

# The effect of environmental chemicals on human health

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Humans and animals have always been exposed to chemicals in our environment—natural products in foods, smoke from cooking fires, sewage in drinking water, pesticides from plants. However, the dramatic increases in industrialization over the past 3 centuries have dramatically changed both the quality and the quantity of human exposures to both natural and synthetic chemicals. We all know that certain things are bad for us—cigarette smoke, alcohol, lead, ozone (too much—or too little). But what about other substances in our environment such as gasoline fumes, dry cleaning fluids, pesticides, wood smoke, or heavy metals? Environmental health risk assessment allows us to identify the potential hazards to human health and understand how serious such problems may be. It is composed of four components: exposure assessment, hazard identification, dose/response assessment, and risk characterization. Risk assessment is the scientific basis for standard setting. However, regulatory decision making always involves issues other than science.

Environmental health threats may come from physical agents, for example, UV or ionizing radiation, or biologicals, such as mold, insects, bacteria, and viruses, as well as chemicals. Common environmental chemical pollutants

include pesticides and herbicides, volatile organics such as benzene, toluene, and chloroform; heavy metals such as lead, mercury, and arsenic; air contaminants such as carbon monoxide, ozone, particulate matter, and second-hand smoke; and persistent organic pollutants, such as the dioxins, PCBs, and DDT. Environmental chemicals can cause a broad spectrum of effects, which depend not only on route of exposure and dose, but on the susceptibility of the recipient of the pollution. Age, gender, and genotype can have major effects on whether or not an exposure causes a problem. We know that children are not like adults, concerning behaviors, metabolism, and responses. We also know that the elderly may be a population at special risk to environmental chemicals. As is true from the study of pharmaceutical agents, much of our knowledge about the effects of environmental chemicals come from studies in animals. However, by using biomarkers of exposure and effect, as well as studies from some unfortunate poisoning episodes, we do have human information on many types of environmental exposures. Because nature is inherently conservative, when environmental chemicals cause multiple effects in multiple species, it is highly likely that people are also susceptible.

This article reflects the ideas of the author, and does not reflect Agency policy.

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