EVE 491/591
Toxicology

Case Study #1. "Mary Beth"

Part 4. Epidemiology vs. Toxicology

Risk assessment is accomplished through the review of all available research data reported for a potential toxic compound. In cancer risk assessment two general types of research are conducted that provide the data for risk assessment: epidemiology and toxicology. The two research types approach the problem very differently, with each having both strengths and weaknesses.

Epidemiology

Epidemiologists are concerned with the study of outbreaks of disease that affect large numbers of people. They use sophisticated statistics, field investigations, and laboratory techniques to investigate the cause of a disease, its distribution, method of spread, and measures for control and prevention.

A mining area in western Pennsylvania was chosen for a retrospective case-control study. Epidemiologists collected data from death certificates for 178 individuals who died in 1981 and 1982. Cancer deaths and neighborhood (living) conditions were compared. The cases were matched with a control group of the same age, race, sex and residence type from an area without coal mining. To gain information on living conditions researchers interviewed neighbors and family members of the deceased.

Epidemiology Questions

1. List the specific strengths and weaknesses of this study.
2. List the general strengths and weaknesses of epidemiology for providing an answer to Mary Beth's question.

Toxicology

Toxicologists study poisons or toxins by detection, isolation, identification, and determination of their effects on the human body. However rather than looking at retrospective (past) data as the epidemiologist does, they utilize bioassays. Bioassays test the effects of toxins on living model organisms that are not human.

One hundred fifty mice were randomly assigned to three groups. The control group received normal drinking water. One treatment group received drinking water taken from a coal mining town in eastern Ohio while the other received water taken directly from a stream contaminated with mine run-off. Mice were given their specific type of water to drink for the entire length of the experiment. Mice were monitored for 12 months and all health problems and deaths recorded. At the end of the experiment the mice were necropsied and examined for any evidence of health effects or tumors.

Toxicology Questions

1. List the specific strengths and weaknesses of this study.
2. List the general strengths and weaknesses of toxicology for providing an answer to Mary Beth's question.