Quantitative Assessment of Risk to Infants from Environmental Contaminants in Human Milk

David Farrer, Ph.D.
Office of Environmental Public Health
Oregon Public Health Association
October 18, 2010
Overview

• What are polychlorinated biphenyls (PCBs), and why are we concerned about them?
• The nursing infant exposure pathway
• Selection of method to predict PCB levels in human milk
• Quantifying risk to infants
• Applications in Oregon and cross-cutting collaboration
Polychlorinated Biphenyls (PCBs) – A Fat-Soluble Environmental Contaminant
Portland Harbor Fish Advisory

• Based on polychlorinated biphenyls (PCBs)
• Specific warnings for pregnant and nursing women
• Based on qualitative information
• Why not quantify?
Comparison of 3 Models

• 8 Actual mother-infant pairs selected from larger study (N=75). Criteria for selection included:
  – Observed data for each study parameter
  – Breastfed for at least 11 months
  – Equal number male and female infants
  – Good spread of milk concentrations across the range

• Haddad model was validated against observed data from this study
Simulated Doses to Infants Were Similar Across 3 Models

Model Comparison

1-Year Average PCB-153 Dose to Infant

- EPA
- Haddad
- Yang

PCB-153 Dose to Infant (µg/kg-BW/day)

Minimal Risk Dose (0.03 µg/kg/day)
Infant Dose Compared to Maternal Dose

Comparison of PCB-153 Average Dose to Mother and Infant (at 6 Months) Calculated with Haddad Model

Minimal Risk Dose (0.03 µg/kg/day)
Oregon DEQ Human Health Risk Assessment Guidance

- Oregon Department of Environmental Quality (DEQ) has included this nursing infant exposure pathway in their updated Human Health Risk Assessment Guidance: Appendix D.
- Oregon is first state in the country to require quantitative assessment of risk to infants from contaminated human milk.
- OHA helped with model selection and crafted messaging around this guidance for nursing mothers, because…
Breast is Still Best

• Important to communicate that calculated risks are not intended to advise women about whether or not to breastfeed.
• Benefits still outweigh the risks
• Public health messages focus on reducing maternal exposure to contaminants to optimize benefits of breastfeeding
• The earlier maternal exposure to fat-soluble contaminants is reduced, the better for the future infant.
Project of Collaboration

- Oregon Health Authority
- Mike Poulser, Oregon DEQ
- Clement Welsh, Agency for Toxic Substances and Disease Registry (ATSDR)
- Marcia Bailey, Environmental Protection Agency (EPA) Region 10 office staff in Seattle
- Dr. Sami Haddad, University of Montreal in Quebec
- Dr. Raymond Yang, Raymond Yang Consulting LLC.