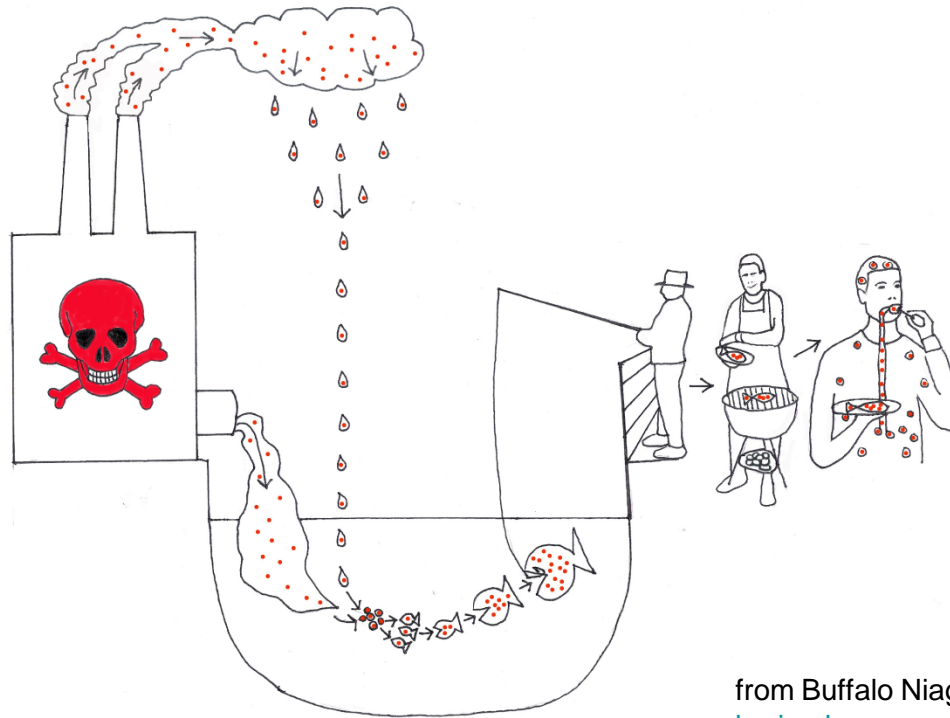
<b>Chemical</b>	<b>Number of People Tested</b>	<b>Detection Frequency</b>
<b>Metals in whole blood</b>		
Cadmium	529	61%
Lead	529	100%
Manganese	452	100%
<b>Mercury</b>	<b>529</b>	<b>97%</b>

Check our website <http://www.oehha.ca.gov/multimedia/biomon/index.html> later this year for the full report titled "Biomonitoring California Data Summary Report"

# What's Coming Up in Biomonitoring CA as to Chemicals and Fish?

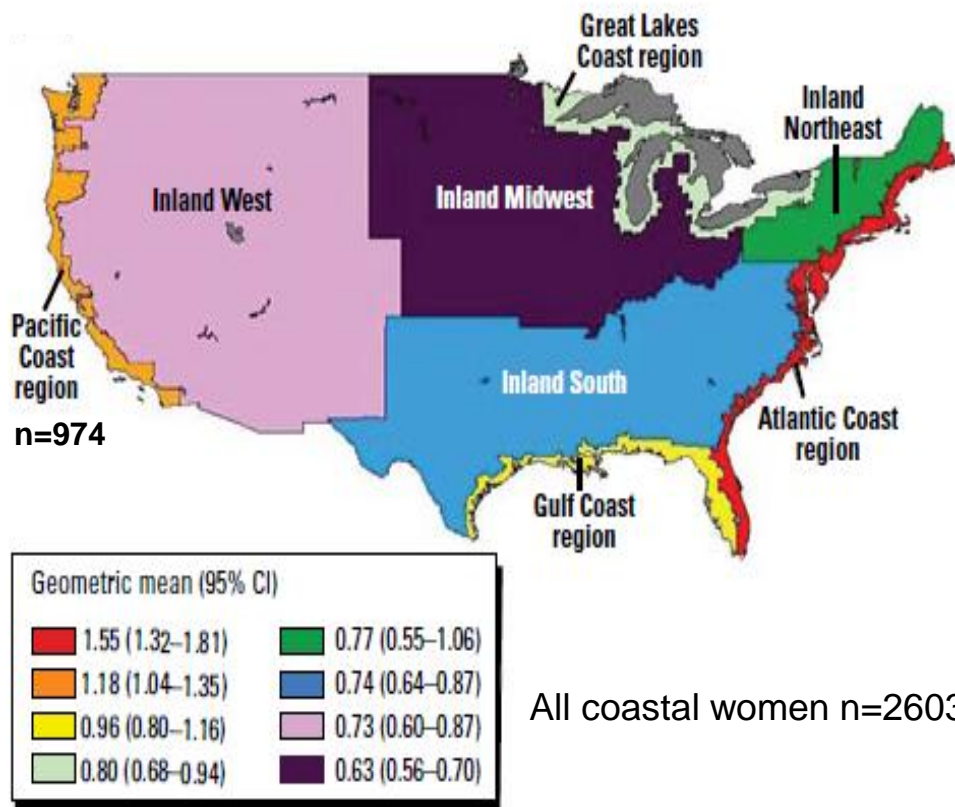
- **Mercury:** investigate cases with high levels
  - link to fish only in individual cases where high organic mercury levels are further investigated
- **PCBs:** limited ability to link to fish
  - overall human PCB levels decreasing
- **PBDEs:** limited ability to link to fish
  - Examine fish consumption in addition to other sources
- **Subpopulations** – oversample Asians in upcoming study of Kaiser Permanente members

# What can other biomonitoring studies tell us about exposure to chemicals from eating fish?



from Buffalo Niagara Riverkeeper  
[bnriverkeeper.org](http://bnriverkeeper.org)

# Blood Mercury Values by Coastal/Inland Areas (5,400 US adult women – NHANES 1999-2004)



# US women of reproductive age\* with blood total mercury values over 3.5 ug/L\*\* , by study year

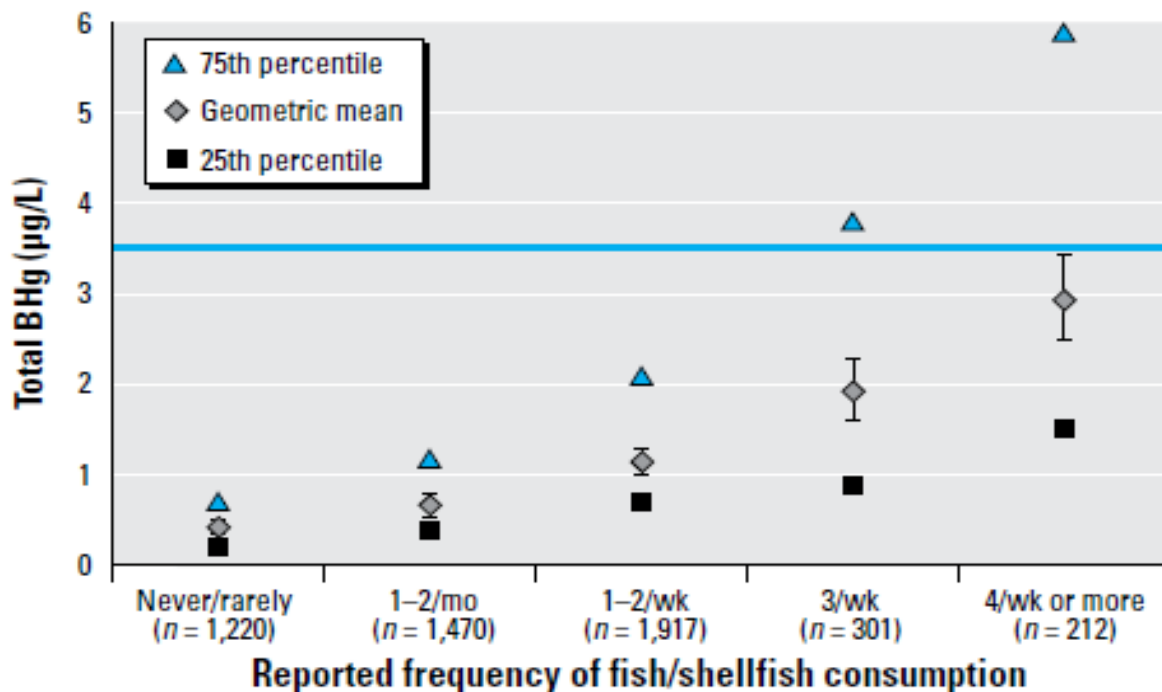
		Mercury Values	
NHANES cycle (years)	N	3.5 – 5.7 ug/L	≥ 5.8 ug/L
		%	%
1999-2000	1,709	7.5	6.9
2001-2002	1,928	4.1	3.7
2003-2004	1,728	5	2.4

\* Women 16-49 years old

\*\* Corresponds to 5.8 ug/L in cord blood (US EPA)

from Mahaffey et al, Env Hlth Perspect, 2009

# Blood mercury by estimated consumption frequency of fish and shellfish (NHANES 1999-2004)



**Figure 4.** BHg concentration (µg/L) by estimated consumption frequency of fish and shellfish. Blue line identifies adult women's concentration associated with cord BHg  $\geq$  5.8 µg/L.

# Mercury Levels in US Women (NHANES 2007-2008 data)

- Percent exceeding mercury reference doses:
  - 3.5  $\mu\text{g}/\text{L}$  – a little over 5%
  - 5.8  $\mu\text{g}/\text{L}$  – less than 5%
- Demographic characteristics
  - Black women have significantly higher mercury levels on average than White or Mexican American women

# The people who make Biomonitoring California happen

Josephine Alvaran	Ruifang Fan	Farla Kaufman	Jianwen She
Frank Barley	Laura Fenster	Gail Krowech	Beverly Shen
Paramjit Behniwal	Jeff Fowles	Michael Lipsett	Darcy Tarrant
Reber Brown	Ryszard Gajek	Nancy Lopez	Alanna Viegas
Shirley Cao	Qi Gavin	Amiko Mayeno	Jed Waldman
Sungyeol Choi	Phillip Gonzaga	Sandy McNeel	Dongli Wang
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Thank You!

Questions?

