Pesticide Epidemiology in US EPA’s Office of Pesticide Programs

Update and Current Activities

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Outline

• EPA/OPP Regulatory Mandate

• Epidemiological Studies in EPA/OPP

• EPA/OPP Approach: Tiered Process

• Other or Ongoing Epidemiological Projects/Activities
US EPA’s Office of Pesticide Programs (OPP) is the US governmental agency responsible for registering and regulating pesticide products in the USA.

- As part of this activity, OPP evaluates the effects of pesticides on human health and the environment.

Under FIFRA and FQPA, EPA has a regulatory mandate to determine if pesticides cause unreasonable adverse effects on human health.

- OPP receives extensive hazard and exposure information through FIFRA and FFDCA.
- Information on hazard generally derived from laboratory animal studies.
- High quality, pesticide-specific epidemiological information has not traditionally been widely available.
Epidemiological Studies in OPP

• An increasing number of epidemiology studies are entering literature, particularly from the Agricultural Health Study (AHS) and its publications.

• OPP is putting increasing emphasis and the use of these epidemiology studies in its Human Health Risk Assessments.
  ▪ Goal is to use this information in a scientifically robust and transparent way.

• Epidemiology review is an important component of the risk assessment process and complements other information available to the Agency.
Epidemiology Assessment Approach

• Tiered reviews are guided by OPP’s Epidemiological Framework published in 2016

• Emphasizes study quality and weight of evidence

• "Fit for purpose“
  
  ▪ Required resources are “matched” or balanced against any anticipated or expected information gain from further, more in-depth research
  
  ▪ Can include formal systematic review, when appropriate
    
    ▪ Systematic review: “a scientific investigation that focuses on a specific question and uses explicit, pre-specified scientific methods to identify, select, assess, and summarize the findings of similar but separate studies”
      
Tiered Review Approach

- EPA’s Office of Pesticide Programs has adopted a tiered assessment approach to fulfill its regulatory mandate and respond to emerging public health issues.
  - Manage program workload
  - Prioritize potential risk issues that warrant systematic investigation
Tier I, Tier II, & Tier III Epidemiology Reviews

**Tier I: Update to scoping exercise**
- Research and evaluation generally limited to Agriculture Health Study (AHS)-related publications

**Tier II: Systematic review**
- Broader search of epidemiologic literature including comprehensive data collection and systematic literature review
- Generally limited in scope to epidemiology
- Integration by risk assessors occurs as part of Draft Risk Assessment

**Tier III: Systematic review + multi-disciplinary integration**
- Can involve more comprehensive epidemiologic methods
  - Meta-analysis; Design calculations/power issues; Publication Bias/Egger (Funnel) Plots; Multiple Comparisons/False Discovery Rate; Heterogeneity/ I²; Meta-regression; Sensitivity analysis/quantitative bias analysis; Causal Analysis
Tier I, Tier II, & Tier III Epidemiology Reviews

Links to Tier I Epi/incident reviews available in the chemical dockets:


Links to Tier II Epi/incident reviews available in the chemical dockets:


*Bold italics* = newest ones in docket
Other Epidemiological Projects/Activities

• **HESI (Health and Environmental Sciences Institute)**
  
  “Application of Environmental Epidemiology for Risk Assessment and Decision Making”
  
  • Series of small focus group sessions with tripartite representation from regulators, industry, and academia in a dialogue on the use of environmental epidemiology for regulatory decision-making [more, next- C.Chen...]

• **IRAC (Interagency Risk Assessment Consortium)**
  
  “Reproducibility and Replication Issues in Science: Quantitative analysis of biases in epidemiology and its role in risk assessment”
  
  • Multi-agency workgroup within IRAC co-chaired by FDA/CBER and EPA/OPP exploring regulatory issues associated with epidemiology studies as they relate to reproducibility and replication
  
  • Effect size magnification/design calculations; quantitative bias analysis (QBA); Reproducibility and Replication Benefits and Challenges

• **International Society of Environmental Epidemiology (ISEE)**
  
  Annual Meeting is August 2020 in Washington, D.C
Summary

- OPP has placed increased emphasis on incorporating high quality epidemiology studies, when available, in its Human Health Risk Assessments, with the goal of using this information in a scientifically robust and transparent way.

- Review of epidemiologic research is an important component of the EPA OPP risk assessment process mandated under FIFRA and FQPA.

- In order to support regulatory risk assessment and public interest needs, OPP has adopted a tiered review approach to manage workload and prioritize potential risk issues that warrant systematic investigation.

- OPP is involved in variety of other collaborative epidemiological activities.