Cumulative Risk Assessment: Developing the Methods
Available Papers and Where They May be Located

THE BEGINNING

The Food Quality Protection Act (FQPA), which became law in August 1996, requires EPA to consider the cumulative effects to human health that can result from pesticides and other substances that have a common mechanism of toxicity. Through cumulative risk assessment EPA will be able to determine if the risks posed by a group of pesticides that act in the same way in the body meet the current safety standard.

HOW HAS THE CUMULATIVE RISK ASSESSMENT PROCESS COME ABOUT?

The Office of Pesticide Programs has developed a framework for conducting cumulative risk assessments on pesticides. Achieving this framework has required the development of new methods and tools. EPA began with consideration of what constitutes common mechanism of toxicity, then moved on to methods for conducting aggregate exposure and risk assessments, and finally to the cumulative risk assessment process.

Grouping Pesticides by Common Mechanism of Toxicity

A common mechanism of toxicity group consists of chemicals for which scientifically reliable data demonstrate that the same toxic effect occurs in or at the same organ or tissue by essentially the same sequence of major biochemical events.

✔ EPA participated in a workgroup by the International Life Sciences Institute (ILSI) to discuss issues surrounding common mechanism as it applies to the organophosphate pesticides. The ILSI workgroup recommended that the organophosphates be classified as a common mechanism group. EPA accepted that recommendation. (Common Mechanism of Toxicity: A Case Study of Organophosphorus Pesticides, Toxicological Sciences, 41:8-20 (1998))

✔ EPA published draft guidance on common mechanism of toxicity for comment on August 6, 1998.

✔ The revised guidance was published February 5, 1999 (64 FR 5795)BA Guidance for Identifying Pesticide Chemicals and Other Substances That Have a Common Mechanism of Toxicity.@*

✔ EPA has consulted the FIFRA Scientific Advisory Panel regarding various aspects of the Agency=s approach to common mechanism of toxicity:**
  ▶ March 19-20, 1997BCommon Mechanism of Toxicity: The Grouping of a Series of Chloroacetanilide Pesticides Based on a Common Mechanism of Toxicity
  ▶ March 24-25, 1998BCommon Mechanism of Action of Organophosphates
  ▶ March 24-25, 1998BSuggested Probabilistic Risk Assessment Methodology for Evaluating Pesticides that Exhibit a Common Mechanism of Action
Aggregate Exposure and Risk Assessment

As part of the individual chemical risk assessment, EPA performs an aggregate risk assessment. The aggregate risk assessment includes consideration of exposures to the pesticide from food, drinking water, and residential/non-occupational sources.

- International Life Sciences Institute (ILSI) has held workshops with presentations and panel discussions by EPA and other scientists on topics related to aggregate exposure. Publications include:
  - Assessment of Methods to Estimate Pesticides in Drinking Water (1998)

- EPA published draft guidance on aggregate risk assessment for comment on November 10, 1999.*

- EPA has published several guidance documents related to drinking water exposure assessment:
  - Estimating the Drinking Water Component of a Dietary Exposure Assessment was published for comment on January 4, 1999. The revised version was published on November 10, 1999.
  - Standard Operating Procedure for Incorporating Screening-Level Estimates of Drinking Water Exposure in Aggregate Risk Assessments was published for comment October 11, 2000.
  - Drinking Water Screening-Level Assessments, Part A Guidance for Use of the Index Reservoir in Drinking Water Exposure Assessments was published for comment October 11, 2000.

- EPA has published guidance on conducting residential exposure assessments:
  - Standard Operating Procedures for Residential Exposure Assessment was published for comment January 4, 1999.
  - Framework for Assessing Non-occupational/Non-dietary Exposure to Pesticides was published for comment January 4, 1999.

- EPA has consulted the FIFRA Scientific Advisory Panel regarding various aspects of the Agency’s approach to aggregate risk assessment**
  - March 19-20, 1997BAggregate Exposure Assessment as Required by FQPABInterim Approach
  - September 9-10, 1997BStandard Operating Procedures (SOPs) for Residential Exposure Assessments
  - December 10-11, 1997BEstimating Drinking Water Exposure as a Component of the Dietary Risk Assessment
  - October 14-15, 1998BProposed Methods for Basin-Scale Estimation of Pesticide Concentrations in Flowing Water and Reservoirs for Tolerance Reassessment
Assessing Cumulative Risk

Assessing cumulative risk involves developing ways to combine exposures to different substances that may have differing degrees of toxicity and be used in various ways at various times of the year. EPA’s guidance has to address how these factors will be handled. EPA has pursued an open, peer-reviewed process to develop cumulative risk assessment methods and approaches.

- International Life Sciences Institute (ILSI) has held workshops with presentations and panel discussions by EPA and other scientists on topics related to cumulative risk assessment. Publications include:

- EPA published draft guidance on cumulative risk assessment for comment on June 30, 2000.*

- In July 2000, EPA held a technical briefing to help explain the methods and issues addressed in the guidance.

- EPA has consulted the FIFRA Scientific Advisory Panel regarding various aspects of the Agency’s approach to cumulative risk assessment**
  - December 8-9, 1999BIssues Pertaining to Exposure Assessment and Estimating Cumulative Risk
December 8-9, 1999 Chapter 4 Exposure Assessment and Characterization; Chapter 6 Estimation and Characterization of Cumulative Risk

September 21-24, 1999 Proposed Guidance on Cumulative Risk Assessment of Pesticide Chemicals that have a Common Mechanism of Toxicity

September 21-24, 1999 Issues Pertaining to Hazard and Dose-Response Assessment


September 26-29, 2000 Assessing Aggregate and Cumulative Risk Using LifeLine™ (Hampshire Research Institute)*

September 26-29, 2000 CALENDEX™ Calendar-Based Dietary and Non-dietary Aggregate and Cumulative Exposure Software System (Novigen Sciences, Inc.)**

December 7-8, 2000 Case Study of the Cumulative Risk of 24 Organophosphate Pesticides; Cumulative Risk Assessment Method for Dietary (Food) Exposure; Cumulative Risk Assessment for Residential Exposure; Cumulative Risk Assessment for Drinking Water; Integrated Cumulative Risk Assessment

* Science policy documents available on EPA’s web site: www.epa.gov/oppfead1/trac/science

** Background documents and reports from the FIFRA SAP available on EPA’s web site: www.epa.gov/scipoly/sap/

*** Information on reports by the International Life Sciences Institute available at www.ilsi.org/publications/

**** Model presented by the company developing it, not by EPA