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Senate
State of Minnesota

S.F. No. 639 - Mercury-Free Vaccines

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Prepared by: Katie Cavanor, Senate Counsel (651/296-3801) KTC

Date: February 1, 2005

S.F. No. 639 prohibits the use of vaccines that contain mercury if a mercury-free vaccine is available.

Section 1 (121A.15, subdivision 3a) makes conforming changes.

Section 2 (145.929) prohibits vaccines that contain mercury from being administered in the state unless a mercury-free vaccine is not manufactured or the provider finds that a mercury-free vaccine is not obtainable by utilizing best efforts because the vaccine is not on the market for sale. This section also states that if a mercury-free vaccine is not available, then a vaccine containing a trace amount of mercury as defined by the United State Food and Drug Administration (FDA) may be administered, and if there is not a mercury-free vaccine or a vaccine with just a trace amount of mercury available, then the vaccine containing the least amount of mercury may be administered.

KC:ph

Senator Lourey introduced--

S.F. No. 639: Referred to the Committee on Health and Family Security.

A bill for an act

relating to health; prohibiting the use of certain vaccines containing mercury or mercury compounds; amending Minnesota Statutes 2004, section 121A.15, subdivision 3a; proposing coding for new law in Minnesota Statutes, chapter 145.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF MINNESOTA:

Section 1. Minnesota Statutes 2004, section 121A.15, subdivision 3a, is amended to read:

Subd. 3a. [DISCLOSURES REQUIRED.] (a) This paragraph applies to any written information about immunization requirements for enrollment in a school or child care facility that:

(1) is provided to a person to be immunized or enrolling or enrolled in a school or child care facility, or to the person's parent or guardian if the person is under 18 years of age and not emancipated; and

(2) is provided by the Department of Health; the Department of Education; the Department of Human Services; an immunization provider; or a school or child care facility.

Such written information must describe the exemptions from immunizations permitted under subdivision 3, paragraphs (c) and (d). The information on exemptions from immunizations provided according to this paragraph must be in a font size at least equal to the font size of the immunization requirements, in the same font style as the immunization requirements, and on the

same page of the written document as the immunization requirements.

(b) Before immunizing a person, an immunization provider must provide the person, or the person's parent or guardian if the person is under 18 years of age and not emancipated, with the following information in writing:

(1) a list of the immunizations required for enrollment in a school or child care facility;

(2) a description of the exemptions from immunizations permitted under subdivision 3, paragraphs (c) and (d);

(3) a list of additional immunizations currently recommended by the commissioner; and

(4) in accordance with federal law, a copy of the vaccine information sheet from the federal Department of Health and Human Services that lists possible adverse reactions to the immunization to be provided.

(c) The commissioner ~~will~~ shall continue the educational campaign to providers and hospitals on vaccine safety including, but not limited to, information on the vaccine adverse events reporting system (VAERS), the federal vaccine information statements (VIS), and medical precautions and contraindications to immunizations.

(d) The commissioner ~~will~~ shall encourage providers to provide the vaccine information statements at multiple visits and in anticipation of subsequent immunizations.

(e) The commissioner ~~will~~ shall encourage providers to use existing screening for immunization precautions and contraindication materials and make proper use of the vaccine adverse events reporting system (VAERS).

(f) In consultation with groups and people identified in subdivision 12, paragraph (a), clause (1), the commissioner ~~will~~ shall continue to develop and make available patient education materials on immunizations including, but not limited to, contraindications and precautions regarding vaccines.

(g) ~~The commissioner will encourage health care providers to use thimerosal-free vaccines when available~~ Immunization

providers shall comply with section 145.929.

Sec. 2. [145.929] [ELIMINATION OF MERCURY IN VACCINES.]

Subdivision 1. [CITATION.] This section may be cited as the Minnesota Elimination of Mercury in Vaccines Act of 2005.

Subd. 2. [ELIMINATION OF MERCURY.] (a) Effective July 1, 2005, vaccines administered in the state shall not contain any mercury or mercury compounds, including but not limited to thimerosal, unless:

(1) a vaccine containing no mercury is not manufactured; or

(2) the provider finds that the mercury-free vaccine is not obtainable by utilizing best efforts, because the vaccine is not on the market for sale.

(b) If a mercury-free vaccine is not available according to paragraph (a), then a vaccine containing a trace amount of mercury as defined by the United States Food and Drug Administration may be administered. If neither a mercury-free vaccine nor a vaccine containing a trace amount of mercury is available, then the vaccine containing the least amount of mercury may be administered.

Sec. 3. [EFFECTIVE DATE.]

Sections 1 and 2 are effective July 1, 2005.

Senator Lourey ..... moves to amend S.F. No. 639 as follows:

Page 3, line 9, delete "or"

Page 3, line 11, delete "best" and insert "reasonable"

Page 3, line 12, before the period, insert "; or

(3) a public health emergency has been declared as defined in chapter 12 and the declared public health emergency includes a public vaccination program"

Page 3, after line 19, insert:

"(c) The commissioner of health shall provide to the public contact information for vaccine manufacturers and mercury level content of vaccines through the department Web site.

Subd. 3. [DRUG MANUFACTURE REPORT.] Drug manufacturers licensed in this state must provide the commissioner of health with an annual status report on the availability of vaccines that are mercury free. For vaccines that are not available without mercury, the report must contain an update on the progress being made to manufacture a mercury-free vaccine, including an anticipated timeline as to when a mercury-free vaccine would be available. The commissioner shall make this report available to the public through the department's Web site."

Mercury-Free Minnesota

Clean Water, Safe Fish, Healthy Kids

2005 Policy Goals

Mercury pollution should be reduced from all sources, including coal-burning power plants and taconite processing, which are the two largest sources of mercury in the state. Minnesota should also continue to be a leader in reducing mercury use in products, by making sure that all vaccines used in the state are mercury-free. Public education efforts by state agencies should be increased, to provide adequate information about the health effects and sources of mercury.

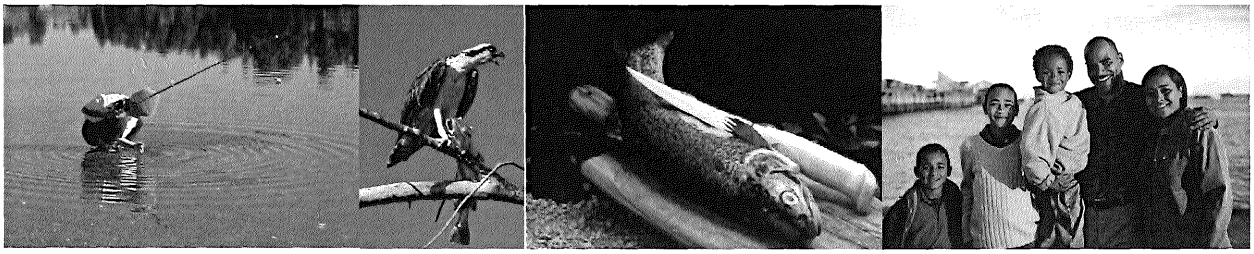
The Problem

Mercury has contaminated Minnesota's waters and fish. Minnesota has issued a statewide advisory limiting the number of walleyes and other game fish that people should eat from our 12,000 lakes.

Mercury is a potent neurotoxin that causes learning and developmental disabilities in children. The EPA reported in January 2004 that ***1 in 6 U.S. women*** of childbearing age have mercury in their bodies at levels that may adversely affect their unborn child.

The primary sources of mercury in Minnesota are coal-burning power plants and taconite processing. There are many mercury-containing products, including vaccines and dental amalgams, which also pose serious risks.

Since mercury is unquestionably bad for our health and the technology exists to create clean energy and mercury-free products, we should put safety first and choose safer alternatives.



www.MercuryFreeMinnesota.org

Erin Jordahl-Redlin

Mercury-Free Minnesota is working to achieve the following goals in 2005:

Reduce Emissions from Power Plants

As the single largest source of mercury emissions in Minnesota, coal-burning power plants should be required to do their fair share to reduce mercury emissions. Coal-burning power plants must meet emissions standards currently achieved by the best performing control technologies on the market.

Research & Develop Control Technology for Taconite Industry

Taconite processing releases a large amount of mercury, both from taconite ore and from coal. A research and development program should be established to develop technology to capture mercury emissions from this industry.

Make Vaccines in Minnesota Mercury-Free

All vaccines given in Minnesota shall be mercury-free unless a mercury-free version is not manufactured or not obtainable by best efforts. All persons receiving vaccinations should be informed if their vaccines contain mercury and the hazards posed by mercury, especially the hazards posed to fetuses and children.

Increase Public Education Efforts on Fish Consumption Advice

The Department of Health, Department of Natural Resources, the Pollution Control Agency and the Office of Environmental Assistance should create a plan to ensure that the public is provided adequate notice of and education about the sources and health effects of mercury.

Mercury-Free Minnesota

Clean Water, Safe Fish, Healthy Kids

Mercury-Free Minnesota is made up of more than 30 environmental, conservation, health, and faith groups working with government agencies, legislators, industries, and the public to phase-out harmful mercury emissions in Minnesota, find safer alternatives, and protect human health and the environment.

Go to *www.mercuryfreeminnesota.org* to find out more about us and how you can help to make Minnesota Mercury-Free!

Dr. Wallinga

Mercury: Fish Concerns, Human exposure, Health impacts,

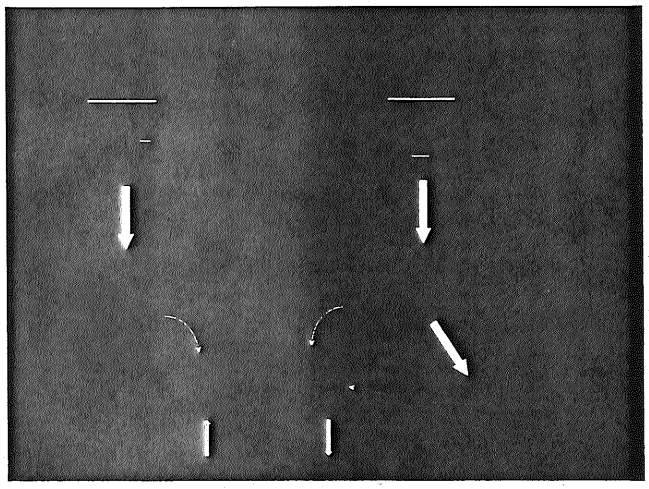
David Wallinga, M.D.
Food & Health Program,
Institute for Agriculture
& Trade Policy
612 870-3418
Dwallinga@iatp.org

Why Eat Fish?

- Protein
- Essential vitamins (A, B and D),
- Minerals (iron and zinc, from shellfish)
- Essential fats

Essential Fatty Acids

- mega-6 Fats (LA, AA)
- mega-3 Fats
  - ALA (18 carbon atoms)
  - EPA (20 carbon atoms)
  - DHA (22 carbon atoms)



Why Essential?

- ✓ Needs only met through diet
- ✓ Energy sources
- ✓ Critical component of cell membranes
- ✓ Building blocks for self-healing agents (eicosanoids)
- ✓ Influence how our genetic information gets expressed

Omega-3 Fats: Potential Health Benefits

For Adults

- ❑ EPA/DHA prevent cardiovascular disease
  - ➢ in people with known disease
  - ➢ in those at high risk
  - ➢ lower blood pressure, lower active heart rate, reduce clotting (all risk factors for heart disease)
- ❑ Improves rheumatoid arthritis patients, possibly other autoimmune diseases
- ❑ May protect against prostate cancer

For Fetuses, Children

- ❑ Brain development
  - ➢ Preemies fed formula without DHA suffer illness, poor retinal development
  - ➢ DHA concentrated in brain synapses, retina, nervous system

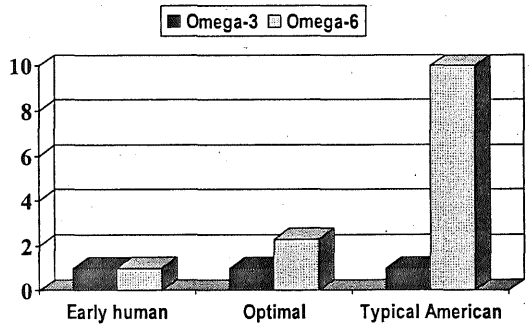
SOURCES: Aericanm Heart Association Scientific Statement (2002); Simopoulos AP 2002; Stenson WF et al. 1992; Terry P et al. 2001.

Heart-Protective Effects

Two large, randomized clinical trials

- ❑ Reduced mortality following MI among those assigned diets rich in fatty fish or fish-oil supplements
  (Burr et al 1989; GISSI-Prevenzione Investigators 1999)
- ❑ Healthy women given omega-3 supplements (4 grams EPA+DHA and 2 grams gamma ALA)
  (Laidlaw M, Holub BJ. *Am J Clin Nutr.* 2003)
  - ✓Blood lipid and fatty acid profiles change for the better
  - ✓43% reduction in 10-yr risk of heart attack, estimated

Relative Amounts of Essential Fats in Diet

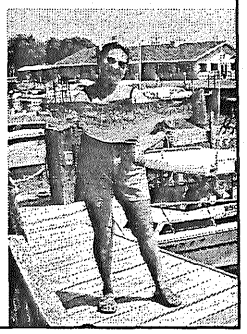


SOURCE: Kris-Etherton et al. 2000; Kris-Etherton et al. 2002.

Omega-3s:
American Diet Deficient

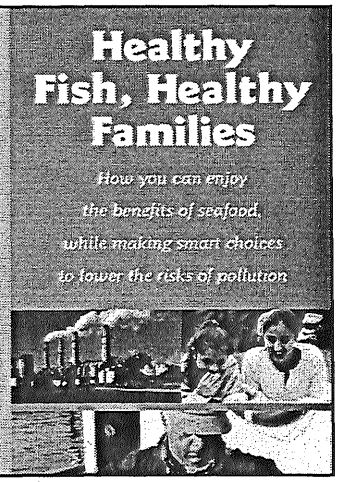
Making up the deficiency

Fish = Major dietary source



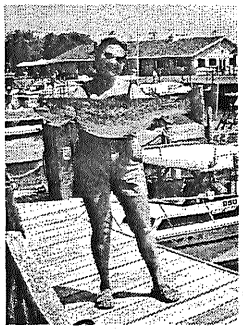
Association of Reproductive Health Professionals
Physicians for Social Responsibility

"Health benefits of omega-3 fats may be compromised by the health risks of toxic contaminants in many fish."



Mercury
Fish = Major route of human exposure

- ✓ "[N]early all fish and shellfish contain traces of mercury." FDA 2004
- ✓ In 2002, 45 states issued more than 2,100 fish consumption advisories for rivers, lakes, and coastal based on mercury contamination.



ehp Environmental Health

Abstract | Full | PDF | Citation in Pub Med

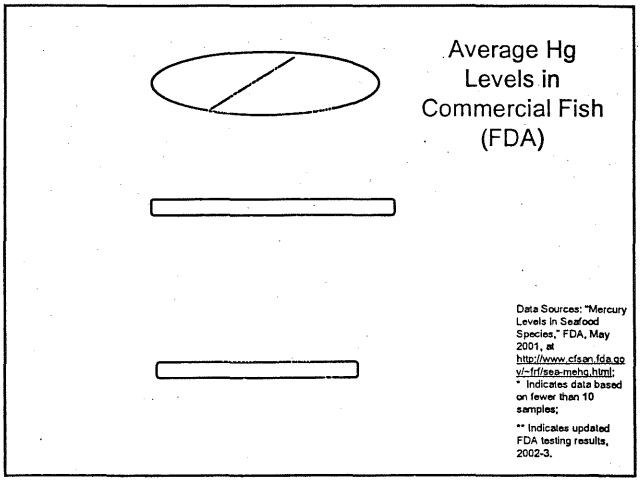
Environmental Health Perspectives Volume 111, Number 4 April 2003
http://ehp.niehs.nih.gov/docs/2003/5837/abstract.html

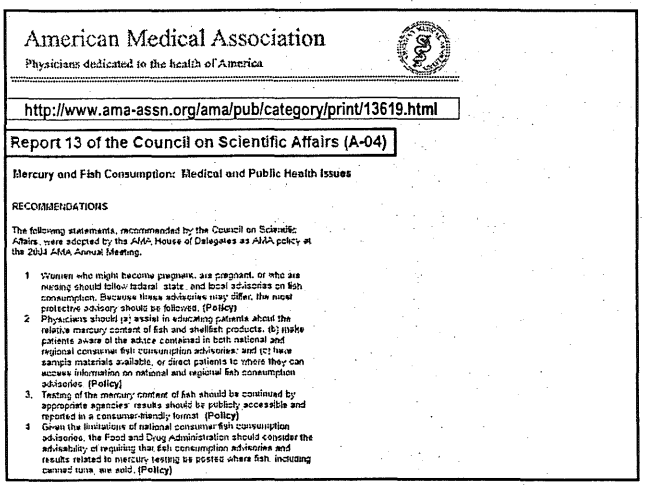
Environmental Medicine
Mercury Levels in High-End Consumers of Fish

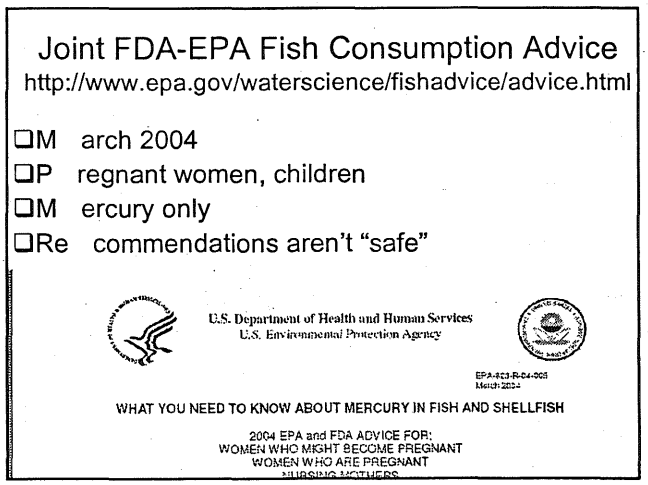
Jane M. Hightower[1] and Dan Moore[2]

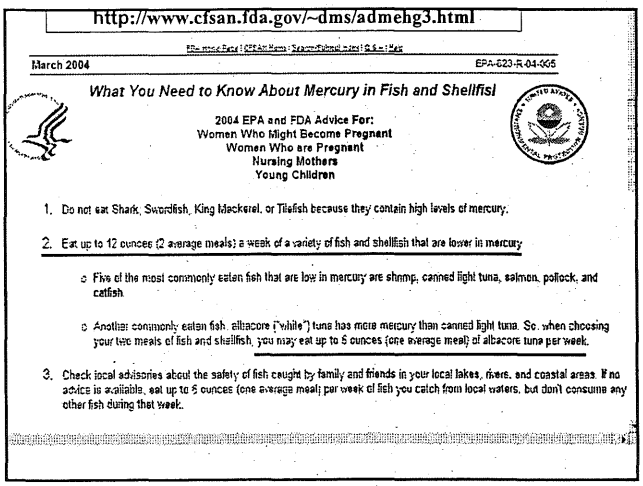
[1]California Pacific Medical Center and [2]Geraldine Brush Research Institute, California Pacific Medical Center, San Francisco, California, USA

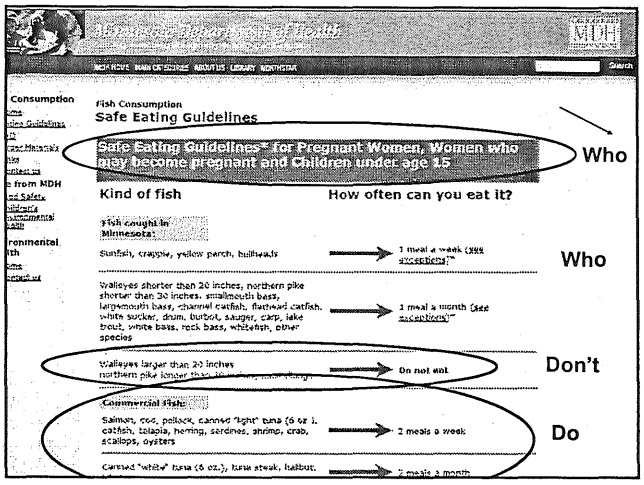
- ❑ "Patients in my practice regularly get mercury poisoning from eating commercial seafood, "says Dr. Jane Hightowe
- ❑ Although patients' symptoms were not specifically correlated with mercury levels, when they stopped consuming those fish symptoms improved

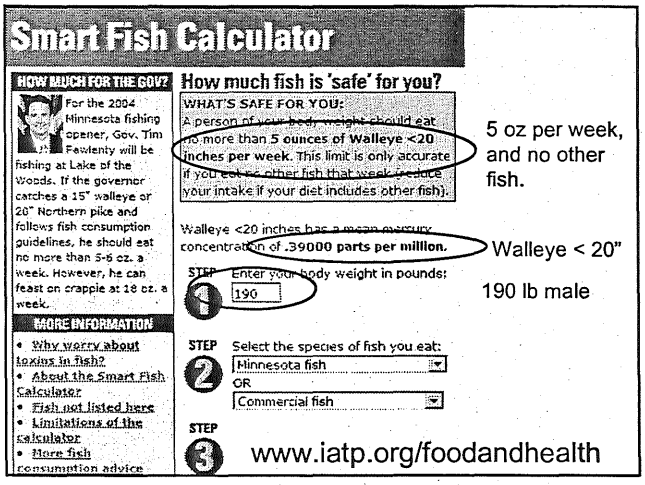

Average Hg Levels in Commercial Fish (FDA)
Data Sources: "Mercury Levels in Seafood Species," FDA, May 2001, at http://www.cfsan.fda.gov/~frf/sea-mehg.html;
* Indicates data based on fewer than 10 samples;
** Indicates updated FDA testing results, 2002-3.

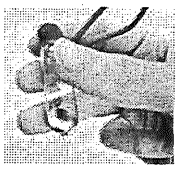

American Medical Association
Physicians dedicated to the health of America
http://www.ama-assn.org/ama/pub/category/print/13619.html
Report 13 of the Council on Scientific Affairs (A-04)
Mercury and Fish Consumption: Medical and Public Health Issues
RECOMMENDATIONS
The following statements, recommended by the Council on Scientific Affairs, were adopted by the AMA House of Delegates as AMA policy at the 2004 AMA Annual Meeting.
1 Women who might become pregnant, are pregnant, or who are nursing should follow federal, state, and local advisories on fish consumption. Because these advisories may differ, the most protective advisory should be followed. (Policy)
2 Physicians should (a) assist in educating patients about the relative mercury content of fish and shellfish products, (b) make patients aware of the advice contained in both national and regional consumer fish consumption advisories; and (c) have sample materials available, or direct patients to where they can access information on national and regional fish consumption advisories. (Policy)
3. Testing of the mercury content of fish should be continued by appropriate agencies' results should be publicly accessible and reported in a consumer-friendly format. (Policy)
4 Given the limitations of national consumer fish consumption advisories, the Food and Drug Administration should consider the advisability of requiring that fish consumption advisories and results related to mercury testing be posted where fish, including canned tuna, are sold. (Policy)


Joint FDA-EPA Fish Consumption Advice
http://www.epa.gov/waterscience/fishadvice/advice.html
❑M arch 2004
❑P regnant women, children
❑M ercury only
❑Re commendations aren't "safe"
U.S. Department of Health and Human Services
U.S. Environmental Protection Agency
EPA-823-R-04-005
March 2004
WHAT YOU NEED TO KNOW ABOUT MERCURY IN FISH AND SHELLFISH
2004 EPA and FDA ADVICE FOR:
WOMEN WHO MIGHT BECOME PREGNANT
WOMEN WHO ARE PREGNANT
NURSING MOTHERS


http://www.cfsan.fda.gov/~dms/admehg3.html
March 2004
EPA-823-R-04-005
What You Need to Know About Mercury in Fish and Shellfish
2004 EPA and FDA Advice For:
Women Who Might Become Pregnant
Women Who are Pregnant
Nursing Mothers
Young Children
1. Do not eat Shark, Swordfish, King Mackerel, or Tilefish because they contain high levels of mercury.
2. Eat up to 12 ounces (2 average meals) a week of a variety of fish and shellfish that are lower in mercury
o Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollock, and catfish
o Another commonly eaten fish, albacore ("white") tuna has more mercury than canned light tuna. So, when choosing your two meals of fish and shellfish, you may eat up to 6 ounces (one average meal) of albacore tuna per week.
3. Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas. If no advice is available, eat up to 6 ounces (one average meal) per week of fish you catch from local waters, but don't consume any other fish during that week.







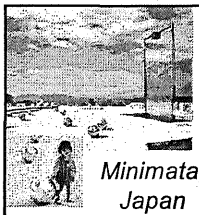
Quicksilver

Mercury 101

- ❑ Mercury is toxic (poisonous)
- ❑ Mercury is in human blood
- ❑ Blood mercury is mostly methylmercury (MeHg)
- ❑ Fish accounts for most human exposure to MeHg
- ❑ Mercury in fish stems from air deposition
- ❑ Air sources are diverse, dominated by coal plants

Mercury is toxic (poisonous)

- ❑ Elemental mercury
  - ✓ Workers
  - ✓ Children
  - ✓ Others
- ❑ Methylmercury
- ❑ Other mercury compounds (inorganic and organic)



Minimata, Japan (1950s)

Iraq (1970s)

(Me)Hg Poisonings

Wonderland

Photographs from *Neurotoxicology*, 1995, Vol. 16, No. 4

Higher Dose Effects
Infants Exposed to Hg in the Womb

- ❑ Mental retardation
- ❑ Seizures
- ❑ Cerebral palsy
- ❑ Disturbances of vision, hearing, sensation
- ❑ Abnormal gait
- ❑ Abnormal speech
- ❑ Disturbances of swallowing and sucking
- ❑ Abnormal reflexes

What's "safe"?

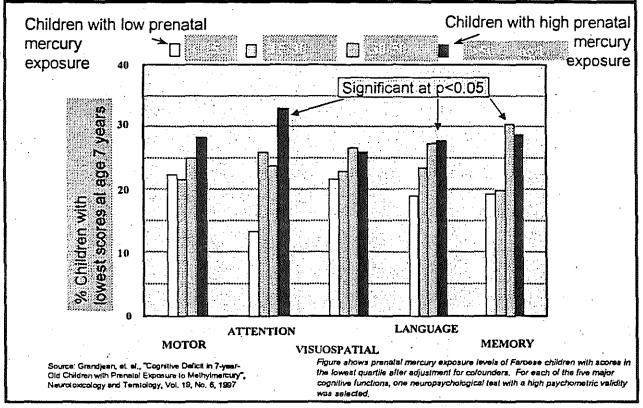
- ❑ Environmental Protection Agency
  - ➢ "Safe" dose = Reference Dose
  - ➢ Intake of mercury of 0.1 ug/kg-bw/day
  - ➢ Associated with blood mercury at 5.8 ug/L
  - ➢ What is equivalent for fetal "cord" blood?

"Gold Standard" studies of methylmercury toxicity at day-to-day levels of exposure?

- ❑ 3 large studies of chohorts of children born to mothers who consumed fish:
  - ✓ Faroe Islands (Grandjean et al)
  - ✓ New Zealand (Kjellstrom et al)
  - ✓ Seychelles Island (Myers et al)

- ❑ 2 studies (Faroe Is. & New Zealand) found babies born to mothers who ate more fish were developmentally affected.* (prenatal mercury exposure associated with deficits in neurological function & behavior – e.g. memory, attention)
- ❑ Seychelles study found no such effects in children.

Mercury: Effects of Lower-Dose Prenatal Exposure



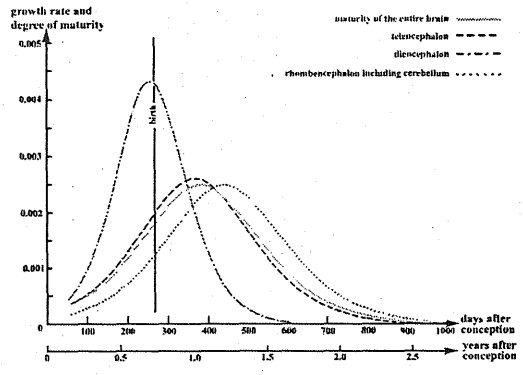
Source: Grandjean, et. al., "Cognitive Deficit in 7-year-Old Children with Prenatal Exposure to Methylmercury", Neurotoxicology and Teratology, Vol. 19, No. 6, 1997

Figure shows prenatal mercury exposure levels of Faroese children with scores in the lowest quartile after adjustment for confounders. For each of the five major cognitive functions, one neuropsychological test with a high psychometric validity was selected.

Fetus often is more vulnerable to harm from environmental toxins

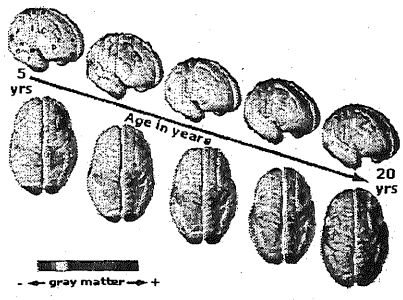
- NAS 1993
  - Immature defenses
  - Immature organs
- True for PCBs, solvents, some pesticides, etc.

Regional Growth Rate of the Human Brain



Source: Rice D & Barone S (2000), Critical Periods of Vulnerability for the Developing Nervous System: Evidence from Human and Animal Models, Environ Health Perspect 108 (Suppl 3): 511-533. With author's permission.

Older children's brains continue to develop



National Academy of Sciences

- *Toxicological Effects of Methylmercury (2000)*
- Conclusions
  - ✓ Neurodevelopmental deficits most sensitive, well-documented health effect
  - ✓ Reference dose or RfD (EPA "safe" exposure level) should be based on the Faroe Islands study
  - ✓ Affirmed EPA RfD of 0.1 ug/kg/day

- Mercury is toxic (poisonous)
- Mercury is in human blood

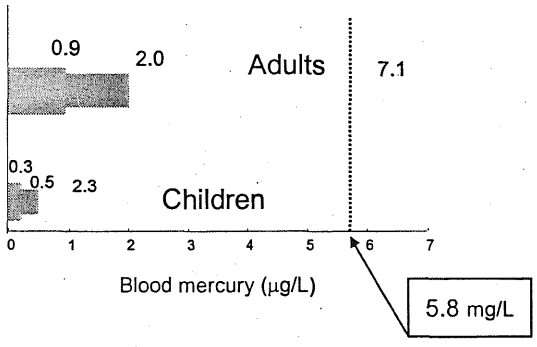
National Health and Nutritional Survey (NHANES), 1999-2000

Blood and hair analyses:

- Blood Hg
  - ✓ 1707 adult women, ages 16 to 49
  - ✓ 709 children, ages 1 to 5
  - ✓ Blood mercury is predominantly MeHg
- Hair Hg
- Urinary Hg

Mercury

50th, 75th and 95th percentiles in blood



JAMA

http://jama.ama-assn.org/

Original Contribution

Blood Mercury Levels in US Children and Women of Childbearing Age, 1999-2000

Susan E. Schober, PhD; Thomas H. Sinks, PhD; Robert L. Jones, PhD; P. Michael Bolger, PhD, DAET; Margaret McDowell, MPH, RD; John Osterloh, MD, MS; E. Spencer Garrett, MS; Richard A. Canady, PhD, DABT; Charles F. Dillon, MD, PhD; Yu Sun, PhD; Catherine B. Joseph, MSPH; Kathryn R. Mahaffey, PhD

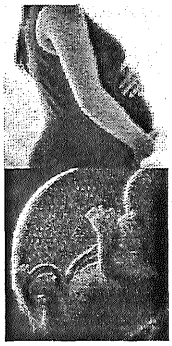
JAMA. 2003;289:1667-1674.

- About 8% of American adult women have blood mercury higher than what the U.S. EPA considers "safe"
- About 8% of newborns each year, then – more than 300,000 – born with blood mercury exceeding EPA "safe" levels?

Fish Consumption Associated with Blood Mercury Concentration

Mean blood mercury nearly 4-fold higher among women eating ≥ fish servings in the previous 30 days

How Long to Clear Methylmercury from Blood?

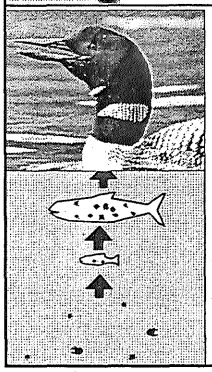


Half-life in blood varies by individual

- Ranges from ~ 30–180 days
- Average half–life ~ 70 days
- 10% of people > 130 days
- Methylmercury in blood representing Hg ingested in last 30 days ~ 25%

SOURCE: Mahaffey K. US Profile Biomarkers of Exposure to Mercury. Presentation at the Annual Meeting of the American Public Health Association. San Francisco, CA 2002

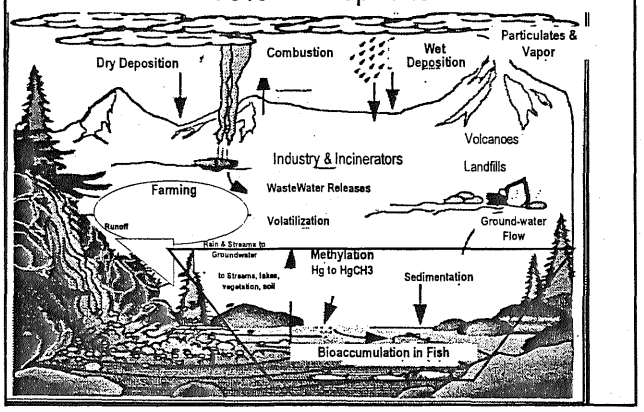
- Mercury is toxic (poisonous)
- Mercury is in human blood
- Fish accounts for most exposure to MeHg



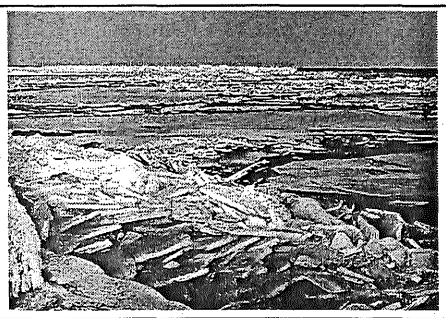
- Who's atop the food chain? 95% of MeHg in fish is absorbed into the human GI tract
- MeHg accumulates in fish
- MeHg is taken up by tiny animals and plankton
- Where bacteria convert it to toxic methylmercury (MeHg)
- Mercury is deposited by air to ALL Minnesota lakes

- Mercury is toxic (poisonous)
- Mercury is in human blood
- Fish is the major source of MeHg exposure
- Mercury in fish stems from air deposition

Mercury Loading to Minnesota Surface Waters is 98% Atmospheric



- Mercury is toxic (poisonous)
- Mercury is in human blood
- Fish is the major source of MeHg exposure
- Mercury in fish stems from air deposition
- Air emission diverse, dominated by coal plants



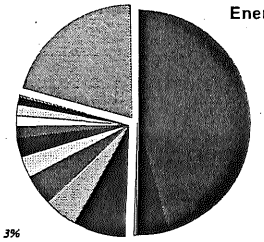
Mercury Emissions in Minnesota, 2000

Material Processing 21%

Taconite processing 21%

Purposeful Use 28%

Medical waste incineration 0.2%
Fluorescent lamp breakage 0.9%
Recycling mercury from products 1.4%
On-site household waste incineration 2%
Crematories 2%
Dental preparations 3%
Smelters that recycle cars and appliances 5%
Sewage sludge incineration 3%
Municipal solid waste combustion 5%
Volatilization from disposed products 7%



Energy 51%

Coal 46%

Petroleum 5%
Wood 0.3%
Natural gas 0.09%

Source: Minnesota Pollution Control Agency March 2004

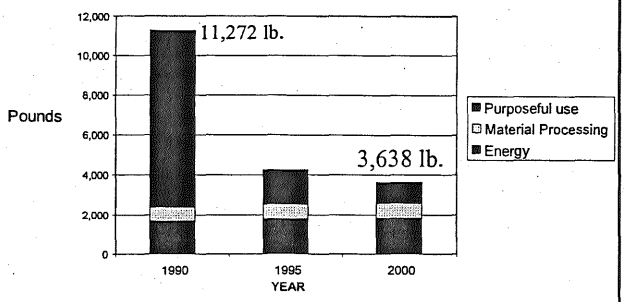
How much Hg would account for fish contamination in Minnesota's lakes?

Just one gram of atmospheric mercury per year deposited on a 20-acre lake

- A teaspoonful of mercury weighs about 70 grams
- A gram of mercury = 1/70th of a teaspoon

Edward B. Swain , One Gram of Mercury in a Twenty Acre Lake: Origin of the Phrase, Minnesota Pollution Control Agency, edward.swain@pca.state.mn.us March 2004

Trends in Minnesota Mercury Emissions 1990-2000



Source: Minnesota Pollution Control Agency March 2004

- ❑ Mercury is toxic (poisonous)
- ❑ Mercury is in human blood
- ❑ Fish is the major source of MeHg exposure
- ❑ Other health concerns

Sources of mercury exposure other than fish

- ❑ Workplace
- ❑ Religious practices
- ❑ School labs
- ❑ Wastewater (from dental offices, hospitals, etc.)
- ❑ Products

- ❑ Fibromin turkey litter incinerator. After best available control techology removes 80% of heavy metals, remaining air emissions estimated include:
  - ✓ 56 pounds of mercury
  - ✓ Also 104 pounds of chromium; 64 pounds of arsenic; 54 pounds of lead

Other Products

- ❑ Dental amalgam – *300 metric tons* per year (NAS 2000)
  - ✓ 50% elemental Hg (Nadakavukaren, 2001)
  - ✓ Vaporized via chewing, then inhaled
  - ✓ Accounts for as much 30-40% of total Hg exposure, assuming average of 8 fillings. (Klassen CD (2001). Casarett & Doull's *Toxicology: The basic science of poisons*, 6th edition)
- ❑ Thimerasol-containing products
  - ✓ Organic, ethylmercury
  - ✓ Up to 219 products in use (NAS 2000)
- ❑ Fluorescent lamps, thermostats & switches, pre-1990 latex paint, steam irons w/15-minute shut-off

Fish aren't the only source of early-life Hg exposure

- ❑ Mercury is toxic (poisonous)
- ❑ Mercury is in human blood
- ❑ Fish is the major source of MeHg exposure
- ❑ Other health concerns

Sources of mercury exposure other than fish

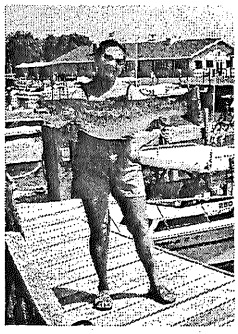
- ❑ Workplace
- ❑ Religious practices
- ❑ School labs
- ❑ Wastewater (from dental offices, hospitals, etc.)
- ❑ Products

Fetal or early child brain toxins, other than mercury, also found in fish

- ❑ The EPA "safe" dose, and therefore fish advisories, aren't based on *ALL* the toxins affecting a child or fetus' developing brain

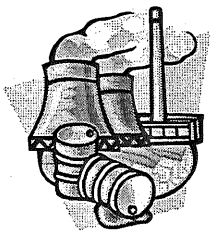
In real life, Hg may be one of several brain toxins in fish

- PCBs
  - In 2002, 38 states issued consumption advisories for PCBs (polychlorinated biphenyls) in freshwater and coastal fish
- Other persistent compounds
  - Dioxins
  - Chlorinated pesticides
  - Flame retardants (polybrominated diphenyl ethers)



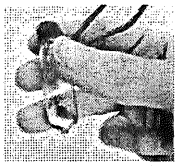
Along With Mercury, Several Environmental Toxicants Are Linked to Effects on Child Development & Learning

- Dioxins
- PCBs
- Pesticides
- Other metals (Lead, cadmium, manganese)
- Solvents



Specific parts of brain development known to be disrupted by mercury and other toxins

proliferation	radiation, ethanol, mercury, cholinesterase inhibitors
migration	radiation, mercury, ethanol
differentiation	ethanol, nicotine, mercury, lead
synaptogenesis	radiation, ethanol, lead, triethyl tin, parathion, PCBs
gliogenesis & myelinization	dec. thyroid, ethanol, lead
apoptosis	ethanol, lead, mercury
signaling	ethanol, cholinesterase inhibitors, mercury, lead, PCBs

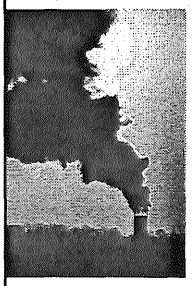


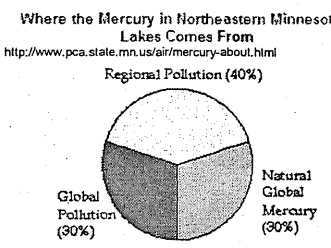
Quicksilver

Summarize

Can we eat as much fish as we want or need?

Where does Minnesota's Mercury Come From?





Does it Matter?

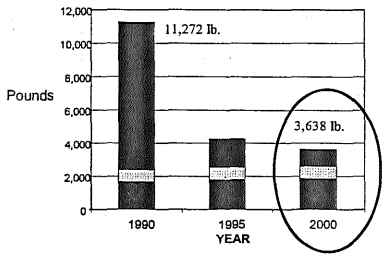
Consensus Statement

- "..the American public is not adequately protected from exposure to mercury in the environment. We call for immediate actions to protect the general public and vulnerable populations .... through stronger regulations to curb mercury emissions at their source"
- "Treat mercury emissions from all anthropogenic sources as 'hazardous'.."
- "[L]ocal mercury sources play an important role in local pollution. Draft EPA modeling indicates that at mercury "hotspots" ....local emission sources can be the dominant source of deposition."

If 3,638 lbs is equal to 1,637,100 grams, and....

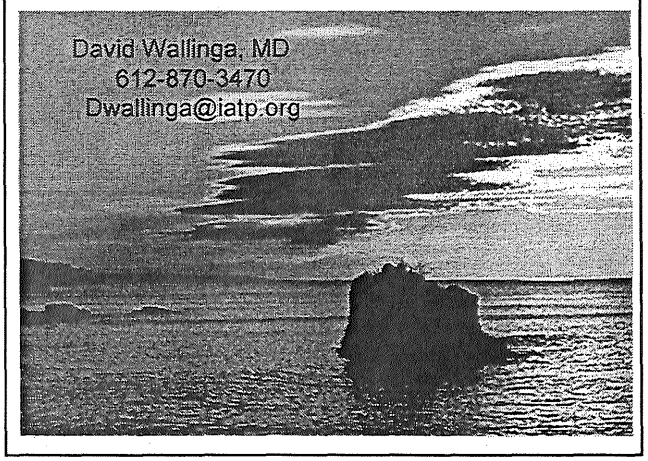
If one gram per year of atmospheric Hg is enough to make the fish in a 20 acre lake inedible...

And our medical goal is fish that are good to catch AND good to eat, then.....



The Rx is:

Every little bit of doable mercury reduction is worthwhile



Statement of Sen. Becky Lourey regarding S. F. 639
Removal of mercury in vaccinations
February 1, 2005

Vaccinations are necessary – in fact imperative – to protect public health.

Some people are very nervous and frightened of the mercury (thimerosal) in some vaccinations.

In fact, the American Academy of Pediatrics and the U. S. Public Health Service want mercury (thimerosal) out of vaccines. And our own MN Department of Health states in their 2005 information sheet, "the thimerosal in vaccines is a small but controllable source that can be removed."

Thus, this legislation is one more step to remove mercury (thimerosal) so that people can be vaccinated in larger numbers without the accompanying concerns of mercury (thimerosal) which is a neurotoxin that causes neurological damage.

Our effort is not to limit vaccinations, but to broaden vaccinations so that we can protect public health.

American Academy of Pediatrics & US Public Health Service } both recommend that mercury be removed

Minnesota Department of Health

January 2005

Thimerosal and Childhood Vaccines: What You Should Know

Is there thimerosal in childhood vaccines today?

Since 2001, all routinely recommended vaccines currently being made for administration to young children in the U.S. contain no thimerosal or only trace amounts. Some vaccines that are not routinely recommended do contain thimerosal.

What is thimerosal?

- Thimerosal is an organic mercury-based preservative used in some vaccines, including some influenza vaccines.
- Thimerosal contains 49% ethyl mercury. This is not the same as the methyl mercury found in fish or emitted by power plants.
- It has been used as a preservative since the 1930s to prevent contamination in vials containing multiple doses of a vaccine and other medical products. (This is in contrast to prepackaged single-dose syringes of vaccine that do not contain thimerosal.) Federal agencies have guidelines to make sure no child will receive excessive mercury from childhood vaccines or other medical products.
- Thimerosal is also found in other medical products such as some throat and nose sprays.

Is thimerosal bad for you?

- There is no convincing evidence of harm caused by small amounts of thimerosal in vaccines, except insofar as it might contribute to minor reactions like redness and swelling at the injection site.
- In rare instances, people have had a severe allergic reaction to thimerosal.
- There are studies that show mercury can cause brain and kidney damage; however, they are based on research of methyl mercury – the kind found in foods – not on ethyl mercury which is the kind found in medical products.
- We are not able to predict adverse effects of ethyl mercury exposure based on studies of exposure to other forms of mercury, especially since ethyl mercury is excreted faster from the body than methyl mercury.

If thimerosal isn't bad for you, why did they take it out of vaccines?

There is a broader goal legislated by Congress to remove as many sources of mercury exposure as possible. Unlike much of the environmental sources of mercury that are hard to remove, the thimerosal in vaccines is a small but controllable source that can be removed.

Does thimerosal cause autism?

- In a recent study, a panel of medical experts at the Institutes of Medicine examined dozens of studies and found no evidence that thimerosal in vaccines causes autism.
- In one of the studies, the Centers for Disease Control and Prevention examined the incidence of autism and other neurological disorders in relation to the amount of thimerosal in vaccines. They found no change in autism rates relative to the amount of thimerosal a child received from vaccines in the first six months of life. In other words, a child who received more thimerosal was not more likely to be autistic.
- Studies done to date show no association between developmental disorders such as autism and thimerosal.

Thimerosal and Childhood Vaccines Page 2

Is there thimerosal in flu vaccines?

Yes. The majority of influenza vaccines distributed in the United States contain thimerosal as a preservative. However, some contain only trace amounts of thimerosal and are considered by the Food and Drug Administration to be preservative-free.

Concerns about the preservative should not keep a person from getting themselves or their child vaccinated. The real threat is the disease itself.

Can I get flu vaccine that does not contain thimerosal?

- Aventis Pharmaceutical manufactures an injectable flu shot for children age 6 months to 3 years that does not contain thimerosal as a preservative.
- The new nasal-spray flu vaccine, made from a weakened live virus, does not contain thimerosal. Healthy persons 5 through 49 years of age can be vaccinated with the nasal-spray flu vaccine.

What other vaccines contain thimerosal?

Some vaccines that are NOT routinely recommended for young children, such as meningococcal vaccine, are only available with thimerosal. Again, all routinely recommended vaccines currently being made for administration to young children in the U.S. contain no thimerosal or only trace amounts.

Is it safe for children to get a flu vaccine?

- Yes. Because there is no convincing evidence of harm caused by the small doses of thimerosal in vaccines, except for minor effects like swelling and redness at the injection site due to sensitivity to thimerosal.
- On the other hand, there is the very real risk of influenza disease in children. Very young children often end up in the hospital when they get influenza.

Is it safe for pregnant women to receive an influenza vaccine that contains thimerosal?

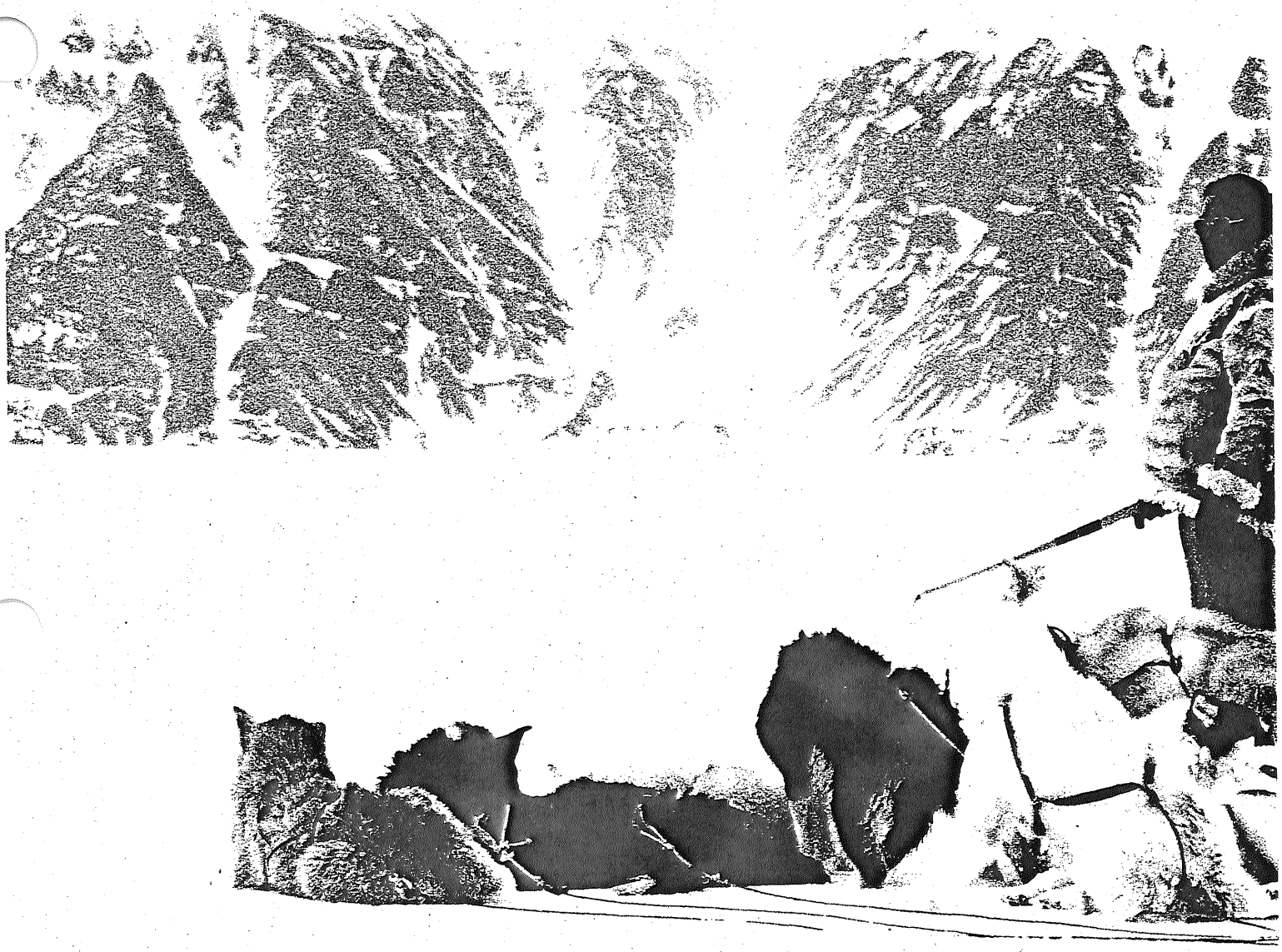
- All pregnant women should be vaccinated against influenza unless they have an allergy to influenza vaccine.
- Reports and studies indicate that pregnancy can increase the risk for serious medical complications of the flu.
- A study of over 2,000 pregnant women who received thimerosal-containing flu vaccine showed no adverse (negative) fetal effects associated with the vaccine.
- At this time, there is no thimerosal-free flu vaccine available for pregnant women.

For more information about thimerosal and immunizations, call us at 612-676-5414 or visit the Web site of the Minnesota Department of Health Immunization Program at http://www.health.state.mn.us/immunize.

MINNESOTA MDH DEPARTMENT OF HEALTH

Immunization Program
P.O. Box 9441
Minneapolis, MN 55440-9441
612-676-5014,
http://www.health.state.mn.us/immunize

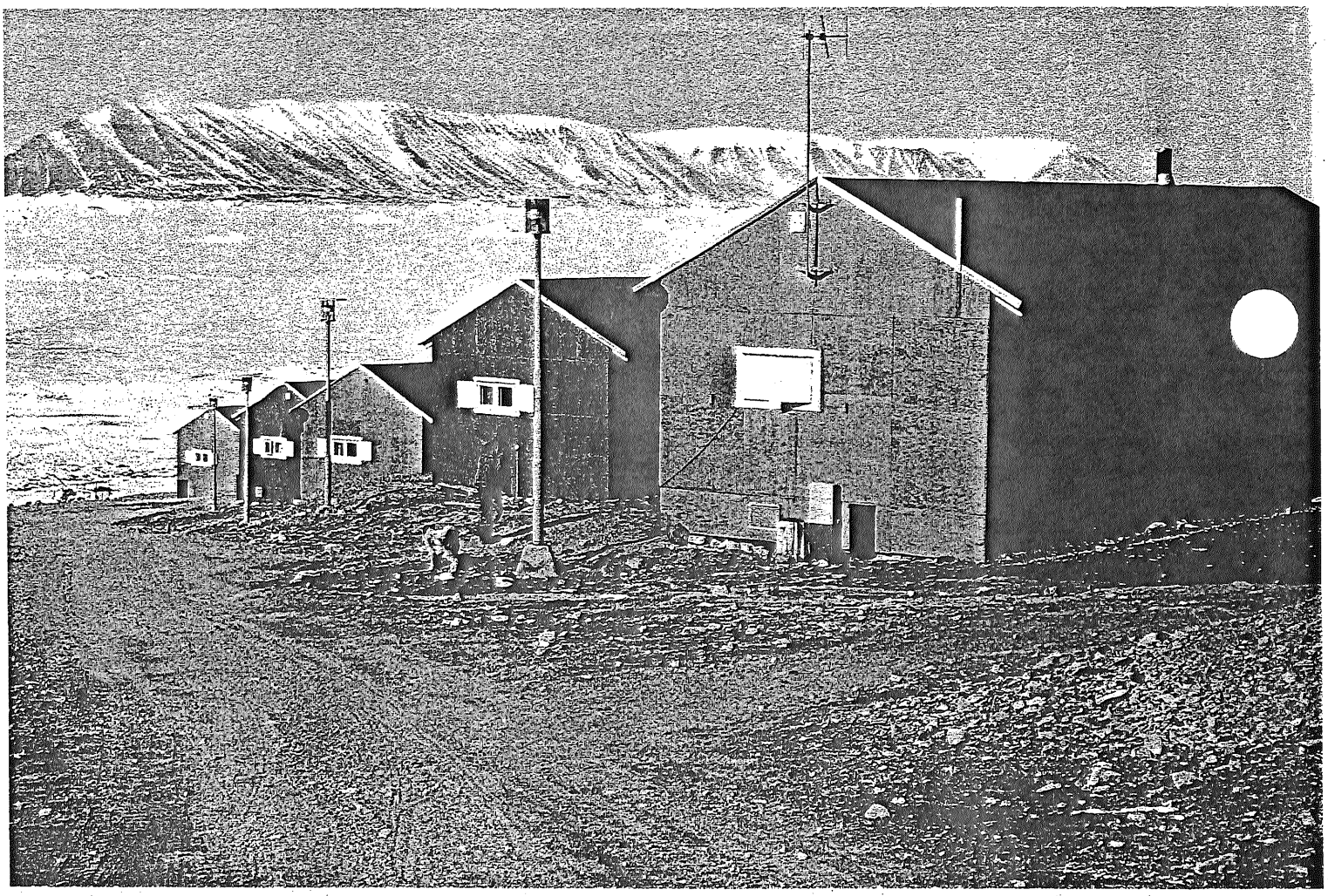
Sea Lovers



Dozens of Words for Snow, None for Pollution

Perched atop the Arctic food chain, the people of the Far North face an impossible choice: abandon their traditional foods, or ingest the rest of the world's poisons with every bite.

Story and photographs by **Marla Cone**



Qaanaaq, population 860, is a village of Inuit hunters living in prefabricated houses.

ON A SHEET of ice where the Arctic Ocean meets the North Atlantic in the territorial waters of Greenland, Mamarut Kristiansen kneels beside the carcass of a narwhal, the elusive animal sometimes known as "the unicorn of the sea" for its spiraled ivory tusk. He slices off a piece of *mattak*, the whale's raw pink blubber and mottled gray skin, and bites into it. "*Peqqinnartoq*," he says in Greenlandic. Healthy food. Nearby, Mamarut's wife, Tukummeq Peary, a descendant of North Pole explorer Robert Peary, is boiling the main entrée on a camp stove. She, Mamarut, and his brother Gedion dip their hunting knives into the kettle and pull out steaming ribs of ringed seal.

From their home in Qaanaaq, a village in Greenland's Thule region, the Kristiansens have traveled here, to the edge of the world, by dog sledge. It took six hours to journey the 30 miles across a rugged glacier to this sapphire-hued fjord, where every summer they camp on the precarious ice awaiting their prey. The family lives much as their ancestors did thousands of years ago, relying on the bounty of the sea and skills honed by generations. Their lifestyle isn't quaint; it is a necessity in this hostile and isolated expanse. Survival here, in the northernmost civilization on earth, means living the way marine mammals live, hunting as they do, wearing their skins. No factory-engineered fleece compares to the warmth of a sealskin parka. No motorboat can sneak up on a whale like a handmade kayak lashed together with strips of hide. And no imported food nourishes the people's bodies and warms their spirits like the meat they slice from the flanks of a whale or seal.

Traditionally, this marine diet has made the people of the Arctic Circle among the world's healthiest. Beluga whale, for example, has 10 times the iron of beef, twice the protein, and five times the vitamin A. Omega-3 fatty acids in the seafood protect the indigenous people from heart disease. A 70-year-old Inuit in Greenland has coronary arteries as elastic as those of a 20-year-old Dane eating Western foods, says Dr. Gert Mulvad of the Primary Health Care Clinic in Nuuk, Greenland's capital. Some Arctic clinics do not even keep heart medications like nitroglycerin in stock. Although heart disease has appeared with the introduction of Western foods, it remains "more or less unknown," Mulvad says.

Yet the ocean diet that gives these l
life and defines their culture also threatens them. Despite living amid pristine ice and glacier-carved bedrock, people like Mamarut,

The Arctic has become the planet's chemical trash can,

the final destination for toxic waste that originates thousands of miles away.

Tukummeq, and Gedion are more vulnerable to pollution than anyone else on earth. Mercury concentrations in Qaanaaq mothers are the highest ever recorded, 12 times greater than the level that poses neurological risks to fetuses, according to U.S. government standards. A separate study has linked PCBs with slight effects on the intelligence of children in Qaanaaq. Although most of the village's people never leave their hunting grounds, the world travels to them, riding upon wintry winds.

THE ARCTIC has been transformed into the planet's chemical trash can, the final destination for toxic waste that originates thousands of miles away. Atmospheric and oceanic currents conspire to send industrial chemicals, pesticides, and powerplant emissions on a journey to the Far North. Many airborne chemicals tend to migrate to, and precipitate in, cold climates, where they then endure for decades, perhaps centuries, slow to break down in the frigid temperatures and low sunlight. The Arctic Ocean is a deep-freeze archive, holding the memories of the world's past and present mistakes. Its wildlife, too, are archives, as poisonous chemicals accumulate in the fat that Arctic animals need to survive. Polar bears denning in Norway and Russia near the North Pole carry some of the highest levels of toxic compounds ever found in living animals.

Perched at the top of the Arctic food chain, eating a diet similar to a polar bear's, the Inuit also play unwilling host to some 200 toxic pesticides and industrial compounds. These include all of the "Dirty Dozen"–the 12 pollutants capable of inflicting the most damage–including PCBs and chlorinated pesticides such as chlordane, toxaphene, and DDT, long banned in most of North America and Europe. Other compounds still in use today–flame retardants in furniture and computers, insecticides, and the chemicals used to make Teflon–are growing in concentration as well.

The first evidence of alarming levels of toxic substances in the bodies of Arctic peoples came from the Canadian Inuit. In 1987, Dr. Eric Dewailly, an epidemiologist at Laval University in Quebec, was surveying contaminants in the breast milk of mothers near the industrialized, heavily polluted Gulf of St. Lawrence, when he met a midwife from Nunavik, the Inuit area of Arctic Quebec. (Across the Hudson Bay, the Inuit also have their own self-governing territory, Nunavut, or "our land.") She asked whether he wanted milk samples from Nunavik women. Dewailly reluctantly agreed, thinking they might be useful as "blanks," samples with nondetectable pollution levels.

A few months later, glass vials holding half a cup of milk from each of 24 Nunavik women arrived. Dewailly soon got a phone call from his lab director. Something was wrong with the Arctic milk. The chemical concentrations were off the charts. The peaks overloaded the lab's equipment, running off the page. The technician thought the samples must have been tainted in transit.

Upon testing more breast milk, however, the scientists realized that the readings were accurate: Arctic mothers had seven times more PCBs in their milk than mothers in Canada's biggest cities. Informed of the results, an expert in chemical safety at the World Health Organization told Dewailly that the PCB levels were the highest he had ever seen. Those women, he said, should stop breastfeeding their babies.

Dewailly hung up the phone. "Breast milk is supposed to be a gift," he says. "It isn't supposed to be a poison." And in a place as remote as Nunavik, he knew that mothers often had nothing else to feed their infants. Nearly 18 years have passed since Dewailly tested those first vials of breast milk; subsequent data has emerged to show that people, especially babies, are exposed to dangerous concentrations of contaminants all across the Arctic. The average levels of PCBs and mercury in newborn babies' cord blood and women's breast milk are a staggering 20 to

THE INUIT LIVE IN GREENLAND AND ARCTIC CANADA, BOTH PART OF THE CIRCUMPOLAR NORTH.

MAP BY DAVE STEVENSON

Mamarut Kristiansen surveys the ice, hoping to spot a narwhal.

50 times higher in Greenland than in urban areas of the United States and Europe, according to a 2002 report from the Arctic Monitoring and Assessment Programme (AMAP), a project created by eight governments including the United States. Ninety-five percent of women tested in eastern Greenland, nearly 75 percent of women in Arctic Canada's Baffin Island, and nearly 60 percent in Nunavik exceed Canada's "level of concern" for PCBs. Fewer measurements have been taken in Siberia, but the AMAP says contamination levels are high there as well.

In addition to their potential to cause cancer, many of the compounds found in Arctic inhabitants are capable of altering sex hormones and reproductive systems, suppressing immune systems, and obstructing brain development. Infants are the most vulnerable–subject to exposure both in utero and through breast milk, because contaminants such as PCB and DDT accumulate in the fatty nourishment–and are harmed in subtle but profound ways. Arctic babies with high PCB and DDT exposure suffer greater rates of infectious diseases. A study of such infants in Nunavik found that they have more ear and respiratory infections, a quarter of them severe enough to cause hearing loss. "Nunavik has a cluster of sick babies," says Dewailly. "They fill the waiting rooms of the clinics."

A 2003 study found that, compared to infants in lower Quebec, Nunavik infants had much higher exposure to PCBs, mercury, and lead, which resulted in lower birth weight, impaired memory skills, and difficulty in processing new information.

Excessive levels of contamination are not limited to the Arctic. People throughout the world, especially those in seafood-eating cultures, are at similar risk. In the United States, one of every six babies–about 698,000 a year–is born to a mother carrying more mercury in her body than is considered safe under federal guidelines.

The difference is that Americans and Europeans can make choices in their diets to limit their exposure, avoiding fish such as swordfish that are high on the food chain or from highly contaminated waters. For the 650,000 native people of the circumpolar North–the Inuit of Greenland and Canada, the Aleuts, Yup'ik, and Inupiat of Alaska, the Chukchi and other tribes of Siberia, the Saami of Scandinavia and western Russia–there is no real choice. Spread over three continents and speaking dozens of languages, almost all of them face the same dilemma: whether to eat traditional food and face the health risk–or abandon their food, and with it their culture.

"Our foods do more than nourish our bodies," Inuit rights activist Ingmar F[illegible]e said. "When many things in our li[illegible] changing, our foods remain the same. [illegible] make us feel the same as they have for generations. When I eat Inuit foods, I know who I am."

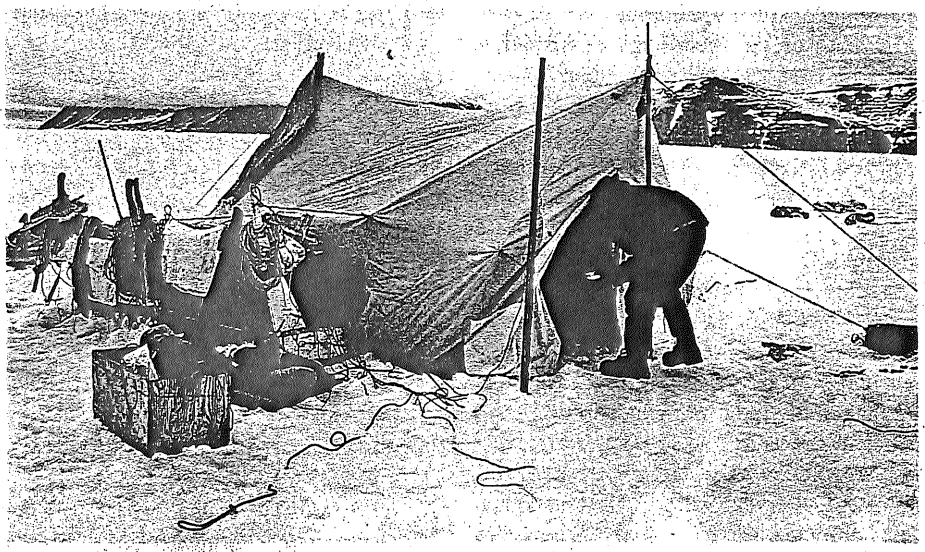
Eating traditional food is a way to hold on to a culture under assault. "When I eat Inuit foods," activist Ingmar Egede said, "I know who I am."

KNOWN TO NAVIGATORS as the North Water, the ocean off Qaanaaq is a polynya, a spot that remains thawed year-round in an otherwise frozen sea. An upwelling of nutrients draws an array of marine life, and the Kristiansens and the other people of Qaanaaq, an isolated village of 860 on the slope of a granite mountain, come here to hunt seal, beluga, walrus, narwhal, even polar bear. A century ago, the famous Arctic explorers–Peary, Frederick Cook, Knud Rasmussen–learned on their expeditions through the area that eating Inuit food was key to survival.

Greenland has no trees, no grass, no fertile soil, which means no cows, no pigs, no chickens, no grains, no vegetables, no fruit. In fact, there is little need for the word "green" in Greenland. The ocean is its food basket. In the remote villages, people eat marine mammals and seabirds 36 times per month on average, consuming about a pound of seal and whale each week. One-third of their food is the meat of wild animals. The International Whaling Commission has deemed the Inuit "the most hunting-oriented of all humans." Greenland is an independently governed territory of Denmark, but 85 percent–or 48,000–of its people are Inuit, and hunting is essential to everything in their 4,000-year-old culture: their language, their art, their clothing, their legends, their celebrations, their community ties, their economy, their spirituality.

Today, the Kristiansens are gathered on the edge of the ice, waiting to spot a whale's breath. "If only we could see one, we'd be happy," Mamarut whispers, lifting binoculars and eyeing the mirrorlike water for the pale gray back of *qilalugaq,* or narwhal. "Sometimes they arrive at a certain hour of the day and then the next day, same hour, they come back."

Once, Gedion and Mamarut waited almost a month on the ice before catching a narwhal. During such vigils, hunters must remain alert for cracks or other signs that the ice beneath them is shifting. In an instant, it can break off and carry them out to sea. To Greenlanders, ice is everything–it's danger,



Out on the ice, a tarp and a sledge are the only shelter, and a freshly killed seal (below) is the meal for the day.

it's the source of dinner, it's the water they drink. Their language has several dozen expressions for ice, only one for tree.

Mamarut is big, bawdy, and beefy, the elder brother and joker of the family. He celebrated his 42nd birthday on this hunting trip. Gedion is 10 years younger, lanky, quiet, the expert kayaker, wearing a *National Geographic* cap. The Kristiansen brothers are among the best hunters in a nation of hunters, able to sustain their families without the help of other jobs for their wives or themselves. In a good year, they can eat their fill of whale meat and earn more than $15,000 a year selling the rest to markets. In winter, they sell sealskins to a Greenlandic company marketing them in Europe. The men's hair is black, thick and straight, cut short. Their skin is

In remote Inuit villages, people eat marine mammals and seabirds 36 times a month, consuming about a pound of seal and whale each week.

darkened by the sun, but they have no wrinkles. Their only shelter on the ice is a canvas tarp attached to their dog sledge, a makeshift tent so cramped that one person can't bend a knee or straighten an elbow without disturbing the others. A noxious oil-burning lamp is their only source of heat; the kitchen is a camp stove, used to melt ice for tea and to boil seal meat.

Hunting narwhal is a dangerous endeavor. When Gedion hears or sees them coming, he quietly climbs into his kayak with his harpoon and sealskin buoy. He must simultaneously judge the ice conditions, the current, the wind, the speed and direction of the whales. If a kayaker makes the slightest noise, a narwhal will hear it. If he throws the harpoon, the whale must be directly in front of his kayak, about 30 feet away, close but not too close—or the animal's powerful dive will submerge him and he will likely drown. Gedion, like most Greenlanders, can't swim. There's not much need to master swimming when one can't survive more than a few moments in the frigid water.

Pollution isn't the first force to disrupt local Inuit culture. A little more than a century ago, the people of Qaanaaq didn't have a written language and had scant contact with the Western world. In the 1950s, during the Cold War, their entire community was moved 70 miles to the north to make way for an American military base. The U.S. and Danish governments built the villagers contemporary prefabricated houses—small red, green, blue, and purple chalets. Qaanaaq's population has since doubled, with people attracted by the good hunting. The move also brought liquor, television, and other distractions of modern life. Alcoholism, violence, domestic abuse, and suicide now exact a heavy toll.

Today, the people of Qaanaaq can smear imported taco sauce on their seal meat, buy dental floss and Danish porn magazines in the small local market, and watch *Nightmare on Elm Street* and *Altered States* in their living rooms on the one TV station that beams into Qaanaaq. When asked how he catches a whale, Gedion jokes that he uses a lasso like American cowboys he's seen on television.

Whatever is not hunted—from tea to bread to cheese—is imported from Denmark. Imported food is expensive, often stale, and not very tasty or nutritious. The average family income is $24,000 in Greenland's capital Nuuk, $13,000 in Qaanaaq, and though food is government subsidized, the price of staples like milk, bread, and beef is still considerably higher than in the United States.

And so Greenland's public health officials

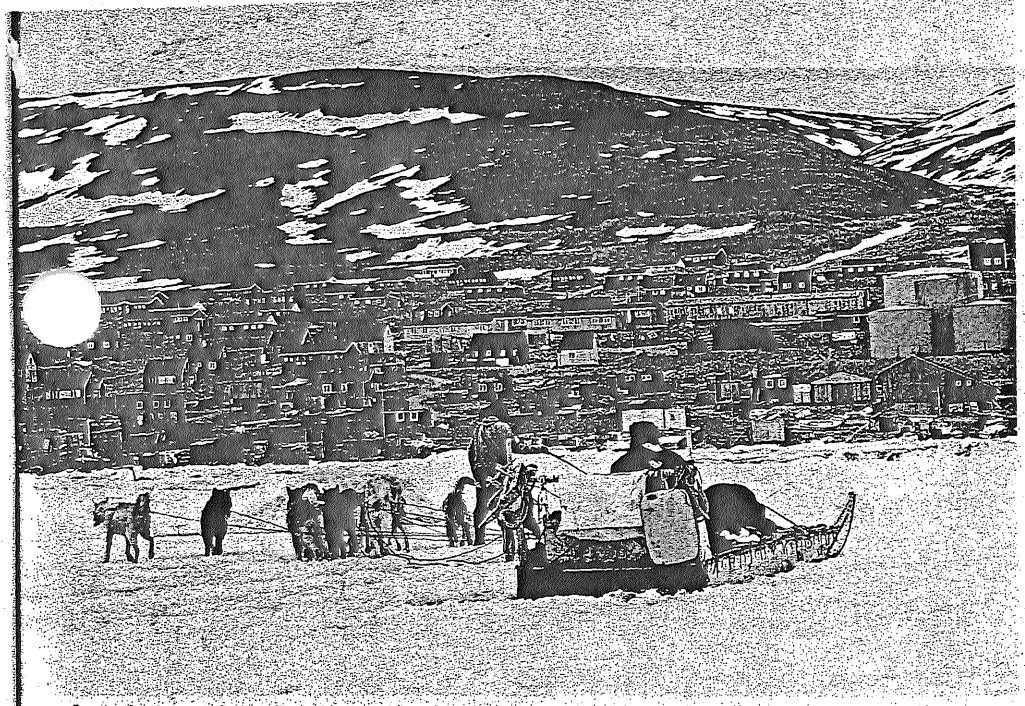
Whale meat on sale in Greenland

are torn between encouraging the Inuit to keep eating their traditional foods and advising them to reduce their consumption. In part, doctors fear the Inuit will switch to processed foods loaded with carbohydrates and sugar. "The level of contamination is very high in Greenland, but there's a lot of Western food that is worse than the poisons," Dr. Mulvad says. Greenland's Home Rule government has issued no advisories, and doctors continue to tell people, even pregnant women, to eat traditional food and nurse their babies without restrictions. Jonathan Motzfeldt, who was Greenland's premier for almost 20 years and is now speaker of the Parliament, says hunting isn't sport for his people; it's survival, and the government will not discourage it. "We eat seal meat as you eat cow in your country," Motzfeldt says. "It's important for Greenlanders to have meat on the table. You don't see many vegetables in Greenland. We integrate imported foods, but hunting and eating seals as well as whales is essential for us to survive as a people."

ACROSS THE BAFFIN BAY, [illegible]s show most Canadian Inuit l[illegible]ot altered their diet either. This is partly the result of a clash of cultures. Inuktitut, the language of Canadian Inuit, has some 50 expressions for snow and ice. *Qanniq* is falling snow. *Maujaq* is deep, soft snow. *Kinirtaq* is wet, compact snow. *Katakartanaq* is crusty snow marked by footsteps. *Uangniut* is a snowdrift made by a northwest wind. *Munnguqtuq* is compressed snow softening in spring. Yet there is no Inuktitut word for "chemical" or "pollution" or "contaminant." Over the millennia that their culture has existed, the Inuit have had no need for such words. Most have never seen soot spew from a factory smokestack, or smelled the stench of truck exhaust, or waded in an oily river. So Canadian health officials have dubbed the toxic chemicals found in native foods *sukkunartuq*—something that destroys or brings about something bad. But use of the word has made the contaminants seem lethal and m[illegible]-ious, even supernatural, and that—co[illegible] with a history of government secrec[illegible] poor communication about health risks—has left the Inuit confused, scared, and sometimes angry.

In 1985, Canadian health officials, concerned that an Arctic radar warning system might be a source of PCBs, decided to study the people of Broughton Island, a tiny hamlet in the Baffin Bay region. Government researchers, led by Dr. David Kinloch, collected blood samples and breast milk. The PCB levels were so high—much higher than what could have come from local military facilities—that the mayor of Broughton Island granted Kinloch permission to test more women. Completed in the summer of 1988, the research confirmed high concentrations of PCBs in breast milk at about the same time that Quebec's Dewailly was finding extraordinary levels of DDT, PCBs, and other toxic chemicals in the women of Nunavik. Before any of this data could be fully analyzed, and before people were notified, the discovery was leaked to the press.

On December 15, 1988, Toronto's *Globe and Mail* published a front-page story, quot-



At the end of their hunting trip, the Kristiansens return to Qaanaaq.

ing a Canadian environmental official saying that the Inuit were so contaminated that they might have to give up whale, seal, and walrus. The Inuit were terrified; some stopped eating their native foods, or breastfeeding. Overnight, Arctic contaminants became a crisis for the Canadian government. Health Canada, the nation's public health agency, was paralyzed with indecision. The Nunavik and Baffin data clearly showed that most Inuit were exceeding the agency's "tolerable daily intake levels" for toxic contaminants. If the agency was to adhere to its own policies, it would have to warn the Inuit to stop eating their traditional foods. But public health officials had never encountered a problem like this before, where the contaminated foods were so vital to a society's health, culture, and economy. On the one hand, it seemed irresponsible to advise people not to nurse their babies and eat their foods when the traditional diet had so many health benefits and alternatives were unavailable. On the other hand, if the government ignored its own toxic guidelines when it came to the Inuit, wouldn't that be discriminatory?

Crisis meetings were held in Ottawa; aboriginal leaders begged to be included, but none were allowed to participate. It wasn't until the spring of 1989, more than a year later, that the Broughton Islanders who'd given their blood and breast milk to scientists were allowed to see the results of their own tests. It was a slap in the face that Canada's indigenous people have not forgotten.

A wide chasm has since grown between what scientists say and what native people hear, and health officials have failed to refine their message to resonate with the traditional cultures of the Arctic. As a result, at least three generations of Inuit have had little or no advice from experts on how to reduce their exposure. In the late 1990s, 42 percent of women questioned in Nunavik said they increased their consumption of traditional foods while pregnant. Of the 12 percent who ate less, only 1 of 135 said she did so to avoid contaminants. Among those who ate more native foods during pregnancy, most said they did so because they believed it would be good for their baby.

Inuit Tapiriit Kanatami, an organization that represents the Canadian Inuit, launched a project in the mid-1990s to gauge the success of authorities' efforts to inform nine Arctic communities about contaminants. The researchers found the communication so poorly handled that it caused extreme psychological distress among the Inuit. Fear, they concluded, is as dangerous a threat as the contaminants themselves.

"In every instance, there was a pervasive unease and anxiety about contaminants," the organization wrote in its 1995 report. "Whether or not individuals are exposed to...contaminants, the threat alone leads to anxiety, loss of familiar and staple food, loss of employment or activity, loss of confidence in the basic food source and the environment, and more generally a loss of control over one's destiny and well-being."

Lately, health officials have been doing a better job at informing the Inuit of new data. And in 2003, the Nunavik Nutrition and Health Committee, based in Kuujjuaq and composed of Inuit leaders as well as Quebec medical experts, finally took a different tack, focusing on telling people what they should eat rather than what they should not eat. Women were advised to eat Arctic char, a tasty, popular fish that has low levels of contaminants and high amounts of beneficial fatty acids; a pilot program distributed free char to three communities. The hope is that if the Inuit eat more char they will eat less beluga, the source of two-thirds of the PCBs in Nunavik residents.

THE KRISTIANSENS, like their fellow residents of Qaanaaq, learned about the contaminants from listening to the radio. But like most Greenlandic Inuit, they have not changed their diet. Virtually every day, they eat seal meat and mattak, and with every bite, traces of mercury, PCBs, and other chemicals amass in their bodies. "We can't avoid them," Gedion says with a shrug. "It's our food."

This hunting trip proves to be a short one, only five days, and they reap little reward for their patience. "Sometimes you have to just go back empty-handed and feed your dogs," Mamarut says. Upon returning to their village, hunters share their experiences so that everyone may benefit from them. The Kristiansen brothers learned to hunt narwhal from their father, who, in turn, learned from his relatives. Gedion's seven-year-old son, Rasmus, often comes along on their hunts, pretending to drive the dogs and harpoon narwhals. Soon enough, he will be paddling a kayak beside his father. Since 2500 B.C., when the forebears of the Inuit arrived in Greenland, this legacy has been passed on to generations of boys by generations of men like Gedion and Mamarut. Their ancestors' memories, as vivid as a dream, as ancient as the sea ice, mingle with their own.

"Qaatuppunga piniartarlunga," Mamarut says. As far back as I can remember, I hunted. ■

One way to stem pollution in the Arctic is to reduce U.S. power plants' mercury emissions. Physicians for Social Responsibility is pushing the Bush administration and Congress to clean up our skies at *mercuryaction.org*. Get Generation Green's Mercury Action Kit by calling (800) 652-0827. Sign up for mercury action alerts at *generationgreen.org*.

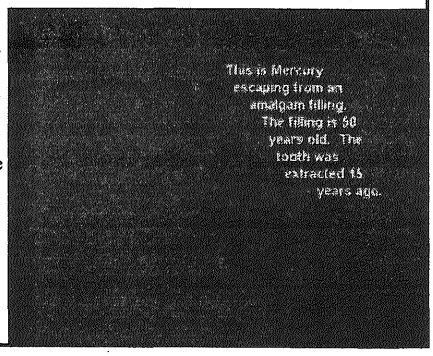
Dr. Haley

Minnesota Legislators

1 February 05

VISUALIZATION OF MERCURY EMITTING FROM A DENTAL AMALGAM

- From: www.uninformedconsent.com
- David Kennedy's IAOMT tape



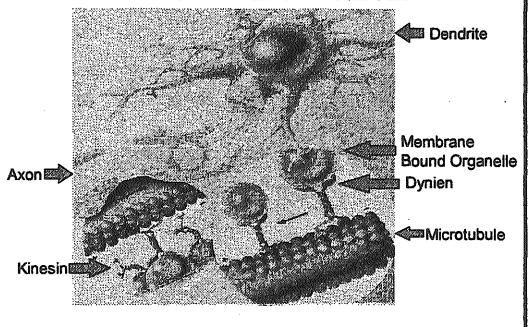
ELEVATED MERCURY IN IDIOPATHIC DILATED CARDIOMYOPATHY (IDCM).

WHERE DOES THE Hg COME FROM?

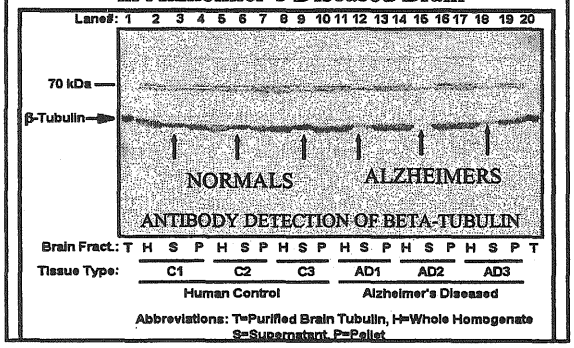
LEVELS ng/g	Hg	Sb
Controls	8.0	1.5
IDCM	178,400	19.260

Frustaci et al., J. of American College of Cardiology, 33, (6) 1578, 1999.
Controls were patients with valvular or ischemic heart disease.
Athletic youth die of IDCM.

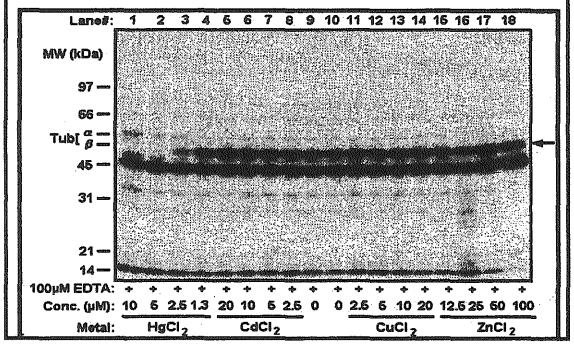
Axonal Transport - A Process Essential for the Survival of Neurons



Partitioning of ß-Tubulin is Aberrant in Alzheimer's Diseased Brain

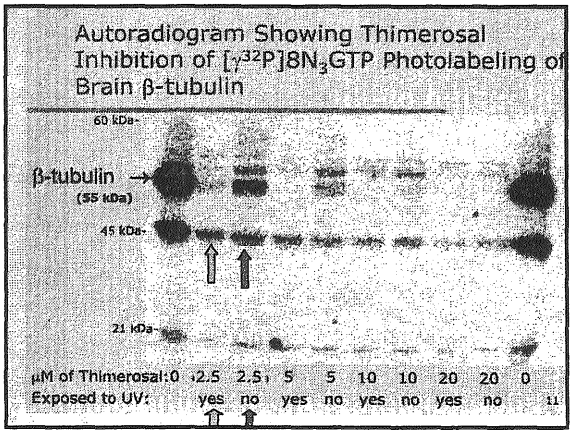


EDTA Prevents Cd, Cu & Zn But Not Hg Inhibition of [^{32}P]8N$_3$GTP Photolabeling of Brain ß-Tubulin

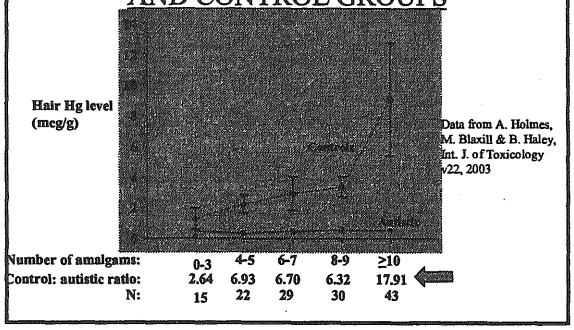


MERCURY AND ALZHEIMER'S DISEASE

- Exposure of neuroblastoma cells to 10^{-9} molar mercury increases *Tau phosphorylation and secretion of beta-amyloid*. Both of these events occur in Alzheimer's diseased brain. Amyloid plaque formation is the "diagnostic hallmark" of Alzheimer's disease. Olivieri et al. J. Neurochemistry, 74, 231, 2000.
- Exposure of cultured neurons to 10^{-7} to 10^{-10} molar mercury rapidly causes *the stripping of tubulin* from the neurofibrils forming the neurite processes *leading to the formation of neurofibillary tangles* (NFTs), a "diagnostic hallmark" of Alzheimer's disease. Leong et al. NeuroReports 12(4), 733, 2001
- Therefore, Hg exposure can create all of the diagnostic hallmarks of Alzheimer's Disease!



MERCURY BIRTH HAIR LEVELS VS. AMALGAM FILLINGS IN AUTISTIC AND CONTROL GROUPS



Data from A. Holmes, M. Blaxill & B. Haley, Int. J. of Toxicology v22, 2003

- Results from other population studies such as the recent NSERC (Canada) where the revealed "mysterious anomaly" of "Hair or blood samples of individuals in the communities with highest mercury exposure actually revealed the lowest body mercury levels."---Is this similar to control versus autistic children?

Observation

- Autistic children appear to have an impaired ability to excrete mercury when compared to normal children!
- This research has been confirmed by scientists at MIT, ASU and the Pfieffer Research Institute.

Other Confirmations On Hair Hg Level and Autism

- Results from Dr. Bradstreet on Hg body burden of autistics.
- Results of Dr. Jill James on GSH levels in autistics.
- Results of Dr. Mady Horning on inducing autism like symptoms in mice susceptible to autoimmune disease.
- Results from other population studies such as the recent NSERC (Canada) where the revealed "mysterious anomaly" of "Hair or blood samples of individuals in the communities with highest mercury exposure actually revealed the lowest body mercury levels."---Is this similar to control versus autistic children?
- Study on seven-year-old children in the Faeroe Isalnds found that blood pressure problems increased with decreased blood Hg.
- Sechylles study of >700 children, boys with higher levels of hair mercury performed better on some tests as the Boston Naming test.

Organ Mercury Levels in Infants with Omophaloceles Treated with Thimerosal. Fagan et al. Archives of Disease in Childhood 52, 962-64, 1977

- Between 1969-75, 13 cases were treated, 10 died. Mercury analysis of organs ranged from 65 to 2,700 times normal levels. This appears to be from 9 to 48 topical applications of 0.1% thimerosal applications. **NOTE; These children were most likely on antibiotics.**
- "Paradoxically, (in another study) 3 infants exposed postnatally (Iraq, Methyl-Hg by ingestion) did not exhibit signs or symptoms, though their blood levels were >1,000ppb, and one was >1,500ppb." **No antibiotics involved!**
- CONCLUSION IN 1977: "Organic mercurial antiseptics should be heavily restricted or withdrawn from hospital use, and the fact that mercury readily penetrates intact membranes and is highly toxic seems to have been forgotten."

Effects of Antibiotics and Diet on Hg Excretion Found in Published Literature

- Rats exposed to antibiotics were severely impaired in their ability to excrete mercury.
- Rats on milk versus high protein diets were much less able to excrete mercury.
- The great enhancement of synergistic toxicity with Hg and other heavy metals (e.g. lead) is well documented in the literature. We have many children with other heavy metals in their bodies.

RAPID BLOOD TO BRAIN MOVEMENT OF [^{203}Hg]-THIMEROSAL

- Pregnant rabbits were injected subcutaneous with [^{203}Hg]-thimerosal.
- From hour 1 post injection to hour 6 the cpm of ^{203}Hg in the blood decreased from 100,000 to less than 25,000 cpm, or over 75%.
- From hour 2 post injection to hour 6 there was increased cpm of ^{203}Hg in the fetal brain (2 fold), liver (4 fold) and kidney (3 fold).
- Gasset et al. Tetratogenicities of Opthalmic Drugs. Arch. Opthalomology 93, 52-55, 1975.

Stajich et al. J.Pediatrics 136;5;679, 2000, IATROGENIC EXPOSURE TO MERCURY AFTER HEPATITIS B VACCINATION

- **Vaccine Hg = 0.5ml of 125,000 nanomolar, or 12.5 mcg Hg.**
- **Normal babies were about 3.5kg or about 7 lbs with 0.04mcg Hg/liter blood.**
- **At 16% blood volume estimate then 0.560 kg was blood or 0.560 liters.**
- **(125,000nmoles/liter)(0.0005 liter) = (0.56liter)(infant blood Hg nmoles/liter)**
- **Calculated infant blood Hg level = 112 nanomoles/liter if all Hg was to be in the blood.**
- **Blood Hg levels were determined pre (0.04mcg/liter)and 48 to 72 hours post injection (2.24mcg/liter).**
- **2.24mcg/liter divided by 200g/mole for Hg = 11.2 nanomoles/liter of Hg in "actual testing", or 10 fold less was found in the blood.**
- **11.2 nanomoles/liter is about 10% of 112 nanomoles/liter, where did 90% of the Hg go? (Of 62.5nanomoles injected, 6.27nanomoles were found in the blood.)**
- **This 11.2mcg of mercury that is not accounted for after 2-3 days and is either somewhere else in the body or has been excreted. Which is it?**

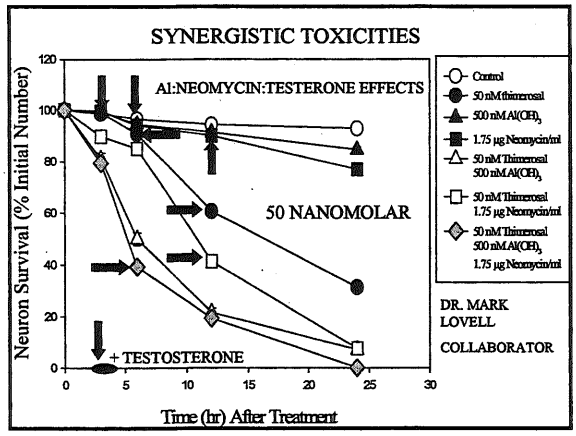
Infant Hg Excretion Rates Based on Pichichero et al. Lancet 360:1737, 2002 Data and a 4kg Infant

Stool Hg concentration	Daily Hg excretion	Days to excrete X mcg	
		12.5mcg	187.5mcg
(ng/g)	(mcg/day)	(days)	(days)
Minimum: 23	0.09-0.28	44.6-139	670-2,083
Mean: 82	0.33-0.98	12.7-37.9	191-568
Maximum: 140	0.56-1.68	7.44-22.3	112-335

As previously calculated, 11.4mcg of Hg were not accounted for after a single vaccination and had to be excreted or retained by body tissues within 48-72 hours, or 2-3 days. As can be seen in the table above, it takes as a minimum about 7.4 days to excrete 12.5 mcg Hg using the maximum fecal Hg excretion rate. **This includes an assumption of 1-3g feces/day/kg body weight.** Using the mean max daily excretion then 1.96-2.94mcg of Hg of the 12.5mcg injected would be excreted leaving 10.54-9.56mcg unaccounted for at days 2-3 respectively.

Conclusions

- Initially injected thimerosal rapidly leaves the blood and goes into the cells of the body.
- Measuring the Hg levels in the blood hours or days after thimerosal exposure cannot be used to determine the extent of mercury exposure or the amount retained in the body.
- Fecal excretion of thimerosal delivered mercury is to slow to account for the drop in blood Hg levels. Also, this drop does not represent removal from the body, even for normal children. Autistic children would be even less able to excrete Hg via the feces.
- Even normal children had a 6-fold difference in excretion rates according to Pichichero et al. How much lower would the autistic children be in rates of Hg excretion?



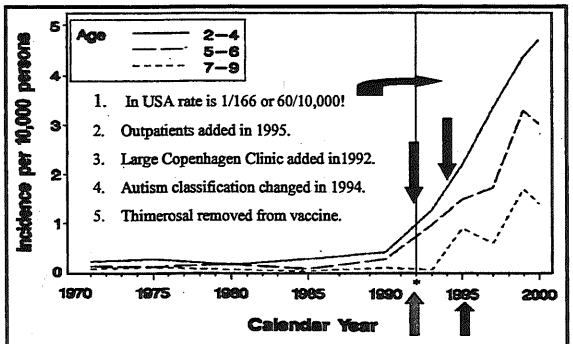


Fig 1. Incidence of autism by age and calendar year. The asterisk (*) indicates removal of thimerosal-containing vaccines in 1992.

Reference: K. M. Madsen, et. al., *Pediatrics*, **112**, 604-606 (2003).

Conclusions

- Without considering diet, antibiotic exposure, synergistic toxicity of other materials, and genetic susceptibility the measurement of mercury deposited in various organs of experimental animals will not answer the question of human susceptibility to the toxic effects of thimerosal or ethylmercury exposure nor the possibility of this exposure impeding neuronal development in the CNS that might lead to autism spectrum disorders.
- The Danish data base used by Madsen et al. and Hviid et al. is flawed and completely invalid for use in studies of the thimerosal-autism hypothesis. This study was defined as "well designed" by the IOM.

Good afternoon.

My name is Libby Rupp, this is my daughter, Isabella, and my husband Chris. We are here to ask you to eliminate mercury exposure from vaccines.

Isabella was a vibrant, thriving newborn. She nursed well, gained weight and was developing beautifully.

Our medical nightmare began after Isabella was immunized. She began waking every 15 minutes all night long and cried frequently. She stopped cooing and making typical "baby noises." Instead, she would scream, uncontrollably, for long periods of time. She missed all the developmental milestones. As time went on, feeding became impossible as she lost the ability to swallow. She had severe constipation and was in constant pain. For more than two years, I slept each night in a chair, holding her so she could sleep. She fell from the 50th percentile in weight to the 5th . We were certain we were going to lose her.

Getting no help from the medical community, I started researching. Each time I typed Isabella's symptoms into the internet, mercury poisoning came up.

I learned mercury was a component of vaccines and worse yet, the lot numbers on Isabella's vaccine record proved she had received the toxin. I was shocked. When I was in kindergarten my teacher broke a mercury thermometer and the school was evacuated. Thirty years later I learned mercury had been injected directly into my daughter.

My pediatrician insisted they were a mercury-free clinic. At my urging she called the Health Department and confirmed that Isabella did in fact receive mercury. "Don't worry" she said. "It's just a little mercury." That 'little mercury' was actually 45 times the EPA guideline for mercury exposure. This is the same exposure that an infant could get today from one flu shot.

This amount is the same that a fetus would be exposed to if given to a pregnant woman – the same amount Isabella received prenatally from the mercury-containing flu shot I received during pregnancy.

While the FDA called upon vaccine manufacturers to remove mercury in 2000, the mercury-laden vaccines were never recalled. Isabella received these toxic shots in 2001. In other words, Isabella's medical problems were completely preventable.

The true severity of Isabella's medical condition has unfolded in the years since those fateful shots. She is diagnosed with inflammatory bowel disease, immune deficiency, autoimmune disease and mitochondrial cytopathy – a life-threatening metabolic disorder. She rarely sleeps and may never speak. This mild-mannered child has unexplained rages where she bangs her head on the floor, bites, kicks and pulls hair uncontrollably.

Mercury did this to her.

Toxline, a publication of the NIH, lists hundreds of citings showing the correlation between mercury and gastrointestinal function, mitochondria, autoimmunity and speech disorder.

Four doctors have concluded that mercury is the cause of Isabella's medical problems. Tests have shown mercury in Isabella's hair, blood and urine. I want to make it very clear – Isabella does not eat fish. Since we've begun chelating her, a process of removing mercury from her body, she has shown great developmental improvements.

Aside from the physical and emotional toll, Isabella's medical problems have had a tremendous financial impact on our family. I had to quit my job causing us to lose almost half of our income. In 2003 alone, we paid more than $20,000 in out-of-pocket medical expenses for bills not covered by insurance. But the monetary issues are secondary to the pain Isabella endures every day and the obstacles she will have to overcome to function in school and society.

Mercury is in vaccines so that pharmaceuticals can save money. For each day that this practice continues, children are being poisoned. It must stop immediately.

Honorable Senators, mercury is mercury no matter what the form. It is toxic and does not belong in the human body. Please pass this bill.

Thank you.

A search of Toxline, an NIH publication of toxicological studies, shows the following results:

- The affects of mercury on gastrointestinal function: 178 citings
- Mercury and mitochondria: 129 citings
- … autoimmunity: 129
- … sleep 30
- … speech disorder: 18
- Prenatal exposure to mercury: 260 citings

Summary of Characteristics of Mercury Poisoning

Source: http://tlredwood.home.mindspring.com/mercurypoison.htm

Indicates symptoms exhibited by Isabella

	Mercury Poisoning
Psychiatric Disturbances	Social deficits, shyness, social withdrawal
	Depression, mood swings; mask face
	Anxiety
	Schizoid tendencies, OCD traits
	Lacks eye contact, hesitant to engage others
	Irrational fears
	Irritability, aggression, temper tantrums
	Impaired face recognition
Speech, Language & Hearing Deficits	Loss of speech, failure to develop speech
	Dysarthria; articulation problems
	Speech comprehension deficits
	Verbalizing & word retrieval problems
	Sound sensitivity
	Hearing loss; deafness in very high doses
	Poor performance on language IQ tests
Sensory Abnormalities	Abnormal sensation in mouth & extremities
	Sound sensitivity
	Abnormal touch sensations; touch aversion
	Vestibular abnormalities
Motor Disorders	Involuntary jerking movements – arm flapping, ankle jerks, myoclonal jerks, choreiform movements, circling, rocking
	Deficits in eye-hand coordination; limb apraxia; intention tremors
	Gait impairment; ataxia – from incoordination & clumsiness to inability to walk, stand, or sit; loss of motor control
	Difficulty in chewing or swallowing
	Unusual postures; toe walking
Cognitive Impairments	Borderline intelligence, mental retardation - some cases reversible
	Poor concentration, attention, response inhibition
	Uneven performance on IQ subtests
	Verbal IQ higher than performance IQ
	Poor short term, verbal, & auditory memory
	Poor visual and perceptual motor skills, impairment in simple reaction time
	Difficulty carrying out complex commands
	Word-comprehension difficulties
	Deficits in understanding abstract ideas & symbolism; degeneration of higher mental powers

Unusual Behaviors	Stereotyped sniffing (rats)
	ADHD traits

	Agitation, unprovoked crying, grimacing, staring spells
	Sleep difficulties
	Eating disorders, feeding problems
	Self injurious behavior, e.g. head banging
Visual Impairments	Poor eye contact, impaired visual fixation
	"Visual impairments," blindness, near-sightedness, decreased visual acuity
	Light sensitivity, photophobia
	Blurred or hazy vision
	Constricted visual fields
Physical Disturbances	Increase in cerebral palsy; hyper- or hypo-tonia; abnormal reflexes; decreased muscle strength, especially upper body; incontinence; problems chewing, swallowing, salivating
	Rashes, dermatitis/dry skin, itching; burning
	Autonomic disturbance: excessive sweating, poor circulation, elevated heart rate
Gastro-intestinal Disturbances	Gastroenteritis, diarrhea; abdominal pain, constipation, "colitis"
	Anorexia, weight loss, nausea, poor appetite
	Lesions of ileum & colon; increased gut permeability
	Inhibits dipeptidyl peptidase IV, which cleaves casomorphin
Abnormal Biochemistry	Binds -SH groups; blocks sulfate transporter in intestines, kidneys
	Has special affinity for purines & pyrimidines
	Reduces availability of glutathione, needed in neurons, cells & liver to detoxify heavy metals
	Causes significant reduction in glutathione peroxidase and glutathione reductase
	Disrupts mitochondrial activities, especially in brain
Immune Dysfunction	Sensitivity due to allergic or autoimmune reactions; sensitive individuals more likely to have allergies, asthma, autoimmune-like symptoms, especially rheumatoid-like ones
	Can produce an immune response in CNS
	Causes brain/MBP autoantibodies
	Causes overproduction of Th2 subset; kills/inhibits lymphocytes, T-cells, and monocytes; decreases NK T-cell activity; induces or suppresses IFNg & IL-2

CNS Structural Pathology	Selectively targets brain areas unable to detoxify or reduce Hg-induced oxidative stress
	Damage to Purkinje and granular cells
	Accummulates in amygdala and hippocampus
	Causes abnormal neuronal cytoarchitecture; disrupts neuronal migration & cell division; reduces NCAMs
	Progressive microcephaly
	Brain stem defects in some cases
Abnormalities in Neuro-	Prevents presynaptic serotonin release & inhibits serotonin transport; causes calcium disruptions
	Alters dopamine systems; peroxidine deficiency in rats resembles mercurialism in humans

Chemistry	Elevates epinephrine & norepinephrine levels by blocking enzyme that degrades epinephrine
	Elevates glutamate
	Leads to cortical acetylcholine deficiency; increases muscarinic receptor density in hippocampus & cerebellum
	Causes demyelinating neuropathy
EEG Abnormalities/ Epilepsy	Causes abnormal EEGs, epileptiform activity
	Causes seizures, convulsions
	Causes subtle, low amplitude seizure activity
Population Charact-eristics	Effects more males than females
	At low doses, only affects those geneticially susceptible
	First added to childhood vaccines in 1930s
	Exposure levels steadily increased since 1930s with rate of vaccination, number of vaccines
	Exposure occurs at 0 - 15 months; clinical silent stage means symptom emergence delayed; symptoms emerge gradually, starting with movement & sensation

TESTIMONY
Minnesota Senate Joint Hearing on Mercury
Tuesday, February 1, 2005

Nancy & Tim Hokkanen
parents of Andy Hokkanen, age 6
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My 6-year-old son Andy is recovering from mercury poisoning. Two years ago tests of his hair, blood, urine and stool revealed toxic levels of mercury, copper, and other metals. The results were verified by two clinics and a PhD biochemist. He was exposed in utero from my tooth fillings, which are 50% mercury, and from RhoGam shots for Rh factor incompatibility. After birth he received Thimerosal from routine childhood vaccinations.

Shortly after Andy's birth I noticed some developmental problems, but their significance was not clear until after I read about the effects of mercury.

At 6 months of age, my son quit saying "mama" and his vocalizations became inarticulate. He spoke no more words until 14 months. He had trouble swallowing thin rice cereal, he gagged often, and had chronically loose stools.

At 18 months Andy's behavior became very strange and wild. Over the next two years he began scripting (repeating TV dialogue as a substitute for "normal" conversation), stimming (physical acting out by jumping, flapping, spinning), perseverating (repeating activities over and over), and obsessing.

At age 3, he almost flunked out of a Christian preschool; it took most of one aide's time to keep him in the room and on task.

In spring 2002, at age 4 we enrolled our son in a tantrum study at the University of Minnesota. No one there had any answers for us, they merely observed.

During that time Andy was given the psychological diagnosis of autism by Minneapolis Public Schools special education department, and Fraser Child and Family Center, an autism treatment organization.

We enrolled our son in a behavioral therapy program at Fraser, and also in the public schools' special ed preschool program.

In June 2002 a neurologist prescribed Adderal for my son without first running tests. My son became psychotic. For four days by mid-afternoon he had to be held down in a dark quiet room while he screamed himself limp.

Next the neurologist prescribed Ritalin, saying, "Usually if one drug doesn't work, the other one does." My instincts told me that this was another disaster in the making, so I quit seeing that neurologist and began reading studies. Then I learned that Adderall enhances levels of norepinephrine and epinephrine, which in my son were already quite high.

I began doing my own research on the Internet, turning up repeated references implicating mercury toxicity with autism. The theory was promoted by chemistry experts such as Boyd Haley, PhD and Andrew Hall Cutler, PhD. I saw a study by entitled "Autism: a novel form of mercury poisoning," which documented about 100 matching symptoms.

Next I read about the CDC meeting at Simpsonwood resort in 2000, where 52 vaccine policymakers discussed how to deal with statistics showing that children given mercury in vaccines had a much higher rate of autism, attention deficit and other neurodevelopmental disorders. Then, of course, the 2002 Lilly rider tucked into the Homeland Security bill made me quite suspicious.

In November 2002 when my son was 4-1/2, we had tests of hair, blood, urine and stool samples run by HRI+Pfeiffer Treatment Center of Warrenville, Illinois. Results came in mid-December indicating mercury toxicity and high levels of copper and other metals, and various nutritional insufficiencies. Within 2 weeks of supplementing with Vitamin B-6, zinc, manganese and magnesium, our son showed drastic improvements in mood, behavior and abilities. We had an almost-normal Christmas without the tantrums and bizarre behavior.

The next year in kindergarten my son spent half time in a mainstream class, and half time in the autism classroom. This year for first grade he spends most of his time mainstreamed (80%/20%), with supports from an autism aide.

My husband's health insurance has covered the cost of behavioral therapy at Fraser. For about 9 months we were on Medical Assistance, which picked up many co-pays.

We estimate that our insurance company was billed about $100,000 for therapy. However we never noticed any drastic improvement until we began biomedical treatment, which has cost about $2,000. Strangely, our insurance company wouldn't cover the costs of those medical tests.

Our current pediatrician says that our son is doing very well, and his medical

tests bear out what his behavior and abilities tell me daily. He is rarely sick, sleeps through the night, is happy, social, creative, intuitive. Last week he and a neighbor girl invented a game together involving Lego structures. this from a child who at 4 engaged only in parallel play, and refused to hold a crayon. He reads 140 words a minute.

My son hears me talk about mercury a lot, because I have been trying to get information on mercury toxicity to physicians, teachers, legislators, and parents. Last summer he asked, "Mommy, is there something wrong with me?"

I told him, "No, you just have a little too much mercury in you and we're trying to get it out." I said that grownups have a problem when they don't clean up their messes. Sometimes grownups don't take the time to read and learn about important things, or they decide to look the other way.

Recently I saw a press release from the Mayo Clinic regarding an epidemiological study of autistic children from Olmstead County. I wondered why no one tested those children for the presence of mercury and other toxic heavy metals. We grownups have failed to provide the best healthcare for our children by ruling out a theory that for my son turned out to be true.

I view society's failure to restrict mercury use as a form of "fatal entrenchment" -- when an unhealthy practice or norm is allowed to continue simply because it has been done that way for so long. But we should not let our desire to disprove an unpleasant theory keep children from having the chance for a normal life.

###

ENSURING MERCURY-FREE VACCINES

Minnesota Natural Health Legal Reform Project

Mercury is a toxic substance used as a preservative (thimerosal) in some vaccines. Some individuals have been seriously harmed by this exposure. However, we now have mercury-free versions of most vaccines. We need to ensure that Minnesotans receive the mercury-free versions whenever possible.

Mercury is a potent neurotoxin that causes kidney, liver, and neurological damage

Toxic effects of mercury as thimerosal

- Thimerosal is "Poison by ingestion, subcutaneous, intravenous, and possibly other routes." Symptoms of thimerosal exposure include "mental retardation, loss of coordination in speech, writing, and gait, and bad temper progressing to mania."
  (U.S. National Toxicology Program, U.S. Dept of Health and Human Services
- Thimerosal "exposure in children may cause mild to severe mental retardation." (Eli Lilly, Material Safety Data Sheet)
- W. Slikker, FDA: "Thimerosal (sodium ethylmercurithiosalicylate) crosses the blood-brain and placental barriers and results in appreciable mercury content in tissues including brain." (Slikker, W, 2000. Developmental neurotoxicology of therapeutics: Survey of novel recent findings. Neurotoxicology 21(1-2): 250)
- Toxicologist Dr. Boyd Haley calls mercury the single most toxic substance he has ever tested.
- A subset of the population is particularly vulnerable to mercury, because they have reduced ability to excrete, or get rid of, mercury and other heavy metals.

The USPHS, AAP, AAFP, and CDC's ACIP in 1999 asked pharmaceutical companies to remove mercury from vaccines.

- *"The American Academy of Family Practitioners, American Academy of Pediatrics, and the U.S. Public Health Service, in consultation with the (CDC) Advisory Committee on Immunization Practices, reaffirm the goal set in July 1999 to remove or greatly reduce thimerosal from vaccines as soon as possible."*
  (Joint Statement Concerning Removal of Thimerosal from Vaccines, AAFP, AAP, USPHS, and ACIP, June 22, 2000)

Some pharmaceutical companies are still using mercury (thimerosal) as a preservative in vaccines

- Thimerosal is 49.6% organic mercury, derived from ethylmercury, and is used in some vaccines and pharmaceutical products to prevent bacterial and fungal contamination.
- Thimerosal was removed from most childhood vaccines by 2002. However, mercury is still being used in full strength (25 mcg per dose) in most influenza vaccines, tetanus vaccines, and meningococcal vaccines.

Preservative-free versions are available for most vaccines that still contain mercury

- Manufacturers can make vaccines free of mercury preservative simply by changing from multi-dose vials to single-dose vials, which do not need a preservative
- Vaccines containing no mercury, or no more than a trace amount of mercury, can now be ordered in place of mercury-containing ones, for most purposes.

How much mercury is in vaccines?

- The influenza, tetanus and meningococcal vaccines, containing 25 mcg of mercury, exceed EPA guidelines for oral ingestion of methyl mercury of 0.1 mcg/kg body weight/day.
- The flu vaccine contains five times the EPA limit for a 110 pound woman.
- For infants, it contains 12.5 mcg if mercury, or twelve times the EPA limit for a 22 pound baby.

How much mercury exposure is considered safe?

- *"No one knows what dose of mercury, if any, from vaccines is safe... We can say there is no evidence of harm, but the truth is - no one has looked."*
  Neil Halsey, director of the Johns Hopkins Institute for Vaccine Safety, 1999
- Many researchers believe increased Thimerosal use during the 1990s contributed to sharply increased rates of neurological disorders in children. During the 1990s, infants received up to 237.5 mcg of mercury via vaccinations. During this time, rates of neurodevelopmental disorders skyrocketed. Today, one in six children suffers from learning disabilities, according to the CDC.
- Many Minnesota parents have reported loss of neuromotor function in their child shortly after their child received multiple vaccines containing mercury.
- Many parents are finding improvement in restoring their children to health after using chelation and other biological methods to remove mercury.

The controversy: Does mercury in vaccinations harm children?

- The IOM report did not rule out thimerosal causing autism in a subset of individuals. The IOM admitted in its report that "the committee cannot rule out, based on the epidemiological evidence, the possibility that vaccines contribute to autism in some small subset or very unusual circumstance." Since then, new research studies have shed light on that small subgroup, individuals who cannot detoxify mercury effectively.
- The IOM statement narrowed its initial scope of all neurodevelopmental disorders after a statement from a leading researcher, and then commented only on autism.
- Many leading scientists disagree with the IOM's conclusions. Regardless of disagreement among experts, there is no longer a need to place a dangerous chemical such as mercury in vaccines. Manufacturers can avoid it by switching to single-dose vials.

What we can do

- Our legislation ensures that no vaccine containing mercury will be administered in Minnesota.
- The bill allows flexibility in cases where mercury-free doses are not manufactured or not obtainable by best efforts of the provider.

Benefits of this legislation

- Protection of Minnesota citizens from the potentially damaging effects of mercury exposure through vaccines
- Reduction in costs of health care and special education by reducing exposure to mercury

Legislation in other states to remove mercury in vaccines

- In May 2004, Iowa became the first state to ban mercury from childhood vaccines, followed by California in October. Other states such as New York, Nebraska, Maryland, and Missouri have introduced similar bills.

- On the federal level, Rep. David Weldon, M.D. (R-FL) introduced the Mercury-Free Vaccines Act of 2004 (HR 4169) with 50 cosponsors. Rep. Weldon calls thimerosal use "medical malpractice."

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Evidence of Thimerosal's Toxicity

Minnesota Natural Health Legal Reform Project

Response to Institute of Medicine Report

Of May 18, 2004

In a controversial report of May, 2004, the Institute of Medicine denied that thimerosal, the mercury compound used in vaccines, is linked to autism. However, the IOM revised its focus to autism only, deciding not to comment on whether thimerosal has caused neurodevelopmental disorders in general. Congressman Dave Weldon, MD, a pediatrician, responded, "This revision raises suspicions that this IOM exercise might be more about drawing pre-designed conclusions aimed at restoring public confidence in vaccines, rather than conducting a complete and thorough inquiry into whether or not thimerosal might cause neurodevelopmental disorders."

The IOM report did not rule out thimerosal causing autism in a subset of individuals. The IOM admitted in its report that "the committee cannot rule out, based on the epidemiological evidence, the possibility that vaccines contribute to autism in some small subset or very unusual circumstance."

It is this "small subset" that has been the focus of important biological studies published since the IOM review.

- June 2004 - A study by Dr. Mady Hornig of Columbia University gave low doses of thimerosal to mice. It found that those mice genetically susceptible to autoimmune disorders developed brain damage similar to autism in humans. This animal model showed that the administration of low-dose ethylmercury can lead to behavioral and neurological changes in the brain, reinforcing previous studies showing that a genetic predisposition, in combination with certain environmental triggers, affects risk. (Molecular Psychiatry, June 8, 2004)

- December, 2004 - Dr. Jill James, a former FDA research scientist now at the University of Arkansas for Medical Sciences, published her study showing that autistic children have a severe deficiency in glutathione, which James said is the body's most important detoxifier of metals such as mercury. Autistic children showed a significant impairment in every one of five measurements of the body's ability to maintain glutathione. These findings are strong evidence that if such children were exposed to mercury, they would be much less able to mount an effective defense. In addition, a number of children studied who received supplements such as methyl B12, which restored methionine levels, experienced great improvement in functioning.

These studies indeed identify the "small subgroup" of people at increased risk of harm from mercury. They provide important new evidence that some individuals have reduced ability to detoxify mercury, thus making them vulnerable to even small amounts of mercury exposure.

The newest studies linking thimerosal to autism have precipitated some backpedaling by IOM participants. Dr. Steve Goodman of Johns Hopkins University School of Medicine, member of the IOM committee, admitted that some of the IOM's statements were misconstrued at the time. "First of all, we didn't dismiss anything. We simply stated the epidemiology evidence favored no relationship, which is true. At this point there is no increased risk to the general population. What we did say is if you've got a fixed pot, don't spend huge amounts more on epidemiology. What we said was that resources would be better spent on understanding the biology." The new studies just released do indeed help to understand the biology – how a small subset of the population which can not detoxify mercury can be vulnerable to damage which others do not experience.

Congressman Dave Weldon, a pediatrician, criticized the IOM report: *"Today's study, along with several other recently published scientific studies, demonstrate clearly that the IOM overstated their conclusions."*

Assessments of thimerosal's toxicity:

- **Eli Lilly, maker of Thimerosal:** *"Exposure in children may cause mild to severe mental retardation."* (Eli Lilly, Material Safety Data Sheet,, 12/8/99)
- *"We have found that for tissue culture work, the merthiolate must be in the concentration of less than 1/1,000,000 in order not to be toxic to the tissue cells."*
  J.W. Smith, Ph.D., Head of the Biological Regulatory Requirements Department at Eli Lilly--- September 7, 1971
- **National Toxicology Program:** *"Thimerosal is a "Poison by ingestion, subcutaneous, intravenous and possibly other routes." Symptoms of exposure include " mental retardation in children, loss of coordination in speech, writing, and gait, stupor, irritability, and bad temper progressing to mania".* (U.S. Dept of Health and Human Services, In nomination of Thimerosal to The National Toxicology Program, NIH, National Institute of Environmental Health Sciences)
- **W. Slikker, FDA:** *"Thimerosal (sodium ethylmercurithiosalicylate) crosses the blood-brain and placental barriers and results in appreciable mercury content in tissues including brain."* Slikker, W, 2000 Developmental neurotoxicology of therapeutics Survey of novel recent findings. Neurotoxicology 21(1-2)

Autistic children undergoing detoxification of heavy metals are often regaining normal function.

"In the treatment of over 2500 children in the autism spectrum in my clinic, the most significant difference is seen after the detoxification of heavy metal. Until we are willing to admit that we as physicians and public health officials are responsible for poisoning a decade of children, we will never heal the wounds of these families." Dr. Stephanie Cave, MD

Minnesota Natural Health Legal Reform Project
651 688 6515

Kris Ehresmann

INACTIVATED INFLUENZA VACC

WHAT YOU NEED TO KNOW

2004-2005

1 Why get vaccinated?

Influenza ("flu") is a serious disease.

It is caused by a virus that spreads from infected persons to the nose or throat of others.

Influenza can cause:

· fever · sore throat · chills
· cough · headache · muscle aches

Anyone can get influenza. Most people are ill with influenza for only a few days, but some get much sicker and may need to be hospitalized. Influenza causes an average of 36,000 deaths each year in the U.S., mostly among the elderly.

Influenza vaccine can prevent influenza.

2 Influenza vaccine

Two types of influenza vaccine are now available. Inactivated (killed) influenza vaccine, given as a shot, has been used in the United States for many years. A live, weakened vaccine was licensed in 2003. It is sprayed into the nostrils.

Influenza viruses change often. Therefore, influenza vaccine is updated every year.

Protection develops about 2 weeks after getting the shot and may last up to a year.

Some people who get flu vaccine may still get flu, but they will usually get a milder case than those who did not get the shot.

Flu vaccine may be given at the same time as other vaccines, including pneumococcal vaccine.

Some inactivated flu vaccine contains thimerosal, a form of mercury, as a preservative. Some contains only a trace of thimerosal. There is no scientific evidence that thimerosal in vaccines is harmful, and the known benefits of the vaccine outweigh any potential risk from thimerosal. If you have questions about thimerosal or reduced-thimerosal flu vaccine, ask your doctor.

3 Who should get inactivated influenza vaccine?

People 6 months of age and older at risk for getting a serious case of influenza or influenza complications, and people in close contact with them (including all household members) should get the vaccine.

An annual flu shot is recommended for:

- **All children** 6-23 months of age.
- **Household contacts and out-of-home caretakers** of infants from 0-23 months of age.
- People **50 years of age or older.**
- Residents of **long-term care facilities** housing persons with chronic medical conditions.
- People who have **long-term health problems** with:
  - heart disease
  - kidney disease
  - lung disease
  - metabolic disease, such as diabetes
  - asthma
  - anemia, and other blood disorders
- People with a **weakened immune system** due to:
  - HIV/AIDS or another disease that affects the immune system
  - long-term treatment with drugs such as steroids
  - cancer treatment with x-rays or drugs
- People 6 months to 18 years of age on **long-term aspirin treatment** (these people could develop Reye Syndrome if they got the flu).
- Women who will be **pregnant** during influenza season.
- Physicians, nurses, family members, or anyone else coming in **close contact with people at risk** of serious influenza.
- Anyone else who wants to **reduce their chance of catching influenza.**

An annual flu shot should be *considered* for:

- People who provide **essential community services.**
- People at high risk for flu complications who **travel** to the Southern hemisphere between April and September, or who travel to the tropics or in organized tourist groups at any time.
- People living in **dormitories** or under other crowded conditions, to prevent outbreaks.

4 When should I get influenza vaccine?

The best time to get a flu shot is in October or November.

Some people should get their flu shot in ***October*** or earlier. This includes:
- people **50 years of age and older,**
- younger people at **high risk** from flu and its complications (including **children 6 through 23 months of age**),
- **household contacts** of persons at high risk,
- **health care workers,** and
- **children under 9 years of age** getting the flu shot for the first time.

The flu season can peak anywhere from December through March, but most often it peaks in February. So getting the vaccine in December, or even later, can be beneficial in most years.

Most people need only one flu shot each year to prevent influenza. **Children under 9 years old getting flu vaccine for the first time** should get 2 doses. With the inactivated vaccine, these doses are given one month apart. Children in this age group who got one dose the previous year, even if it was the first time they got the vaccine, need only one dose this year.

5 Some people should talk with a doctor before getting influenza vaccine

Talk with a doctor before getting a flu shot if you:

1) ever had a serious allergic reaction to eggs or to a previous dose of influenza vaccine, or
2) have a history of Guillain-Barré Syndrome (GBS).

If you have a fever or are severely ill at the time the shot is scheduled, you should probably wait until you recover before getting influenza vaccine. Talk to your doctor or nurse about whether to reschedule the vaccination.

6 What are the risks from inactivated influenza vaccine?

A vaccine, like any medicine, could possibly cause serious problems, such as severe allergic reactions. The risk of a vaccine causing serious harm, or death, is extremely small.

Serious problems from inactivated flu vaccine are very rare. The viruses in inactivated influenza vaccine have been killed, so you cannot get influenza from the vaccine.

Mild problems:
•soreness, redness, or swelling where the shot was given
•fever
•aches
If these problems occur, they usually begin soon after the shot and last 1-2 days.

Severe problems:
- Life-threatening allergic reactions from vaccines are very rare. If they do occur, it is within a few minutes to a few hours after the shot.
- In 1976, swine flu vaccine was associated with a severe paralytic illness called Guillain-Barré Syndrome (GBS). Influenza vaccines since then have not been clearly linked to GBS. However, if there is a risk of GBS from current influenza vaccines, it is estimated at 1 or 2 cases per million persons vaccinated . . . much less than the risk of severe influenza, which can be prevented by vaccination.

7 What if there is a moderate or severe reaction?

What should I look for?
- Any unusual condition, such as a high fever or behavior changes. Signs of a serious allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

What should I do?
- **Call** a doctor, or get the person to a doctor right away.
- **Tell** your doctor what happened, the date and time it happened, and when the vaccination was given.
- **Ask** your doctor, nurse, or health department to report the reaction by filing a Vaccine Adverse Event Reporting System (VAERS) form.
  Or you can file this report through the VAERS web site at www.vaers.org, or by calling 1-800-822-7967.
  VAERS does not provide medical advice.

8 How can I learn more?

- Ask your doctor or nurse. They can give you the vaccine package insert or suggest other sources of information.
- Call your local or state health department.
- Contact the Centers for Disease Control and Prevention (CDC):
  - Call **1-800-232-2522** (English)
  - Call **1-800-232-0233** (Español)
  - Visit CDC's website at **www.cdc.gov/flu**

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL IMMUNIZATION PROGRAM

Diane Peterson

VACCINES & IMMUNIZATIONS

Thimerosal Preservative and Routinely Recommended Childhood Vaccines

Vaccine Safety

The United States currently has the safest, most effective vaccine supply in history. Years of testing are required by law before a vaccine can be licensed. Once in use, vaccines are continually monitored for safety and efficacy. The Centers for Disease Control and Prevention (CDC), the Food and Drug Administration (FDA), the National Institutes of Health (NIH), and other Federal agencies routinely monitor and conduct research to examine any new evidence that would suggest possible problems with the safety of vaccines. For more information about vaccines and vaccine safety, visit www.cdc.gov/nip .

The Vaccine Adverse Event Reporting System (VAERS) is a national vaccine safety surveillance program co-sponsored by CDC and FDA. CDC and FDA encourage patients, parents, and others to report any significant problems experienced after vaccination, even if they are not certain that a vaccine caused them. Reports can be made by calling VAERS at 1-800-822-7967 or visiting www.vaers.org .

Thimerosal Preservative and Routinely Recommended Childhood Vaccines

Thimerosal is a preservative that contains a form of mercury (ethylmercury). Thimerosal was used in very small amounts for over 50 years as a preservative in some vaccines and to protect multi-dose vials of vaccines from bacterial contamination. Some parents, researchers and others have expressed concerns about a potential link between health problems, particularly autism, and vaccines containing thimerosal. There is no convincing evidence of harm caused by the small amounts of thimerosal in vaccines, except minor effects like swelling and redness at the injection site due to sensitivity to thimerosal.

Because there is public concern about the health effects of mercury exposure of any sort, and the elimination of mercury from vaccines was judged a feasible means of reducing an infant's total exposure to mercury in a world where other environmental sources of exposure are more difficult or impossible to eliminate (e.g., certain foods), vaccine manufacturers began the removal of it from the majority of routinely recommended childhood vaccines in 1999. As of January 14, 2003, the final lots of these vaccines containing thimerosal as a preservative expired.

Today, with the exception of influenza (flu) vaccine, none of the routinely recommended childhood vaccines used in the U.S. to protect preschool children against 12 infectious diseases contain thimerosal as a preservative. These include vaccines that protect against measles, mumps, rubella, chickenpox, hepatitis B, diphtheria, tetanus, pertussis (whooping cough), Haemophilus influenzae type b (Hib), polio, and pneumococcal disease. In addition, the measles-mumps-rubella (MMR), polio, varicella (chickenpox) and pnuemococcal conjugate (PCV) vaccines never contained thimerosal. Influenza vaccine is available in limited supplies in formulations that are thimerosal preservative-free.

With the newly formulated childhood vaccines, the maximum total exposure during the first six months of life is now less than three micrograms of mercury. Based on guidelines established by the FDA, the Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry (ATSDR), no child will receive excessive mercury from childhood vaccines regardless of whether or not receive influenza vaccine that contains thimerosal as a preservative. For more information on thimerosal in U.S. licensed vaccines go to http://www.fda.gov/cber/vaccine/thimerosal.htm .

For more information, visit www.cdc.gov/nip, or call the CDC National Immunization Information Hotline (800) 232-2522 (English), (800) 232-0233 (Español), or (800) 243-7889 (TTY). April 6, 2004

MMA
Minnesota Medical Association

Physicians working for a healthy Minnesota

February 1, 2005

Dear Senate Health and Family Security Committee Members:

On behalf of the members of the Minnesota Medical Association (MMA) and the Minnesota Chapter of the American Academy of Pediatricians (MN-AAP) we would like to express opposition to S.F. 639.

As physicians we want to ensure that our patients receive the best, most effective care based on science. There are currently no valid studies that show a link between thimerosal in vaccines and autism. A report issued by the Institute of Medicine in 2004 concluded that there is no causal relationship between vaccines containing thimerosal and autism. We are concerned that enacting legislation that implies vaccines containing thimerosal may be harmful will raise unwarranted fear in parents and lead to fewer children receiving recommended immunizations.

Although there is not scientific evidence that thimerosal in vaccines is a danger to patients who receive them, the scientific community has already moved toward developing vaccines that are thimerosal free. Since 2001, all routinely recommended vaccines manufactured for administration to infants have been either thimerosal-free or contain very small amounts. We applaud Sen. Lourey's intent to remove as many sources of environmental mercury as possible. We believe, however, that this legislation will cause fear among parents instead of the author's intended goal of removing sources of mercury from the environment.

Immunizations have had a tremendous impact on childhood mortality and morbidity. The Centers for Disease Control (CDC) acknowledged immunizations as one of the "Ten Great Public Health Achievements of the 20th Century." The continued success of immunizations in preventing diseases depends on a continued commitment on behalf of parents and physicians to ensure that children receive recommended immunizations. Please don't enact legislation that causes parents to question the value of immunizations.

Thank you for your consideration and we urge you to oppose S.F. 639.

Sincerely,

Michael Gonzalez-Campoy, M.D, Ph.D., FACE
President, MMA

Jeffery Schiff, M.D.
President MN-AAP

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mayo

Sen Kiscaden

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February 1, 2005

Writer's direct dial: 507-284-3932

VIA FACSIMILE 651-767-0924

The Honorable Sheila Kiscaden
Room 325 Capitol Building
St. Paul, MN 55155

Dear Senator Kiscaden:

On behalf of the Mayo Clinic we are deeply concerned about Section 2 of the proposed "Minnesota Elimination of Mercury in Vaccines Act of 2005." The proposed bill language is as follows:

Sec.2. [145.929] [ELIMINATION OF MERCURY IN VACCINES.]
Subdivision 1. [CITATION.] This section may be cited as the Minnesota Elimination of Mercury in Vaccines Act of 2005.
Subd. 2. [ELIMINATION OF MERCURY.] (a) Effective July 1, 2005, vaccines administered in the state shall not contain any mercury or mercury compounds, including but not limited to thimerosal, unless:
(1) a vaccine containing no mercury is not manufactured; or
(2) the provider finds that the mercury-free vaccine is not obtainable by utilizing best efforts, because the vaccine is not on the market for sale.
(b) If a mercury-free vaccine is not available according to paragraph (a), then a vaccine containing a trace amount of mercury as defined by the United States Food and Drug Administration may be administered. If neither a mercury-free vaccine nor a vaccine containing a trace amount of mercury is available, then the vaccine containing the least amount of mercury may be administered.
Sec. 3. [EFFECTIVE DATE.]
Sections 1 and 2 are effective July 1, 2005.

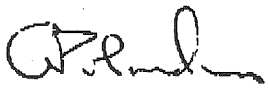
This proposed restriction is ill-conceived for two reasons. **First, there are no data to support the theory that thimerosal causes developmental disorders such as autism.** Thimerosal is a preservative that contains a form of mercury (ethylmercury). Numerous well-designed studies have not found any connection between ethylmercury at the level contained in vaccines and neurological problems. For example, four large epidemiologic studies performed in the U.S., the U.K., and Denmark found that children who received thimerosal-containing vaccines were not at greater risk of autism.

Second, all the vaccines recommended for children under six months of age (the most at-risk population neurologically) are already thimerosal-free. In fact, with the exception of influenza vaccine, none of the routinely recommended childhood vaccines used in the U.S. to protect children against 12 infectious diseases contain thimerosal. These include vaccines that protect against measles, mumps, rubella, chickenpox, hepatitis B, diphtheria, tetanus, pertussis (whooping cough), Haemophilus influenzae type b (Hib), polio, and pneumococcal disease. Influenza vaccine (recommended for children 6-23 months) is available in limited supplies in thimerosal-free formulations.

In short, this bill is a decade behind the times. Introducing such language into Minnesota law has no scientific basis and is unnecessary. More importantly, it would send the wrong message to parents--that thimerosal has been proven to cause developmental disorders and that their child is likely to be exposed to dangerous amounts of this preservative if not protected by law. Neither assumption is true.

Thimoersal does not pose any risk to Minnesota children and adults, and to imply it does misleads the public and places an unnecessary burden on providers to explain what is in fact, a non-issue.

Sincerely,



Gregory A. Poland, MD
Professor Medicine, Infectious Diseases and Molecular Pharmacology and Experimental Therapeutics
Mary Lowell Leary Professor Medicine
Mayo Clinic College of Medicine

Senator Kelley

AMERICAN ACADEMY OF FAMILY PHYSICIANS
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American Family Physician™
A peer-reviewed journal of the American Academy of Family Physicians April 15, 2004

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Can Vaccines Containing Thimerosal Cause Autism?

Thimerosal has been used widely as a preservative in certain vaccines and has been thought to increase the risk of certain neurodevelopmental disorders, such as autism, language and speech delay, and attention-deficit/hyperactivity disorder. Despite the lack of evidence for a causal relationship, the biologic plausibility of a link remains. Hviid and colleagues performed a study to compare children receiving vaccines with and without thimerosal and followed them to note the incidence of autism and other autism-spectrum disorders in both groups.

Using information from Denmark's registry system, the authors were able to link data on vaccinations, diagnoses of autism, diagnoses of other autistic-spectrum disorders, other diagnoses, and confounders to the children in a cohort receiving thimerosal-based pertussis vaccine (before June 1, 1992) and thimerosal-free pertussis vaccine (after June 1, 1992).

During 2,986,654 person-years of follow-up, the authors identified 440 cases of autism and 787 cases of other autism-spectrum disorders. In the original cohort, 20,755 (4.4 percent) did not receive any whole-cell pertussis vaccine, 446,695 (95.6 percent) were vaccinated at least once, 416,081 (89.0 percent) were vaccinated twice, and 293,186 (62.7 percent) received all three doses. In those receiving at least one dose of vaccine, 407 cases of autism were identified, of whom 303 received thimerosal-free vaccine and 104 received thimerosal-containing vaccine; of the 751 cases of other autistic-spectrum disorders identified, 430 received thimerosal-free vaccine and 321 received thimerosal-containing vaccine.

Comparing children who had received at least one dose of thimerosal-containing vaccine as opposed to thimerosal-free vaccine, a fully adjusted relative risk of 0.85 was found for autism and a relative risk of 1.12 for autistic-spectrum disorders. There was no evidence of a dose-response association between the dose of ethyl mercury received and the incidence of autism and autistic-spectrum disorders. The authors found a statistically significant increase in the incidence of autism and autistic-spectrum disorders over the study period.

The authors conclude that there is no evidence of an association between thimerosal-containing vaccine and autism in children. They also found no dose-response association between autism and the amount of ethyl mercury received via thimerosal.

CAROLINE WELLBERY, M.D.

Hviid A, et al. Association between thimerosal-containing vaccine and autism. JAMA October 1, 2003;290:1763-6.

EDITOR'S NOTE: This study adds to the mounting evidence that childhood vaccinations do not cause autism. Other studies have shown no association between the measles, mumps, and rubella vaccine and autism.[1] The use of the mercury-containing vehicle thimerosal was discontinued in the United States because of possible implications in the development of autism. Given the high frequency of vaccination, which coincides temporally with the diagnosis of autism in the first years of life, it is understandable that vaccinations have been implicated by association. However, based on current evidence, this association is merely coincidental.-C.W.

REFERENCE

1. Mäkelä A, Nuorti JP, Peltola H. Neurologic disorders after measles-mumps-rubella vaccination. Pediatrics 2002;110:957-63.

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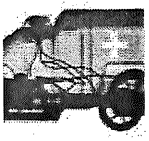
Michael Porter's Prescription For the High Cost of Health Care

July 12, 2004



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We believe that competition is the root of the problem with U.S. health care performance. But this does not mean we advocate a state-controlled system or a single-payer system; those approaches would only make matters worse. On the contrary, competition is also the solution, but the nature of competition in health care must change. Our research shows that competition in the health care system occurs at the wrong level, over the wrong things, in the wrong geographic markets, and at the wrong time. Competition has actually been all but eliminated just where and when it is most important.

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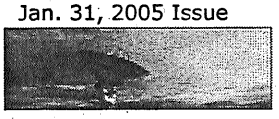
Jan. 31, 2005 Issue



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Positive-sum competition

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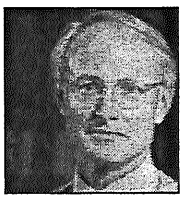

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To Whom It May Concern:

I strongly support vaccination as a method of preventing childhood diseases. I believe we should have the safest vaccines possible for our citizens.

Given the weight of scientific evidence demonstrating that mercury in vaccines can cause serious diseases in a subset of the population that is unable to clear mercury effectively, I strongly support the goal set by the AAP and the USPHS in 1999 to remove mercury from vaccines as soon as possible.

My experience in working with a large number of children with developmental difficulties of all kinds has reinforced in my mind the scientific studies pointing to the concern about thimerosal in vaccines. Many of these children experienced neurological regression shortly following vaccines. Diagnostic studies demonstrate mercury retention in their tissues and many of them have shown striking improvement following therapies to help clear the mercury from their bodies.

It is important that the public continues to have faith in the immunization program, and one of the most important steps we can take is to move quickly to a mercury-free vaccine program in Minnesota.

While it is clear that it is in the best interests of the society to immunize children, it is not clear to many parents that immunizations are the right thing to do for their child. Removing thimerosal from vaccines will remove one more obstacle to the decision of parents to immunize their children.

Thomas A. Sult, MD

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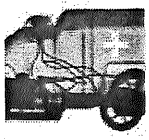
July 12, 2004



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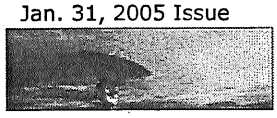

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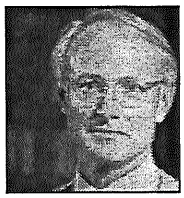

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Mercury-Free Minnesota

Clean Water, Safe Fish, Healthy Kids

2005 Policy Goals

Mercury pollution should be reduced from all sources, including coal-burning power plants and taconite processing, which are the two largest sources of mercury in the state. Minnesota should also continue to be a leader in reducing mercury use in products, by making sure that all vaccines used in the state are mercury-free. Public education efforts by state agencies should be increased, to provide adequate information about the health effects and sources of mercury.

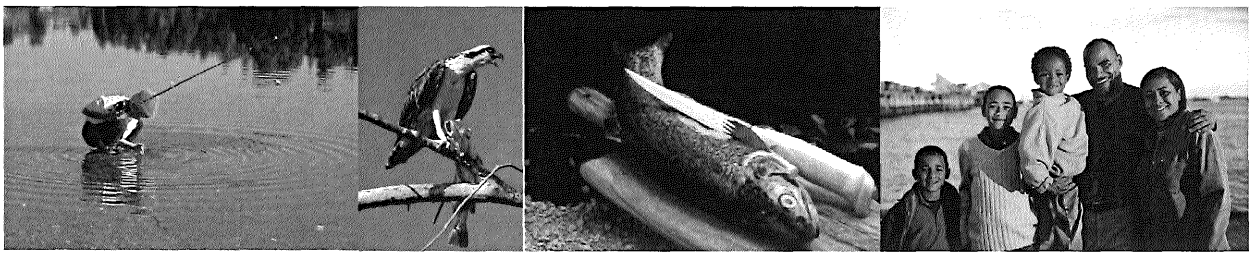
The Problem

Mercury has contaminated Minnesota's waters and fish. Minnesota has issued a statewide advisory limiting the number of walleyes and other game fish that people should eat from our 12,000 lakes.

Mercury is a potent neurotoxin that causes learning and developmental disabilities in children. The EPA reported in January 2004 that *1 in 6 U.S. women* of childbearing age have mercury in their bodies at levels that may adversely affect their unborn child.

The primary sources of mercury in Minnesota are coal-burning power plants and taconite processing. There are many mercury-containing products, including vaccines and dental amalgams, which also pose serious risks.

Since mercury is unquestionably bad for our health and the technology exists to create clean energy and mercury-free products, we should put safety first and choose safer alternatives.



www.MercuryFreeMinnesota.org

Mercury-Free Minnesota is working to achieve the following goals in 2005:

Reduce Emissions from Power Plants

As the single largest source of mercury emissions in Minnesota, coal-burning power plants should be required to do their fair share to reduce mercury emissions. Coal-burning power plants must meet emissions standards currently achieved by the best performing control technologies on the market.

Research & Develop Control Technology for Taconite Industry

Taconite processing releases a large amount of mercury, both from taconite ore and from coal. A research and development program should be established to develop technology to capture mercury emissions from this industry.

Make Vaccines in Minnesota Mercury-Free

All vaccines given in Minnesota shall be mercury-free unless a mercury-free version is not manufactured or not obtainable by best efforts. All persons receiving vaccinations should be informed if their vaccines contain mercury and the hazards posed by mercury, especially the hazards posed to fetuses and children.

Increase Public Education Efforts on Fish Consumption Advice

The Department of Health, Department of Natural Resources, the Pollution Control Agency and the Office of Environmental Assistance should create a plan to ensure that the public is provided adequate notice of and education about the sources and health effects of mercury.

Mercury-Free Minnesota

Clean Water, Safe Fish, Healthy Kids

Mercury-Free Minnesota is made up of more than 30 environmental, conservation, health, and faith groups working with government agencies, legislators, industries, and the public to phase-out harmful mercury emissions in Minnesota, find safer alternatives, and protect human health and the environment.

Go to *www.mercuryfreeminnesota.org* to find out more about us and how you can help to make Minnesota Mercury-Free!

Mercury:
Fish Concerns,
Human exposure,
Health impacts,

David Wallinga, M.D.
Food & Health Program,
Institute for Agriculture
& Trade Policy
612 870-3418
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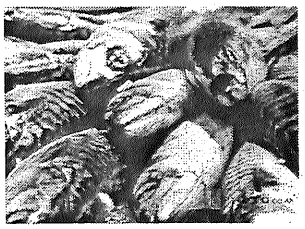
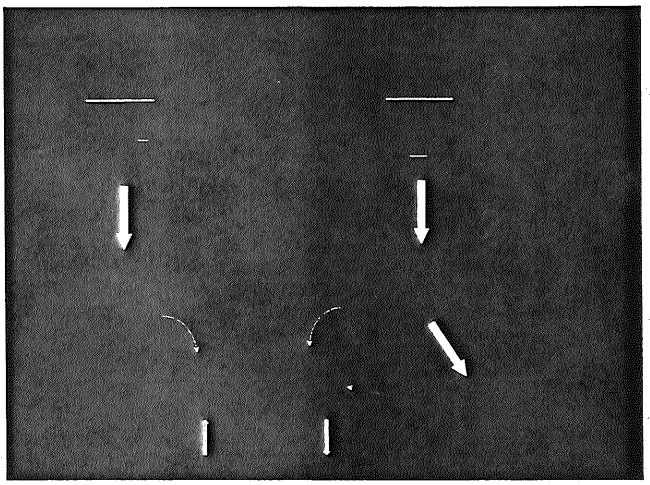
Why Eat Fish?



- Protein
- Essential vitamins (A, B and D),
- Minerals (iron and zinc, from shellfish)
- Essential fats

Essential Fatty Acids

- mega-6 Fats (LA, AA)
- mega-3 Fats
  - ALA (18 carbon atoms)
  - EPA (20 carbon atoms)
  - DHA (22 carbon atoms)



Why Essential?

- ✓ Needs only met through diet
- ✓ Energy sources
- ✓ Critical component of cell membranes
- ✓ Building blocks for self-healing agents (eicosanoids)
- ✓ Influence how our genetic information gets expressed

Omega-3 Fats: Potential Health Benefits

For Adults

- ❑ EPA/DHA prevent cardiovascular disease
  - ➢ in people with known disease
  - ➢ in those at high risk
  - ➢ lower blood pressure, lower active heart rate, reduce clotting (all risk factors for heart disease)
- ❑ Improves rheumatoid arthritis patients, possibly other autoimmune diseases
- ❑ May protect against prostate cancer

For Fetuses, Children

- ❑ Brain development
  - ➢ Preemies fed formula without DHA suffer illness, poor retinal development
  - ➢ DHA concentrated in brain synapses, retina, nervous system

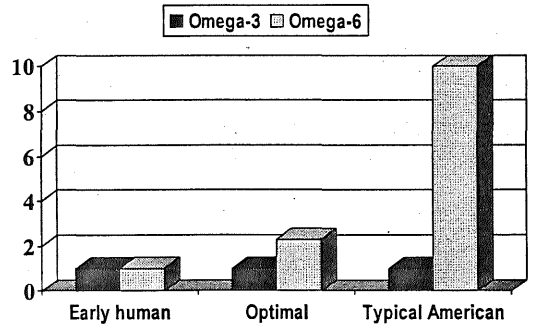
SOURCES: Aericanm Heart Association Scientific Statement (2002); Simopoulos AP 2002; Stenson WF et al. 1992; Terry P et al. 2001.

Heart-Protective Effects

Two large, randomized clinical trials

- ❑ Reduced mortality following MI among those assigned diets rich in fatty fish or fish-oil supplements
  (Burr et al 1989; GISSI-Prevenzione Investigators 1999)
- ❑ Healthy women given omega-3 supplements (4 grams EPA+DHA and 2 grams gamma ALA)
  (Laidlaw M, Holub BJ. *Am J Clin Nutr.* 2003)
  - ✓Blood lipid and fatty acid profiles change for the better
  - ✓43% reduction in 10-yr risk of heart attack, estimated

Relative Amounts of Essential Fats in Diet

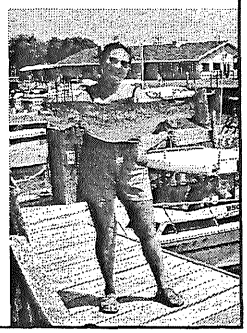


SOURCE: Kris-Etherton et al. 2000; Kris-Etherton et al. 2002.

Omega-3s:
American Diet Deficient

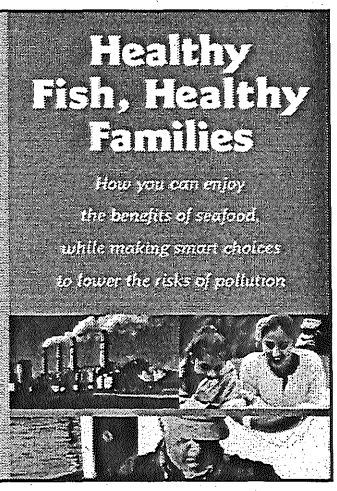
Making up the deficiency

Fish = Major dietary source



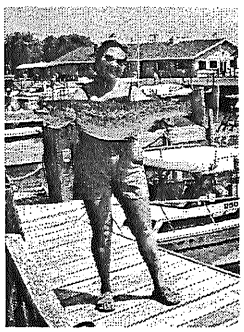
Association of Reproductive Health Professionals
Physicians for Social Responsibility

"Health benefits of omega-3 fats may be compromised by the health risks of toxic contaminants in many fish."



Mercury
Fish = Major route of human exposure

- ✓ "[N]early all fish and shellfish contain traces of mercury." FDA 2004
- ✓ In 2002, 45 states issued more than 2,100 fish consumption advisories for rivers, lakes, and coastal based on mercury contamination.



ehp Environmental Health

Abstract | Full | PDF | Citation in Pub Med

Environmental Health Perspectives Volume 111, Number 4 April 2003

http://ehp.niehs.nih.gov/docs/2003/5837/abstract.html

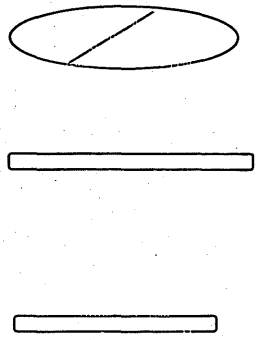
Environmental Medicine

Mercury Levels in High-End Consumers of Fish

Jane M. Hightower[1] and Dan Moore[2]

[1]California Pacific Medical Center and [2]Geraldine Brush Research Institute, California Pacific Medical Center, San Francisco, California, USA

- ❑ "Patients in my practice regularly get mercury poisoning from eating commercial seafood, "says Dr. Jane Hightowe
- ❑ Although patients' symptoms were not specifically correlated with mercury levels, when they stopped consuming those fish symptoms improved



Average Hg Levels in Commercial Fish (FDA)

Data Sources: "Mercury Levels in Seafood Species," FDA, May 2001, at http://www.cfsan.fda.gov/~lrd/sea-mehg.html;
* Indicates data based on fewer than 10 samples;

** Indicates updated FDA testing results, 2002-3.

American Medical Association

Physicians dedicated to the health of America

http://www.ama-assn.org/ama/pub/category/print/13619.html

Report 13 of the Council on Scientific Affairs (A-04)

Mercury and Fish Consumption: Medical and Public Health Issues

RECOMMENDATIONS

The following statements, recommended by the Council on Scientific Affairs, were adopted by the AMA House of Delegates as AMA policy at the 2004 AMA Annual Meeting.

1. Women who might become pregnant, are pregnant, or who are nursing should follow federal, state, and local advisories on fish consumption. Because these advisories may differ, the most protective advisory should be followed. (Policy)
2. Physicians should (a) assist in educating patients about the relative mercury content of fish and shellfish products, (b) make patients aware of the advice contained in both national and regional consumer fish consumption advisories, and (c) have sample materials available, or direct patients to where they can access information on national and regional fish consumption advisories. (Policy)
3. Testing of the mercury content of fish should be continued by appropriate agencies; results should be publicly accessible and reported in a consumer-friendly format. (Policy)
4. Given the limitations of national consumer fish consumption advisories, the Food and Drug Administration should consider the advisability of requiring that fish consumption advisories and results related to mercury testing be posted where fish, including canned tuna, are sold. (Policy)

Joint FDA-EPA Fish Consumption Advice

http://www.epa.gov/waterscience/fishadvice/advice.html

- ❑M arch 2004
- ❑P regnant women, children
- ❑M ercury only
- ❑Re commendations aren't "safe"

U.S. Department of Health and Human Services
U.S. Environmental Protection Agency

EPA-823-R-04-005
March 2004

WHAT YOU NEED TO KNOW ABOUT MERCURY IN FISH AND SHELLFISH

2004 EPA and FDA ADVICE FOR:
WOMEN WHO MIGHT BECOME PREGNANT
WOMEN WHO ARE PREGNANT
NURSING MOTHERS

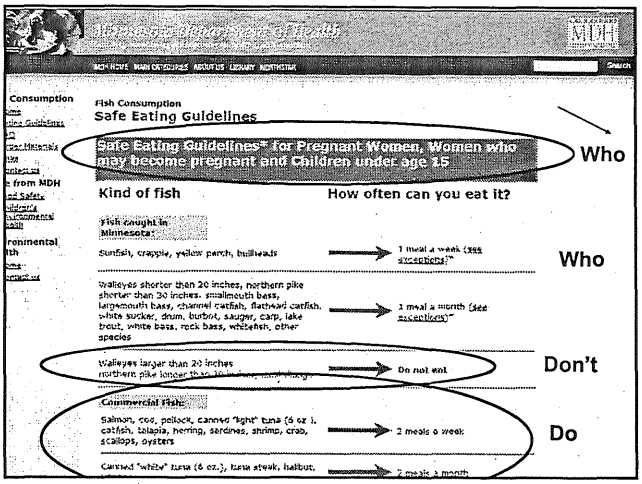
http://www.cfsan.fda.gov/~dms/admehg3.html

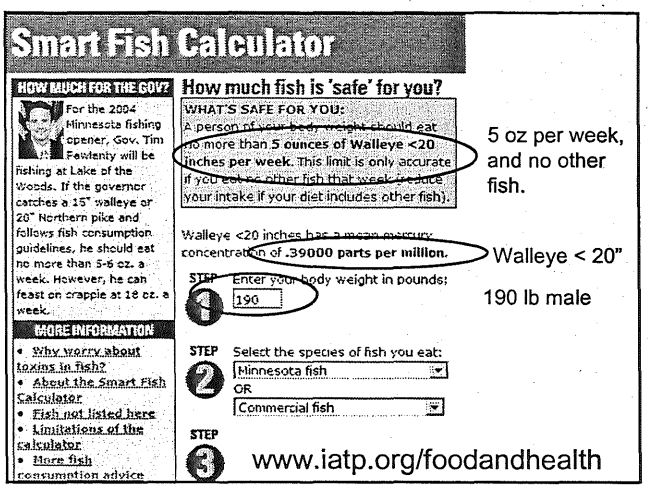
March 2004 EPA-823-R-04-005

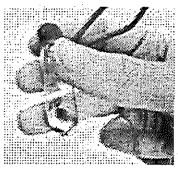
What You Need to Know About Mercury in Fish and Shellfish

2004 EPA and FDA Advice For:
Women Who Might Become Pregnant
Women Who are Pregnant
Nursing Mothers
Young Children

1. Do not eat Shark, Swordfish, King Mackerel, or Tilefish because they contain high levels of mercury.
2. Eat up to 12 ounces (2 average meals) a week of a variety of fish and shellfish that are lower in mercury
   - Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollock, and catfish.
   - Another commonly eaten fish, albacore ("white") tuna has more mercury than canned light tuna. So, when choosing your two meals of fish and shellfish, you may eat up to 6 ounces (one average meal) of albacore tuna per week.
3. Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas. If no advice is available, eat up to 6 ounces (one average meal) per week of fish you catch from local waters, but don't consume any other fish during that week.







Quicksilver

Mercury 101

- ❑ Mercury is toxic (poisonous)
- ❑ Mercury is in human blood
- ❑ Blood mercury is mostly methylmercury (MeHg)
- ❑ Fish accounts for most human exposure to MeHg
- ❑ Mercury in fish stems from air deposition
- ❑ Air sources are diverse, dominated by coal plants

Mercury is toxic (poisonous)

- ❑ Elemental mercury
  - ✓ Workers
  - ✓ Children
  - ✓ Others
- ❑ Methylmercury
- ❑ Other mercury compounds (inorganic and organic)

Minimata, Japan (1950s)

Iraq (1970s)

(Me)Hg Poisonings

Wonderland

Photographs from *Neurotoxicology*, 1995, Vol. 16, No. 4

Higher Dose Effects
Infants Exposed to Hg in the Womb

- ❑ Mental retardation
- ❑ Seizures
- ❑ Cerebral palsy
- ❑ Disturbances of vision, hearing, sensation
- ❑ Abnormal gait
- ❑ Abnormal speech
- ❑ Disturbances of swallowing and sucking
- ❑ Abnormal reflexes

What's "safe"?

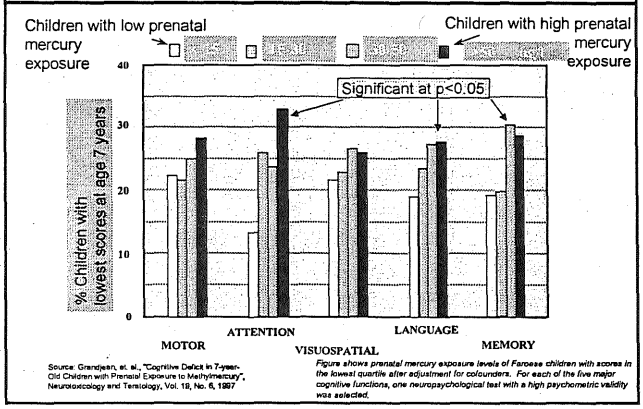
- ❑ Environmental Protection Agency
  - ➢ "Safe" dose = Reference Dose
  - ➢ Intake of mercury of 0.1 ug/kg-bw/day
  - ➢ Associated with blood mercury at 5.8 ug/L
  - ➢ What is equivalent for fetal "cord" blood?

"Gold Standard" studies of methylmercury toxicity at day-to-day levels of exposure?

- ❑ 3 large studies of chohorts of children born to mothers who consumed fish:
  - ✓ Faroe Islands (Grandjean et al)
  - ✓ New Zealand (Kjellstrom et al)
  - ✓ Seychelles Island (Myers et al)

- ❑ 2 studies (Faroe Is. & New Zealand) found babies born to mothers who ate more fish were developmentally affected.* (prenatal mercury exposure associated with deficits in neurological function & behavior – e.g. memory, attention)
- ❑ Seychelles study found no such effects in children.

Mercury: Effects of Lower-Dose Prenatal Exposure



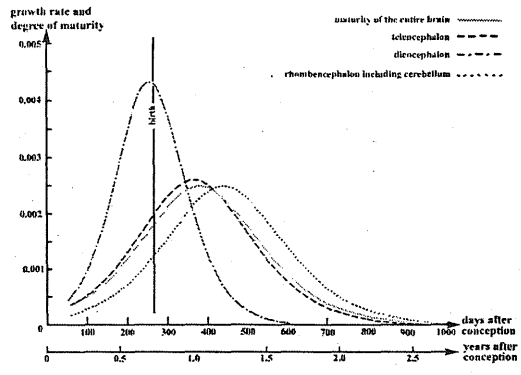
Source: Grandjean, et. al., "Cognitive Deficit in 7-year-Old Children with Prenatal Exposure to Methylmercury", Neurotoxicology and Teratology, Vol. 19, No. 6, 1997

Figure shows prenatal mercury exposure levels of Faroese children with scores in the lowest quartile after adjustment for cofounders. For each of the five major cognitive functions, one neuropsychological test with a high psychometric validity was selected.

Fetus often is more vulnerable to harm from environmental toxins

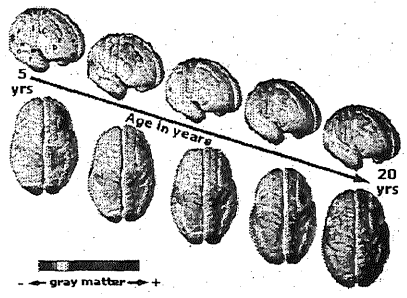
- NAS 1993
  - Immature defenses
  - Immature organs
- True for PCBs, solvents, some pesticides, etc.

Regional Growth Rate of the Human Brain



Source: Rice D & Barone S (2000), Critical Periods of Vulnerability for the Developing Nervous System: Evidence from Human and Animal Models, Environ Health Perspect 108 (Suppl 3): 511-533. With author's permission.

Older children's brains continue to develop



National Academy of Sciences

- *Toxicological Effects of Methylmercury (2000)*
- Conclusions
  - ✓ Neurodevelopmental deficits most sensitive, well-documented health effect
  - ✓ Reference dose or RfD (EPA "safe" exposure level) should be based on the Faroe Islands study
  - ✓ Affirmed EPA RfD of 0.1 ug/kg/day

- Mercury is toxic (poisonous)
- Mercury is in human blood

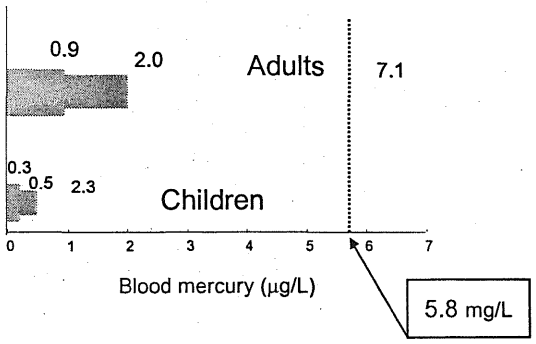
National Health and Nutritional Survey (NHANES), 1999-2000

Blood and hair analyses:

- Blood Hg
  - ✓ 1707 adult women, ages 16 to 49
  - ✓ 709 children, ages 1 to 5
  - ✓ Blood mercury is predominantly MeHg
- Hair Hg
- Urinary Hg

Mercury

50th, 75th and 95th percentiles in blood



JAMA http://jama.ama-assn.org/

Original Contribution

Blood Mercury Levels in US Children and Women of Childbearing Age, 1999-2000

Susan E. Schober, PhD; Thomas M. Sinks, PhD; Robert L. Jones, PhD; P. Michael Bolger, PhD, DABT; Margaret McDowell, MPH, RD; John Osterloh, MD, MS; E. Spencer Garrett, MS; Richard A. Canady, PhD, DABT; Charles F. Dillon, MD, PhD; Yu Sun, PhD; Catherine B. Joseph, MSPH; Kathryn R. Mahaffey, PhD

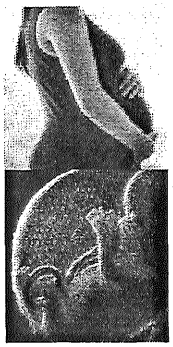
JAMA. 2003;289:1667-1674.

- About 8% of American adult women have blood mercury higher than what the U.S. EPA considers "safe"
- About 8% of newborns each year, then – more than 300,000 – born with blood mercury exceeding EPA "safe" levels?

Fish Consumption Associated with Blood Mercury Concentration

Mean blood mercury nearly 4-fold higher among women eating ≥ fish servings in the previous 30 days

How Long to Clear Methylmercury from Blood?

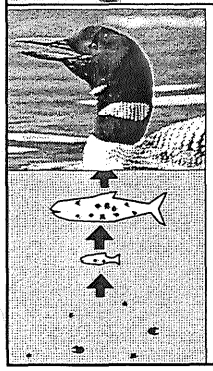


Half-life in blood varies by individual

- Ranges from ~ 30–180 days
- Average half–life ~ 70 days
- 10% of people > 130 days
- Methylmercury in blood representing Hg ingested in last 30 days ~ 25%

SOURCE: Mahaffey K. US Profile Biomarkers of Exposure to Mercury; Presentation at the Annual Meeting of the American Public Health Association. San Francisco, CA 2002

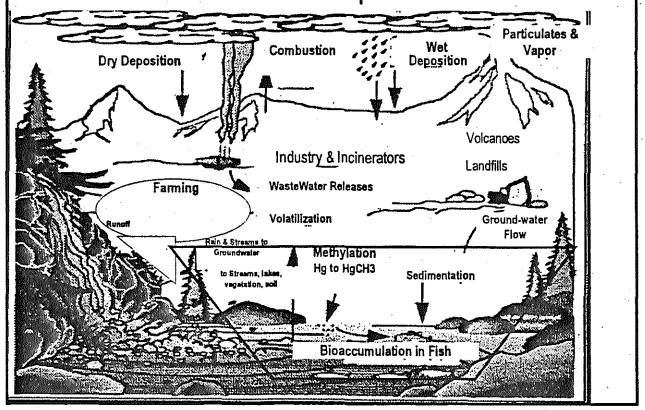
- Mercury is toxic (poisonous)
- Mercury is in human blood
- Fish accounts for most exposure to MeHg



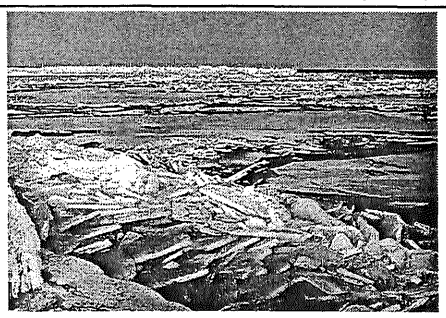
- Who's atop the food chain? 95% of MeHg in fish is absorbed into the human GI tract
- MeHg accumulates in fish
- MeHg is taken up by tiny animals and plankton
- Where bacteria convert it to toxic methylmercury (MeHg)
- Mercury is deposited by air to ALL Minnesota lakes

- Mercury is toxic (poisonous)
- Mercury is in human blood
- Fish is the major source of MeHg exposure
- Mercury in fish stems from air deposition

Mercury Loading to Minnesota Surface Waters is 98% Atmospheric



- Mercury is toxic (poisonous)
- Mercury is in human blood
- Fish is the major source of MeHg exposure
- Mercury in fish stems from air deposition
- Air emission diverse, dominated by coal plants



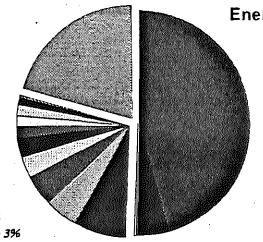
Mercury Emissions in Minnesota, 2000

Material Processing 21%

Taconite processing 21%

Purposeful Use 28%

Medical waste incineration 0.2%
Fluorescent lamp breakage 0.9%
Recycling mercury from products 1.4%
On-site household waste incineration 2%
Crematories 2%
Dental preparations 3%
Smelters that recycle cars and appliances 5%
Sewage sludge incineration 3%
Municipal solid waste combustion 5%
Volatilization from disposed products 7%



Energy 51%

Coal 46%

Petroleum 5%
Wood 0.3%
Natural gas 0.0%

Source: Minnesota Pollution Control Agency March 2004

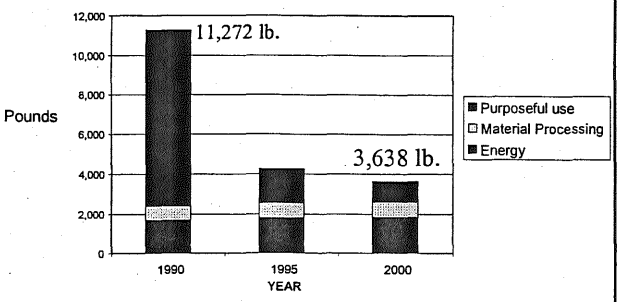
How much Hg would account for fish contamination in Minnesota's lakes?

Just one gram of atmospheric mercury per year deposited on a 20-acre lake

- A teaspoonful of mercury weighs about 70 grams
- A gram of mercury = 1/70th of a teaspoon

Edward B. Swain , One Gram of Mercury in a Twenty Acre Lake: Origin of the Phrase, Minnesota Pollution Control Agency, edward.swain@pca.state.mn.us , March 2004

Trends in Minnesota Mercury Emissions 1990-2000



Source: Minnesota Pollution Control Agency March 2004

- ❑ Mercury is toxic (poisonous)
- ❑ Mercury is in human blood
- ❑ Fish is the major source of MeHg exposure
- ❑ Other health concerns

Sources of mercury exposure other than fish

- ❑ Workplace
- ❑ Religious practices
- ❑ School labs
- ❑ Wastewater (from dental offices, hospitals, etc.)
- ❑ Products

- ❑ Fibromin turkey litter incinerator. After best available control techology removes 80% of heavy metals, remaining air emissions estimated include:
  - ✓ 56 pounds of mercury
  - ✓ Also 104 pounds of chromium; 64 pounds of arsenic; 54 pounds of lead

Other Products

- ❑ Dental amalgam – *300 metric tons* per year (NAS 2000)
  - ✓ 50% elemental Hg (Nadakavukaren, 2001)
  - ✓ Vaporized via chewing, then inhaled
  - ✓ Accounts for as much 30-40% of total Hg exposure, assuming average of 8 fillings. (Klassen CD (2001). Casarett & Doull's *Toxicology: The basic science of poisons*, 6th edition)
- ❑ Thimerasol-containing products
  - ✓ Organic, ethylmercury
  - ✓ Up to 219 products in use (NAS 2000)
- ❑ Fluorescent lamps, thermostats & switches, pre-1990 latex paint, steam irons w/15-minute shut-off

Fish aren't the only source of early-life Hg exposure

- ❑ Mercury is toxic (poisonous)
- ❑ Mercury is in human blood
- ❑ Fish is the major source of MeHg exposure
- ❑ Other health concerns

Sources of mercury exposure other than fish

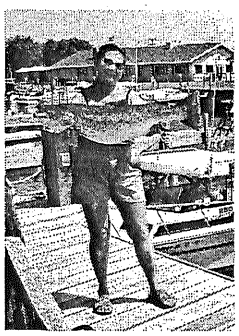
- ❑ Workplace
- ❑ Religious practices
- ❑ School labs
- ❑ Wastewater (from dental offices, hospitals, etc.)
- ❑ Products

Fetal or early child brain toxins, other than mercury, also found in fish

- ❑ The EPA "safe" dose, and therefore fish advisories, aren't based on *ALL* the toxins affecting a child or fetus' developing brain

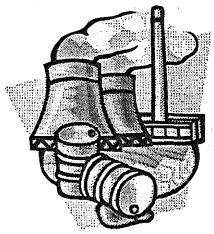
In real life, Hg may be one of several brain toxins in fish

- PCBs
  - In 2002, 38 states issued consumption advisories for PCBs (polychlorinated biphenyls) in freshwater and coastal fish
- Other persistent compounds
  - Dioxins
  - Chlorinated pesticides
  - Flame retardants (polybrominated diphenyl ethers)



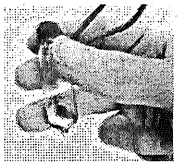
Along With Mercury, Several Environmental Toxicants Are Linked to Effects on Child Development & Learning

- Dioxins
- PCBs
- Pesticides
- Other metals (Lead, cadmium, manganese)
- Solvents



Specific parts of brain development known to be disrupted by mercury and other toxins

proliferation	radiation, ethanol, mercury, cholinesterase inhibitors
migration	radiation, mercury, ethanol
differentiation	ethanol, nicotine, mercury, lead
synaptogenesis	radiation, ethanol, lead, triethyl tin, parathion, PCBs
gliogenesis & myelinization	dec. thyroid, ethanol, lead
apoptosis	ethanol, lead, mercury
signaling	ethanol, cholinesterase inhibitors, mercury, lead, PCBs

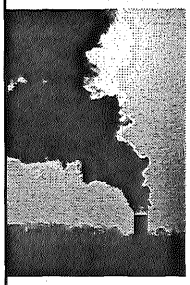


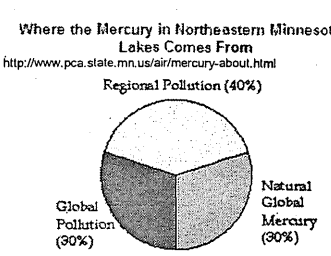
Quicksilver

Summarize

Can we eat as much fish as we want or need?

Where does Minnesota's Mercury Come From?





Does it Matter?

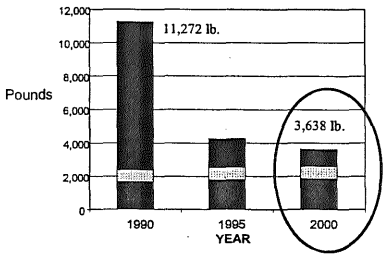
Consensus Statement

- "..the American public is not adequately protected from exposure to mercury in the environment. We call for immediate actions to protect the general public and vulnerable populations .... through stronger regulations to curb mercury emissions at their source"
- "Treat mercury emissions from all anthropogenic sources as 'hazardous'.."
- "[L]ocal mercury sources play an important role in local pollution. Draft EPA modeling indicates that at mercury "hotspots" ....local emission sources can be the dominant source of deposition."

If 3,638 lbs is equal to 1,637,100 grams, and....

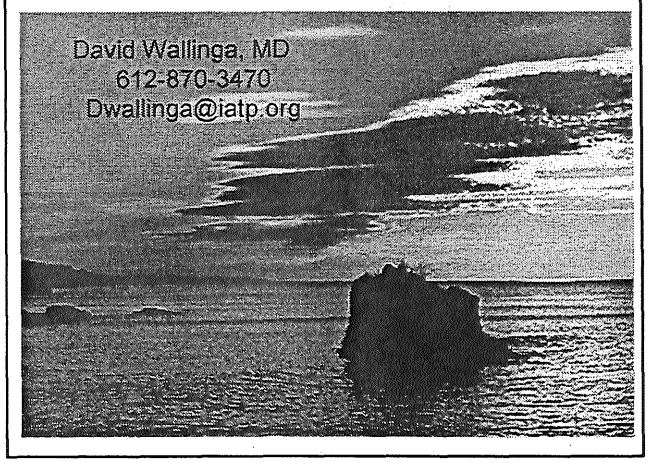
If one gram per year of atmospheric Hg is enough to make the fish in a 20 acre lake inedible...

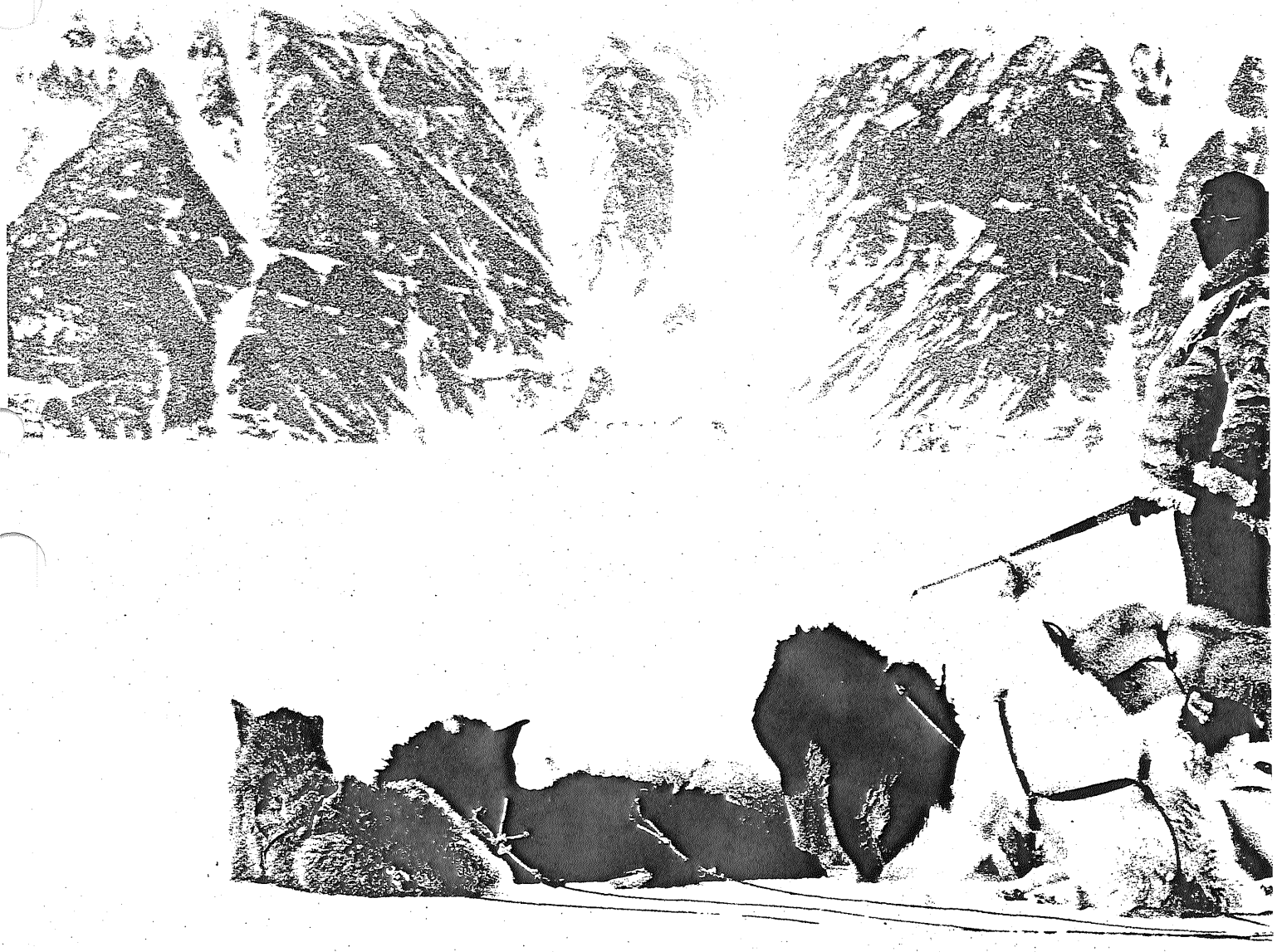
And our <u>medical goal</u> is fish that are good to catch AND good to eat, then.....



The Rx is:

Every little bit of doable mercury reduction is worthwhile

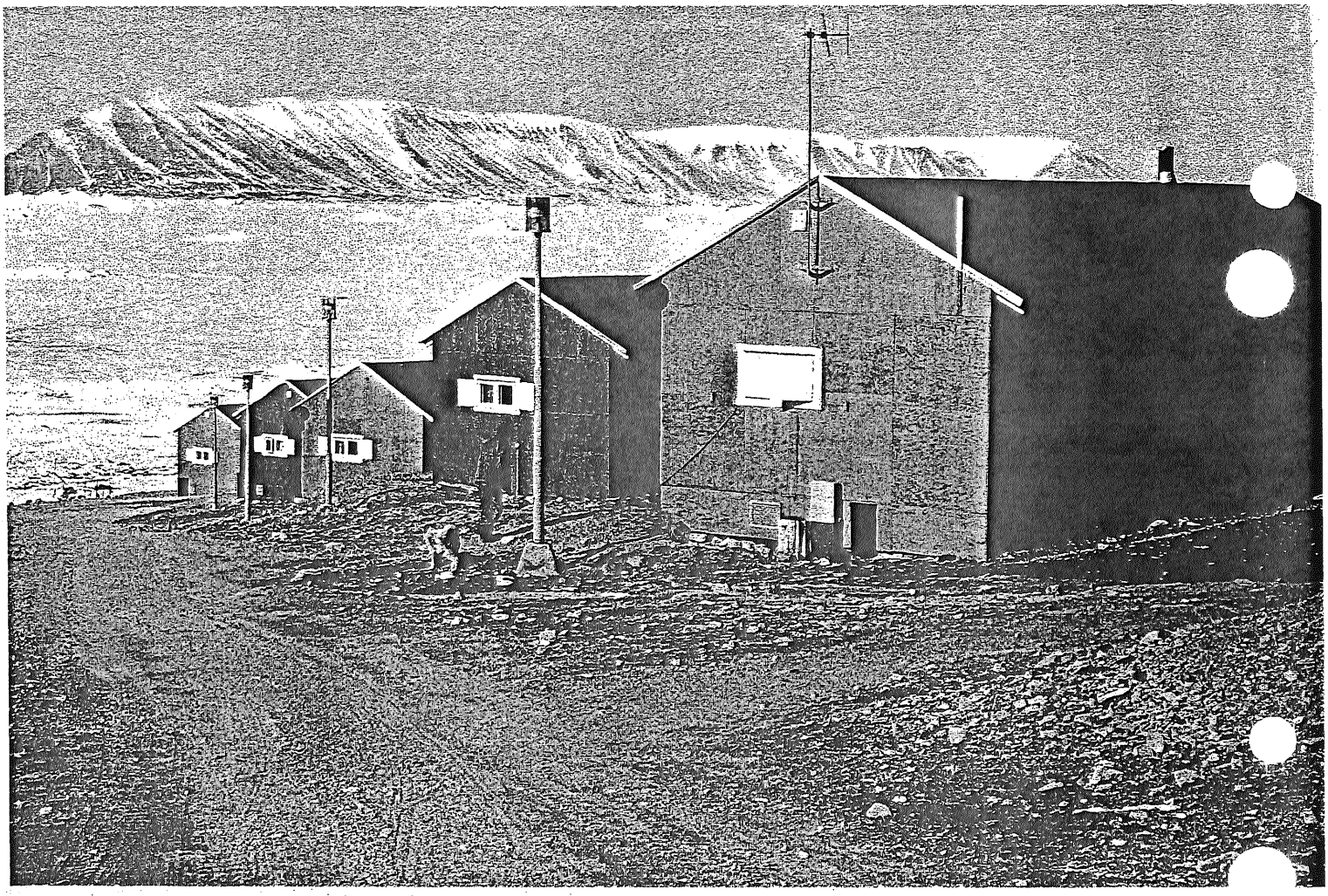




Dozens of Words for Snow, None for Pollution

Perched atop the Arctic food chain, the people of the Far North face an impossible choice: abandon their traditional foods, or ingest the rest of the world's poisons with every bite.

Story and photographs by **Marla Cone**



Qaanaaq, population 860, is a village of Inuit hunters living in prefabricated houses.

ON A SHEET of ice where the Arctic Ocean meets the North Atlantic in the territorial waters of Greenland, Mamarut Kristiansen kneels beside the carcass of a narwhal, the elusive animal sometimes known as "the unicorn of the sea" for its spiraled ivory tusk. He slices off a piece of *mattak*, the whale's raw pink blubber and mottled gray skin, and bites into it. "*Peqqinnartoq*," he says in Greenlandic. Healthy food. Nearby, Mamarut's wife, Tukummeq Peary, a descendant of North Pole explorer Robert Peary, is boiling the main entrée on a camp stove. She, Mamarut, and his brother Gedion dip their hunting knives into the kettle and pull out steaming ribs of ringed seal.

From their home in Qaanaaq, a village in Greenland's Thule region, the Kristiansens have traveled here, to the edge of the world, by dog sledge. It took six hours to journey the 30 miles across a rugged glacier to this sapphire-hued fjord, where every summer they camp on the precarious ice awaiting their prey. The family lives much as their ancestors did thousands of years ago, relying on the bounty of the sea and skills honed by generations. Their lifestyle isn't quaint; it is a necessity in this hostile and isolated expanse. Survival here, in the northernmost civilization on earth, means living the way marine mammals live, hunting as they do, wearing their skins. No factory-engineered fleece compares to the warmth of a sealskin parka. No motorboat can sneak up on a whale like a handmade kayak lashed together with strips of hide. And no imported food nourishes the people's bodies and warms their spirits like the meat they slice from the flanks of a whale or seal.

Traditionally, this marine diet has made the people of the Arctic Circle among the world's healthiest. Beluga whale, for example, has 10 times the iron of beef, twice the protein, and five times the vitamin A. Omega-3 fatty acids in the seafood protect the indigenous people from heart disease. A 70-year-old Inuit in Greenland has coronary arteries as elastic as those of a 20-year-old Dane eating Western foods, says Dr. Curt Mulvad of the Primary Health Care Center in Nuuk, Greenland's capital. Some Arctic clinics do not even keep heart medications like nitroglycerin in stock. Although heart disease has appeared with the introduction of Western foods, it remains "more unknown," Mulvad says.

Yet the ocean diet that gives these people life and defines their culture also threatens them. Despite living amid pristine ice and glacier-carved bedrock, people like Mamarut,

The Arctic has become the planet's chemical trash can,

the final destination for toxic waste that originates thousands of miles away.

Tukummeq, and Gedion are more vulnerable to pollution than anyone else on earth. Mercury concentrations in Qaanaaq mothers are the highest ever recorded, 12 times greater than the level that poses neurological risks to fetuses, according to U.S. government standards. A separate study has linked PCBs with slight effects on the intelligence of children in Qaanaaq. Although most of the village's people never leave their hunting grounds, the world travels to them, riding upon wintry winds.

THE ARCTIC has been transformed into the planet's chemical trash can, the final destination for toxic waste that originates thousands of miles away. Atmospheric and oceanic currents conspire to send industrial chemicals, pesticides, and powerplant emissions on a journey to the Far North. Many airborne chemicals tend to migrate to, and precipitate in, cold climates, where they then endure for decades, perhaps centuries, slow to break down in the frigid temperatures and low sunlight. The Arctic Ocean is a deep-freeze archive, holding the memories of the world's past and present mistakes. Its wildlife, too, are archives, as poisonous chemicals accumulate in the fat that Arctic animals need to survive. Polar bears denning in Norway and Russia near the North Pole carry some of the highest levels of toxic compounds ever found in living animals.

Perched at the top of the Arctic food chain, eating a diet similar to a polar bear's, the Inuit also play unwilling host to some 200 toxic pesticides and industrial compounds. These include all of the "Dirty Dozen"—the 12 pollutants capable of inflicting the most damage—including PCBs and chlorinated pesticides such as chlordane, toxaphene, and DDT, long banned in most of North America and Europe. Other compounds still in use today—flame retardants in furniture and computers, insecticides, and the chemicals used to make Teflon—are growing in concentration as well.

The first evidence of alarming levels of toxic substances in the bodies of Arctic peoples came from the Canadian Inuit. In 1987, Dr. Eric Dewailly, an epidemiologist at Laval University in Quebec, was surveying contaminants in the breast milk of mothers near the industrialized, heavily polluted Gulf of St. Lawrence, when he met a midwife from Nunavik, the Inuit area of Arctic Quebec. (Across the Hudson Bay, the Inuit also have their own self-governing territory, Nunavut, or "our land.") She asked whether he wanted milk samples from Nunavik women. Dewailly reluctantly agreed, thinking they might be useful as "blanks," samples with nondetectable pollution levels.

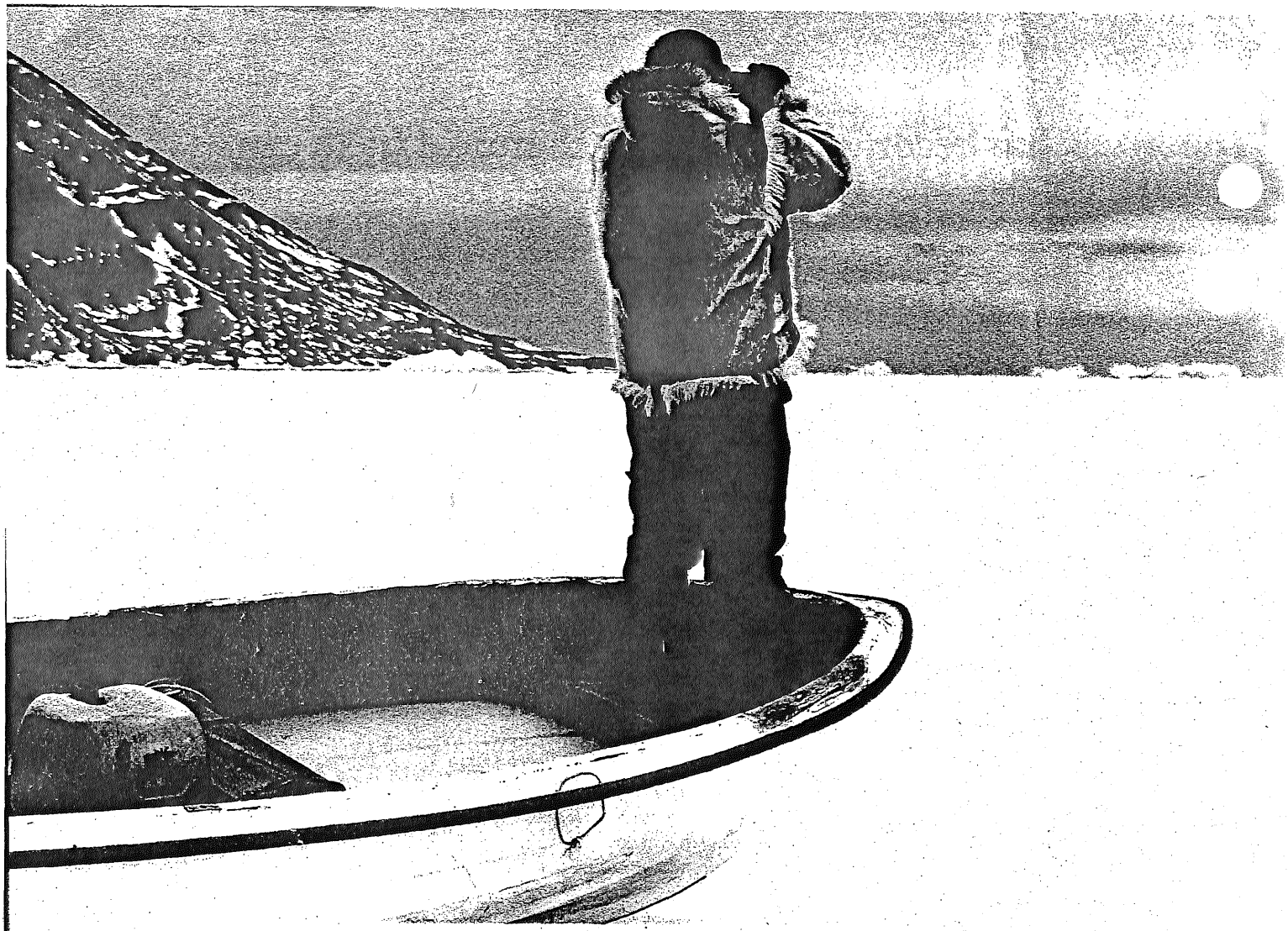
A few months later, glass vials holding half a cup of milk from each of 24 Nunavik women arrived. Dewailly soon got a phone call from his lab director. Something was wrong with the Arctic milk. The chemical concentrations were off the charts. The peaks overloaded the lab's equipment, running off the page. The technician thought the samples must have been tainted in transit.

Upon testing more breast milk, however, the scientists realized that the readings were accurate: Arctic mothers had seven times more PCBs in their milk than mothers in Canada's biggest cities. Informed of the results, an expert in chemical safety at the World Health Organization told Dewailly that the PCB levels were the highest he had ever seen. Those women, he said, should stop breastfeeding their babies.

Dewailly hung up the phone. "Breast milk is supposed to be a gift," he says. "It isn't supposed to be a poison." And in a place as remote as Nunavik, he knew that mothers often had nothing else to feed their infants. Nearly 18 years have passed since Dewailly tested those first vials of breast milk; subsequent data has emerged to show that people, especially babies, are exposed to dangerous concentrations of contaminants all across the Arctic. The average levels of PCBs and mercury in newborn babies' cord blood and women's breast milk are a staggering 20 to

THE INUIT LIVE IN GREENLAND AND ARCTIC CANADA, BOTH PART OF THE CIRCUMPOLAR NORTH.

MAP BY DAVE STEVENSON



Mamarut Kristiansen surveys the ice, hoping to spot a narwhal.

50 times higher in Greenland than in urban areas of the United States and Europe, according to a 2002 report from the Arctic Monitoring and Assessment Programme (AMAP), a project created by eight governments including the United States. Ninety-five percent of women tested in eastern Greenland, nearly 75 percent of women in Arctic Canada's Baffin Island, and nearly 60 percent in Nunavik exceed Canada's "level of concern" for PCBs. Fewer measurements have been taken in Siberia, but the AMAP says contamination levels are high there as well.

In addition to their potential to cause cancer, many of the compounds found in Arctic inhabitants are capable of altering sex hormones and reproductive systems, suppressing immune systems, and obstructing brain development. Infants are the most vulnerable–subject to exposure both in utero and through breast milk, because contaminants such as PCB and DDT accumulate in the fatty nourishment–and are harmed in subtle but profound ways. Arctic babies with high PCB and DDT exposure suffer greater rates of infectious diseases. A study of such infants in Nunavik found that they have more ear and respiratory infections, a quarter of them severe enough to cause hearing loss. "Nunavik has a cluster of sick babies," says Dewailly. "They fill the waiting rooms of the clinics."

A 2003 study found that, compared to infants in lower Quebec, Nunavik infants had much higher exposure to PCBs, mercury, and lead, which resulted in lower birth weight, impaired memory skills, and difficulty in processing new information.

Excessive levels of contamination are not limited to the Arctic. People throughout the world, especially those in seafood-eating cultures, are at similar risk. In the United States, one of every six babies–about 698,000 a year–is born to a mother carrying more mercury in her body than is considered safe under federal guidelines.

The difference is that Americans and Europeans can make choices in their diets to limit their exposure, avoiding fish such as swordfish that are high on the food chain or from highly contaminated waters. For the 650,000 native people of the circumpolar North–the Inuit of Greenland and Canada, the Aleuts, Yup'ik, and Inupiat of Alaska, the Chukchi and other tribes of Siberia, the Saami of Scandinavia and western Russia–there is no real choice. Spread over three continents and speaking dozens of lang s, almost all of them face the same dile a: whether to eat traditional food and face the health risk–or abandon their food, and with it their culture.

"Our foods do more than nou ır bodies," Inuit rights activist Ingm e said. "When many things in our lives are changing, our foods remain the same. They make us feel the same as they have for generations. When I eat Inuit foods, I know who I am."

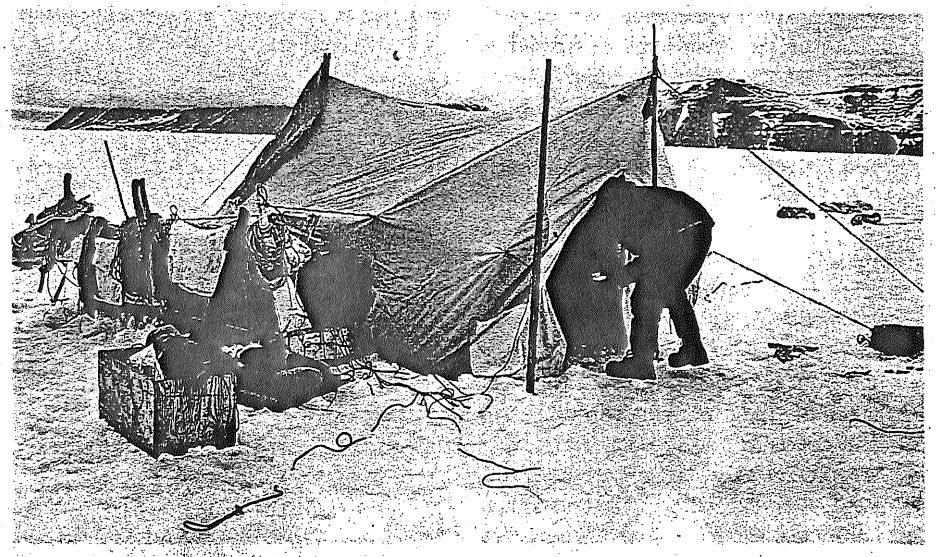
Eating traditional food is a way to hold on to a culture under assault. "When I eat Inuit foods," activist Ingmar Egede said, "I know who I am."

KNOWN TO NAVIGATORS as the North Water, the ocean off Qaanaaq is a polynya, a spot that remains thawed year-round in an otherwise frozen sea. An upwelling of nutrients draws an array of marine life, and the Kristiansens and the other people of Qaanaaq, an isolated village of 860 on the slope of a granite mountain, come here to hunt seal, beluga, walrus, narwhal, even polar bear. A century ago, the famous Arctic explorers—Peary, Frederick Cook, Knud Rasmussen—learned on their expeditions through the area that eating Inuit food was key to survival.

Greenland has no trees, no grass, no fertile soil, which means no cows, no pigs, no chickens, no grains, no vegetables, no fruit. In fact, there is little need for the word "green" in Greenland. The ocean is its food basket. In the remote villages, people eat marine mammals and seabirds 36 times per month on average, consuming about a pound of seal and whale each week. One-third of their food is the meat of wild animals. The International Whaling Commission has deemed the Inuit "the most hunting-oriented of all humans." Greenland is an independently governed territory of Denmark, but 85 percent—or 48,000—of its people are Inuit, and hunting is essential to everything in their 4,000-year-old culture: their language, their art, their clothing, their legends, their celebrations, their community ties, their economy, their spirituality.

Today, the Kristiansens are gathered on the edge of the ice, waiting to spot a whale's breath. "If only we could see one, we'd be happy," Mamarut whispers, lifting binoculars and eyeing the mirrorlike water for the pale gray back of *qilalugaq,* or narwhal. "Sometimes they arrive at a certain hour of the day and then the next day, same hour, they come back."

Once, Gedion and Mamarut waited almost a month on the ice before catching a narwhal. During such vigils, hunters must remain alert for cracks or other signs that the ice beneath them is shifting. In an instant, it can break off and carry them out to sea. To Greenlanders, ice is everything—it's danger,



Out on the ice, a tarp and a sledge are the only shelter, and a freshly killed seal (below) is the meal for the day.

it's the source of dinner, it's the water they drink. Their language has several dozen expressions for ice, only one for tree.

Mamarut is big, bawdy, and beefy, the elder brother and joker of the family. He celebrated his 42nd birthday on this hunting trip. Gedion is 10 years younger, lanky, quiet, the expert kayaker, wearing a *National Geographic* cap. The Kristiansen brothers are among the best hunters in a nation of hunters, able to sustain their families without the help of other jobs for their wives or themselves. In a good year, they can eat their fill of whale meat and earn more than $15,000 a year selling the rest to markets. In winter, they sell sealskins to a Greenlandic company marketing them in Europe. The men's hair is black, thick and straight, cut short. Their skin is

In remote Inuit villages, people eat marine mammals and seabirds 36 times a month, consuming about a pound of seal and whale each week.

darkened by the sun, but they have no wrinkles. Their only shelter on the ice is a canvas tarp attached to their dog sledge, a makeshift tent so cramped that one person can't bend a knee or straighten an elbow without disturbing the others. A noxious oil-burning lamp is their only source of heat; the kitchen is a camp stove, used to melt ice for tea and to boil seal meat.

Hunting narwhal is a dangerous endeavor. When Gedion hears or sees them coming, he quietly climbs into his kayak with his harpoon and sealskin buoy. He must simultaneously judge the ice conditions, the current, the wind, the speed and direction of the whales. If a kayaker makes the slightest noise, a narwhal will hear it. If he throws the harpoon, the whale must be directly in front of his kayak, about 30 feet away, close but not too close–or the animal's powerful dive will submerge him and he will likely drown. Gedion, like most Greenlanders, can't swim. There's not much need to master swimming when one can't survive more than a few moments in the frigid water.

Pollution isn't the first force to disrupt local Inuit culture. A little more than a century ago, the people of Qaanaaq didn't have a written language and had scant contact with the Western world. In the 1950s, during the Cold War, their entire community was moved 70 miles to the north to make way for an American military base. The U.S. and Danish governments built the villagers contemporary prefabricated houses–small red, green, blue, and purple chalets. Qaanaaq's population has since doubled, with people attracted by the good hunting. The move also brought liquor, television, and other distractions of modern life. Alcoholism, violence, domestic abuse, and suicide now exact a heavy toll.

Today, the people of Qaanaaq can smear imported taco sauce on their seal meat, buy dental floss and Danish porn magazines in the small local market, and watch *Nightmare on Elm Street* and *Altered States* in their living rooms on the one TV station that beams into Qaanaaq. When asked how he catches a whale, Gedion jokes that he uses a lasso like American cowboys he's seen on television.

Whatever is not hunted–from tea to bread to cheese–is imported from Denmark. Imported food is expensive, often stale, and not very tasty or nutritious. The average family income is $24,000 in Greenland's capital Nuuk, $13,000 in Qaanaaq, and though food is government subsidized, the price of staples like milk, bread, and beef is still considerably higher than in the United States.

And so Greenland's public health officials

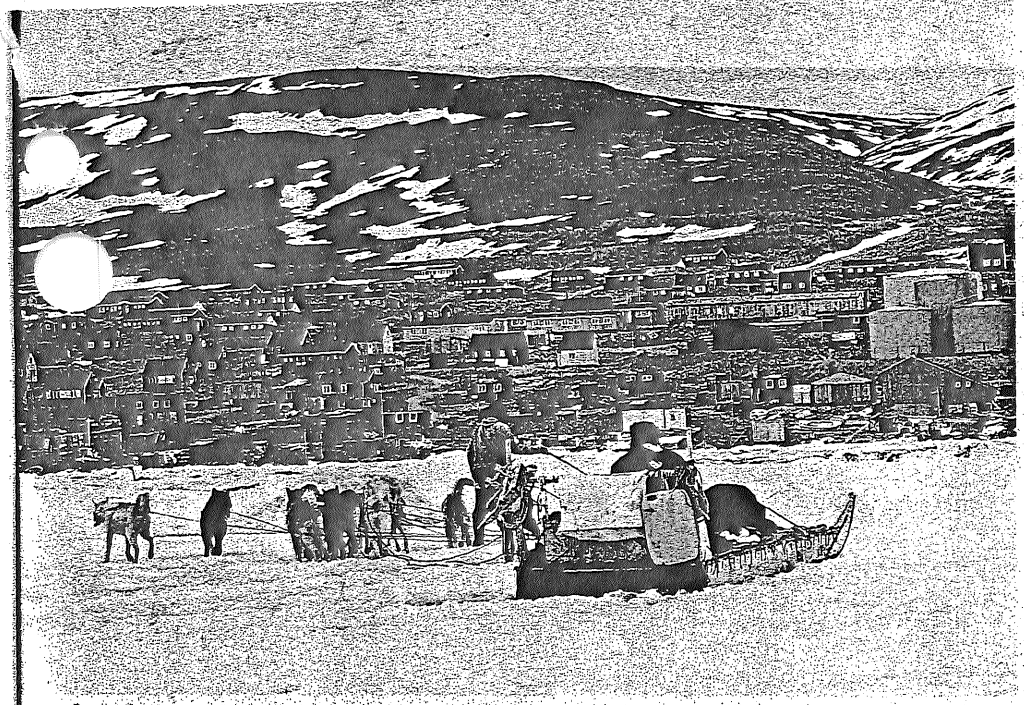
Whale meat on sale in Greenland

are torn between encouraging the Inuit to keep eating their traditional foods and advising them to reduce their consumption. In part, doctors fear the Inuit will switch to processed foods loaded with carbohydrates and sugar. "The level of contamination is very high in Greenland, but there's a lot of Western food that is worse than the poisons," Dr. Mulvad says. Greenland's Home Rule government has issued no advisories, and doctors continue to tell people, even pregnant women, to eat traditional food and nurse their babies without restrictions. Jonathan Motzfeldt, who was Greenland's premier for almost 20 years and is now speaker of the Parliament, says hunting isn't sport for his people; it's survival, and the government will not discourage it. "We eat seal meat as you eat cow in your country," Motzfeldt says. "It's important for Greenlanders to have meat on the table. You don't see many vegetables in Greenland. We integrate imported foods, but hunting and eating seals as well as whales is essential for us to survive as a people."

ACROSS THE BAFFIN BAY, surveys show most Canadian Inuit have not altered their diet either. This is partly the result of a clash of cultures. Inuktitut, the language of Canadian Inuit, has some 50 expressions for snow and ice. *Qanniq* is falling snow. *Maujaq* is deep, soft snow. *Kinirtaq* is wet, compact snow. *Katakartanaq* is crusty snow marked by footsteps. *Uangniut* is a snowdrift made by a northwest wind. *Munnguqtuq* is compressed snow softening in spring. Yet there is no Inuktitut word for "chemical" or "pollution" or "contaminant." Over the millennia that their culture has existed, the Inuit have had no need for such words. Most have never seen soot spew from a fa[illegible]y smokestack, or smelled the stench of [illegible] exhaust, or waded in an oily river. So Canadian health officials have dubbed the toxic chemicals found in native foods *sukkunartuq*–something that destroys or brings [illegible]t something bad. But use of the word h[illegible] the contaminants seem lethal and m[illegible]ous, even supernatural, and that–combined with a history of government secrecy and poor communication about health risks–has left the Inuit confused, scared, and sometimes angry.

In 1985, Canadian health officials, concerned that an Arctic radar warning system might be a source of PCBs, decided to study the people of Broughton Island, a tiny hamlet in the Baffin Bay region. Government researchers, led by Dr. David Kinloch, collected blood samples and breast milk. The PCB levels were so high–much higher than what could have come from local military facilities–that the mayor of Broughton [illegible]land granted Kinloch permission to [illegible] more women. Completed in the summer of 1988, the research confirmed high concentrations of PCBs in breast milk at about the same time that Quebec's Dewailly was [illegible]ing extraordinary levels of DDT, PCB [illegible] other toxic chemicals in the wome[illegible] Nunavik. Before any of this data could be fully analyzed, and before people were notified, the discovery was leaked to the press.

On December 15, 1988, Toronto's *Globe and Mail* published a front-page story, quot-



At the end of their hunting trip, the Kristiansens return to Qaanaaq.

ing a Canadian environmental official saying that the Inuit were so contaminated that they might have to give up whale, seal, and walrus. The Inuit were terrified; some stopped eating their native foods, or breastfeeding. Overnight, Arctic contaminants became a crisis for the Canadian government. Health Canada, the nation's public health agency, was paralyzed with indecision. The Nunavik and Baffin data clearly showed that most Inuit were exceeding the agency's "tolerable daily intake levels" for toxic contaminants. If the agency was to adhere to its own policies, it would have to warn the Inuit to stop eating their traditional foods. But public health officials had never encountered a problem like this before, where the contaminated foods were so vital to a society's health, culture, and economy. On the one hand, it seemed irresponsible to advise people not to nurse their babies and eat their foods when the traditional diet had so many health benefits and alternatives were unavailable. On the other hand, if the government ignored its own toxic guidelines when it came to the Inuit, wouldn't that be discriminatory?

Crisis meetings were held in Ottawa; aboriginal leaders begged to be included, but few were allowed to participate. It wasn't until the spring of 1989, more than a year later, that the Broughton Islanders who'd given their blood and breast milk to scientists were allowed to see the results of their own tests. It was a slap in the face that Canada's indigenous people have not forgotten.

A wide chasm has since grown between what scientists say and what native people hear, and health officials have failed to refine their message to resonate with the traditional cultures of the Arctic. As a result, at least three generations of Inuit have had little or no advice from experts on how to reduce their exposure. In the late 1990s, 42 percent of women questioned in Nunavik said they increased their consumption of traditional foods while pregnant. Of the 12 percent who ate less, only 1 of 135 said she did so to avoid contaminants. Among those who ate more native foods during pregnancy, most said they did so because they believed it would be good for their baby.

Inuit Tapiriit Kanatami, an organization that represents the Canadian Inuit, launched a project in the mid-1990s to gauge the success of authorities' efforts to inform nine Arctic communities about contaminants. The researchers found the communication so poorly handled that it caused extreme psychological distress among the Inuit. Fear, they concluded, is as dangerous a threat as the contaminants themselves.

"In every instance, there was a pervasive unease and anxiety about contaminants," the organization wrote in its 1995 report. "Whether or not individuals are exposed to...contaminants, the threat alone leads to anxiety, loss of familiar and staple food, loss of employment or activity, loss of confidence in the basic food source and the environment, and more generally a loss of control over one's destiny and well-being."

Lately, health officials have been doing a better job at informing the Inuit of new data. And in 2003, the Nunavik Nutrition and Health Committee, based in Kuujjuaq and composed of Inuit leaders as well as Quebec medical experts, finally took a different tack, focusing on telling people what they should eat rather than what they should not eat. Women were advised to eat Arctic char, a tasty, popular fish that has low levels of contaminants and high amounts of beneficial fatty acids; a pilot program distributed free char to three communities. The hope is that if the Inuit eat more char they will eat less beluga, the source of two-thirds of the PCBs in Nunavik residents.

THE KRISTIANSENS, like their fellow residents of Qaanaaq, learned about the contaminants from listening to the radio. But like most Greenlandic Inuit, they have not changed their diet. Virtually every day, they eat seal meat and mattak, and with every bite, traces of mercury, PCBs, and other chemicals amass in their bodies. "We can't avoid them," Gedion says with a shrug. "It's our food."

This hunting trip proves to be a short one, only five days, and they reap little reward for their patience. "Sometimes you have to just go back empty-handed and feed your dogs," Mamarut says. Upon returning to their village, hunters share their experiences so that everyone may benefit from them. The Kristiansen brothers learned to hunt narwhal from their father, who, in turn, learned from his relatives. Gedion's seven-year-old son, Rasmus, often comes along on their hunts, pretending to drive the dogs and harpoon narwhals. Soon enough, he will be paddling a kayak beside his father. Since 2500 B.C., when the forebears of the Inuit arrived in Greenland, this legacy has been passed on to generations of boys by generations of men like Gedion and Mamarut. Their ancestors' memories, as vivid as a dream, as ancient as the sea ice, mingle with their own.

"*Qaatuppunga piniartarlunga*," Mamarut says. As far back as I can remember, I hunted. ■

One way to stem pollution in the Arctic is to reduce U.S. power plants' mercury emissions. Physicians for Social Responsibility is pushing the Bush administration and Congress to clean up our skies at *mercuryaction.org*. Get Generation Green's Mercury Action Kit by calling (800) 652-0827. Sign up for mercury action alerts at *generationgreen.org*.