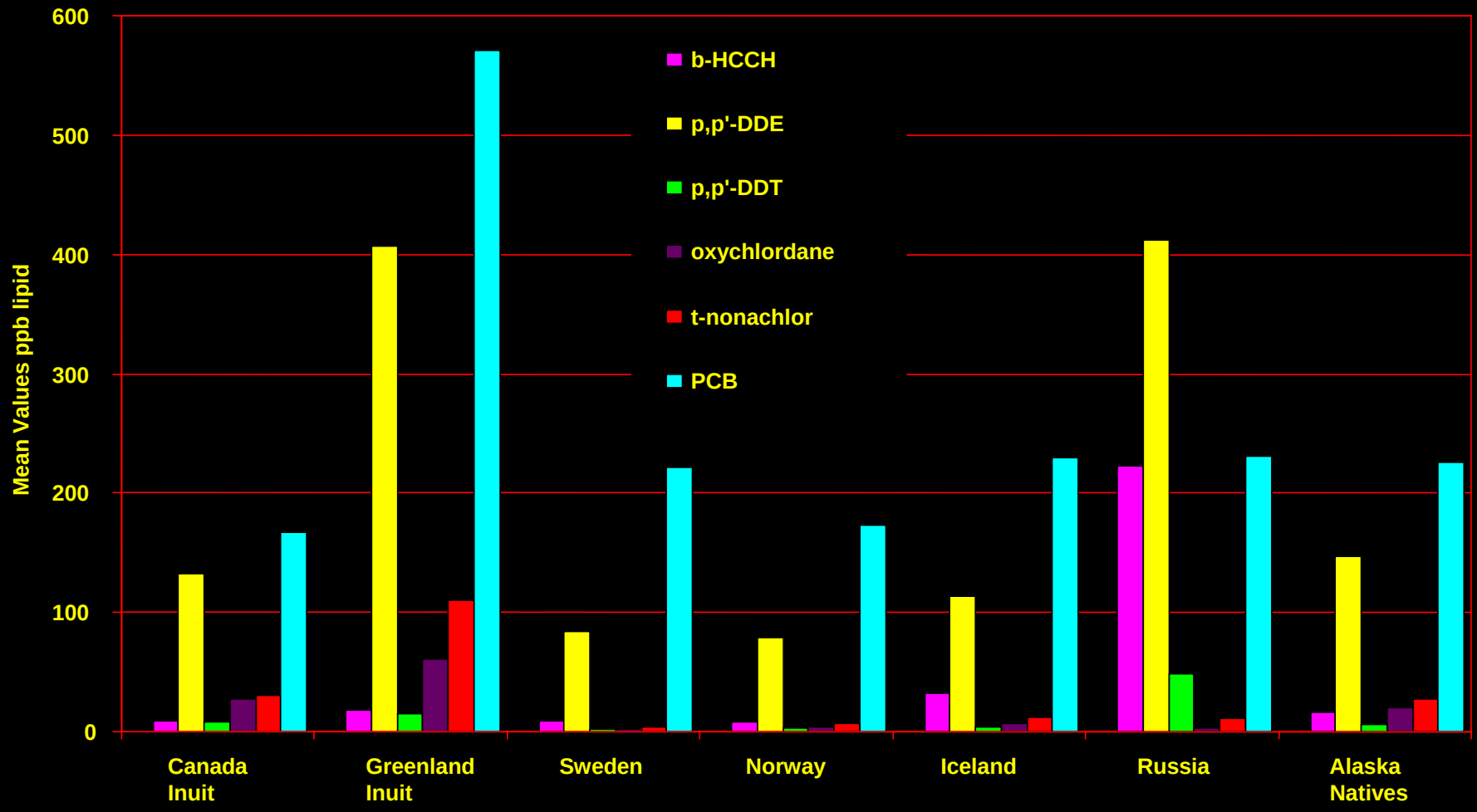
Traditional Food Safety Biomonitoring Program of Pregnant Native Women and Newborn Infants in Rural Alaska

Alaska Native Traditional Food Safety Monitoring Program

Blood Levels of Persistent Organic Compounds

In Circumpolar Pregnant Women



Outcomes for Analysis

- Adverse pregnancy outcome
- Infectious disease in infants
- Infant immune markers (e.g., cytokines, IgE)
- Infants & children growth & development)

Analytic Design

- Collaborative project
  - Alaska Native Tribal Health Consortium
  - Yukon-Kuskokwim Health Corporation
  - Arctic Slope Native Association
  - Aleutian Pribilof Islands Association
  - Centers for Disease Control and Prevention
    - National Center for Environmental Health
    - Arctic Investigations Program
  - Alaska Area Native Health Service
  - Environmental Protection Agency
  - State of Alaska
  - University of Alaska

Analytic Design

- Prospective cohort of maternal-infant pairs
  - Bethel, Barrow, Aleutian/Pribilof Islands
  - Other sites to be added
- Multi-year program
  - Started 1999

Analytic Design

- Enrolled at first prenatal visit
  - Dietary & demographics information
  - Blood & urine
- Umbilical cord blood at delivery
- Health outcomes
  - Maternal medical record (pregnancy outcome)
  - Infant medical record-1st year

Laboratory Analysis

- National Center for Environmental Health, CDC
- Johns Hopkins University
- Arctic Investigations Program laboratory, CDC
- University of Alaska at Anchorage

Analytes

- Metals—lead, cadmium, mercury, arsenic
- POPs
  - -- Pesticides
  - -- Phthalates
  - -- PCBs
- Radionuclides—uranium, thorium

Additional Analytes

- Immune markers-cytokines
- Selenium
- Micronutrients
- Lipid content & omega-3 fatty acids

Preliminary Results

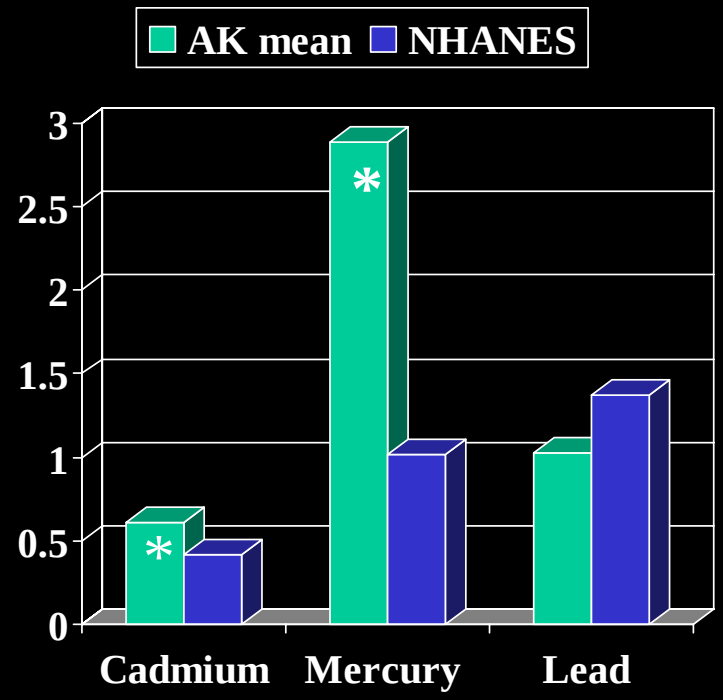
- 205 mothers
- 91 newborns
- Most biological samples distributed to labs
  - Partial results obtained & reported here
  - Other results pending
- Health records review in process

Comparison of Alaska Native Pregnant Women & Women in NHANES

Blood Geometric Mean (N = 144)

Alaska v/s NHANES

- **Cadmium (ppb)**
  0.61 v/s 0.42
- **Mercury (ppb)**
  2.89 v/s 1.02*
- **Lead (ppb)**
  1.03 v/s 1.37



*** Adverse health outcomes at 58 ppb**

- **NHANES = 2nd National Report on Human Exposures to Environmental Chemicals**
- **Comparison Group: 16-49 year old females**

Maternal Urinary Arsenic

- 18.9 ppb (95% CI = 15-23)
- Arsenic not in NHANES Human Exposure Report
- Adverse health outcomes observed at >50 ppb
- Probable source of arsenic in Alaska Native women is organic arsenic in fish

Comparison of Alaska Native POPs (*lipid adj. ppb*)

POPs [1] ***(n = 117)***	***Alaska ppb (95% CI)***	***NHANES*** [2] ***ppb (95% CI)***
β-HCCH	12.8 (11.1, 14.9)	11.1 (10.2, 12,0)
Oxychlor	14.6 (12.5, 17.2)	< LOD
t-NONA	19.3 (16.4, 22.6)	18.8 (17.0, 20.8)
pp-DDE [3]	123.3 (106.0, 143.5)	270 (241, 302)

1 POPs listed only if 60% of study population > LOD. Other POPs to be measured include HCB, γ-HCCH, heptachlor epoxide, dieldrin, op-DDT, pp-DDT, and mirex.

2 Comparison group: **16-49 year old females**

3 Significant at alpha = 0.05

Comparison of Alaska Native PCBs

(*lipid adjusted. Ppb*)

PCB	Alaska	NHANES 2
PCB 74	6.7	29
PCB 146	6.9	13.1
PCB 156	5.5	16.5
PCB 187	8.1	24.2

Comparison of Alaska Native Phthalates

(lipid adjusted. Ppb)

Phthalates	Alaska n=111	U.S.
Mono-benzyl phthalate	23.2 (17.8, 30.1)	14.6 (13, 16.3)
Mono-ethyl phthalate	56.6 (41.8, 76.6)	178 (154, 206)
Mono-n-butyl phthalate	14.16 (11.1, 18.0)	27.3 (24.4, 30.4)

Infant POPs (*lipid adj. ppb*)

- Among Alaska Native infants, all POPs measured were <LOD except pp-DDE (121.6 ppb)
- No comparison values available

Future Data Analysis

- Correlation between analytes and health outcome (pregnancy outcome & rate of infectious disease during 1st year of life)
- Comparison of analytes between river and coastal inhabitants
- Correlation of levels between mothers and infant
- Correlation of levels with dietary history

Future Laboratory Analysis

- Perfluorinated acids
- Polybrominated flame retardants
- Toxaphene
- DEET
- Polonium 210
- Blood mercury speciation
- Urinary arsenic speciation (including valence)