Traditional Foods in Alaska: Potential Threats from Contaminants and Climate Change

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Overview of Talk

- Why are traditional foods important in Alaska?
- Threats to traditional food safety
  - Traditional focus on contaminants
  - Nexus with climate change
- Conclusions
Why are Traditional Foods Important?
Health Benefits of Seafood, Marine and Terrestrial Mammals

- High nutritional value
- Vitamins A, E, C
- Protein
- Energy
- Omega - 3 - fatty acids
- Monolipids
- Iron, zinc
Prenatal & Infant Development

Omega-3 fatty acids important for neurodevelopment. Used during third trimester for:

- brain and retinal development
- maturation of the visual cortex
- motor skills development in infants
Diabetes Prevalence in Alaska Natives: 72% increase from 1990 to 2001

IHS Alaska Area Profile

Age-Adj. Prevalence per 1,000

1990: 18
2001: 31
Percent of Alaskan Adults who are Overweight or Obese

1991-1993: 48%

1999-2001: 61%
Chronic Health Problems Associated with Obesity

- Premature Death
- Heart Disease
- Diabetes
- Arthritis
- Cancer
- Breathing Problems
- Reproductive Complications
- And More.....
Drawbacks of Restricted Consumption of Traditional Foods

- Health risks associated with alternative foods
  - ↑ saturated fat: cardiovascular disease
  - ↑ carbohydrates: diabetes
- Loss of nutritional and health benefits
- Overall negative health impact of dietary and lifestyle changes
- High cost of replacement foods
- Social, economic and health consequences from the breakdown of subsistence
Potential Threats to Traditional Food: Contaminants
Toxic effects of Mercury

- High doses: Personality changes, tremors, changes in vision or hearing, loss of sensation, memory difficulties
- Most sensitive endpoint:
  - fetal brain development
- Low doses through fish/marine mammal consumption: Epi studies inconsistent
What are the Potential Effects of PCB-like chemicals?

- **Immunotoxicity:** Decreased ability to fight disease
- **Neurodevelopment:** Learning and behavior
- **Endocrine disruption:** Interactions with thyroid and sex hormone receptors
- **Cancer**

Fiercely debated whether these effects could occur at the low doses encountered through subsistence food consumption!
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Public Health Recommendations

• Benefits far outweigh potential adverse effects

• Traditional foods are a healthy dietary choice
How could climate change affect traditional foods?
Glaciers Melting

Shown here are Austin Post's 1958 photo of the McCall Glacier terminus, alongside of a 2003 photo by Matt Nolan taken at almost the same spot.
Melting glaciers may be a source of POPs to Arctic lakes

- Alberta Canada – elevated concentrations of POPs in layers of ice deposited in the 1950s through 1980s
- Bow Lake POPs input measured in 1997
  - Glacial melt stream a major source of POPs to the lake
- Italy – melting Alpine glaciers a current source of DDT to local lakes
Vibrio Outbreak: Mean Daily Farm “A” Water Temperature by Date, and Number of Farm “A”-associated Case-patients by Harvest Date of Consumed Oysters-2004

McLaughlin et al NEJM 2005 353: 1463-70
Arctic Warming may Increase Bioaccumulation of Methyl Hg

- Temperature enhances Hg methylation
  - Warming increases primary productivity
  - Sunlight = demethylation by UV light
  - Methylation by sulfate-reducing bacteria depends on organic matter
  - Zooplankton species – Daphnia higher in Hg; dependent on dissolved organic carbon
- Methylated Hg bioaccumulates in fish
Eagle Village spring flooding, June 2009
Eroding Landfill, Port Heiden 2008
Trend in winter sea ice volume

Credit: Ron Kwok, NASA/JPL
Effects of decreasing sea ice on Pacific Walrus

- Use sea ice for:
  - Resting platform over offshore feeding areas
  - Escape from predators

- Since 2007, large # of walrus haul out on coast
  - 131 young walrus killed in stampede near Icy Cape
  - Stampedes also on Russian side of Chukchi Sea in 2007
Conclusions

- Traditional foods are central to Alaska Native culture, and a healthy lifestyle
- Climate change has the potential to threaten traditional food safety and security
- Need to protect the environment to protect traditional food abundance and safety
- Need careful planning to minimize impacts of climate change that are unavoidable