Epidemiologic Evidence on PFOA from the C8 Science Panel and Beyond

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Overview of Presentation

• Describe DuPont plant contamination in Ohio/West Virginia
• C8 Science Panel research activities
• Probable link findings
• Update based on more recent research
PFAA Toxicity

- Persistent, resistant, and pervasive in the environment
- Reported adverse effects in animal models
  - Carcinogenicity – liver, pancreatic, and testicular
  - Developmental toxicity – reduced growth, survival
  - Hepatotoxicity – hypertrophy, altered lipid metabolism, peroxisome proliferation
  - Neurotoxicity – altered behavior, cell replication, and proteins
  - Immunotoxicity – suppression
PFOA Emissions from a Teflon Plant in West Virginia
PFOA in Public Water and Private Wells near DuPont Washington Works

Detection of elevated PFOA in water supplies near the DuPont Plant due to air emissions and river discharges led to a class action lawsuit

Settlement mandated:
1. Filtration of water
2. C8 Health Project, a survey of exposure and clinical markers in exposed population
3. C8 Science Panel to study and evaluate link of PFOA to disease
Schematic Transport Pathways

Source: Data Assessment Report, DuPont (2008)
Plant Emissions to Air and River, 1950-2005

[Shin et al ES&T 2011]
Serum Levels of PFOA

- Background range of 4-5 ng/mL in US at this time with subsequent decline
- Mid-Ohio Valley mean = 82.9, median = 28.2
- Dominant determinant is water district and duration of residence
- Additional predictors of elevated exposure are older age, male, private well user, grows own vegetables
The C8 Science Panel

Tony Fletcher, London School of Hygiene & Tropical Medicine
David Savitz, Brown University
Kyle Steenland, Emory University

• Selected by agreement between the “Settling Parties” - DuPont and the Plaintiffs/Class
• Charge: Determine if there is a “Probable Link” between C8/PFOA exposure and any human disease - would lead to medical monitoring program
• Conduct research needed to determine whether Probable Link is present between PFOA and disease
Definition of Probable Link

- Given available scientific evidence, is it more probable than not that a connection is present between C8 (PFOA) exposure and human disease?
- Judge whether 50% threshold is exceeded considering biological evidence, chance and bias in epidemiologic studies
C8 Science Panel Research Program

Overall objective: conduct research needed to reach informed judgment on probable links

- Cohort follow-up on community and worker populations to assess timing of disease onset, prospective identification of new disease
- Cross-sectional analyses of serum PFAAs and blood chemistry
- Half-life assessment after cessation of exposure
- Exposure reconstruction using modeling
- Ecologic exposure studies of birth outcomes and cancer
- Neurodevelopment in children
Data Sources

• History of plant emissions of PFOA into the air and river to reconstruct exposure
• Serum PFOA levels, clinical chemistry, and questionnaire responses in community – 69,030 participants in the “C8 Health Project”
Health Outcomes Judged to Have Probable Links

- Diagnosed elevated cholesterol
  - Limited support but corroborative studies
- Ulcerative colitis
  - Unanticipated, but clear dose-response gradient
- Thyroid disease
  - Mixed elevated and reduced levels, different by sex
Health Outcomes Judged to Have Probable Links

• Testicular cancer
  – Dose-response gradient

• Kidney cancer
  – Dose-response gradient

• Pregnancy-induced hypertension
  – Small association but consistent across studies
Major Research Areas Following C8 Science Panel Research

• Immunologic effects
  – Evidence of disruption to immune response to vaccines, not clearly linked infection

• Reduced birth weight
  – Support for small reduction in fetal & postnatal growth

• Thyroid disease
  – Mixed, sex-specific effects on T4

• Serum lipids
  – Continued modest support
Concerns and Challenges

• Distinctive vs. general effects across PFAAs
• Potential for reverse causality affecting biomarker levels, especially in background exposure range
• Need for very large populations to address cancer, clinically significant chronic disease