

Rachel's Environment & Health News

#501 - Chemicals and the Brain, Part 2

July 03, 1996

(Continued from RACHEL'S #499.)

Here we continue our presentation of the Erice Statement, a consensus statement issued May 30, 1996, by an international group of scientists and physicians, including U.S. government scientists. (The signers were listed and identified in RACHEL'S #499.) The statement expresses great concern about the effects of hormone-disrupting chemicals on the brain and central nervous system. The Erice Statement resulted from a workshop held November 5-10, 1995 at Erice, Italy.

Hormones are chemical messengers that travel in the blood stream, turning on and off critical bodily functions to maintain health and well being. Hormones control growth, development, and behavior in birds, fish, reptiles, amphibians, and mammals, including humans. In humans, 100 different hormones have been identified. Taken together, the tissues and organs that produce, and respond to, hormones are called the endocrine system. In 1991, an international group of 23 scientists issued a consensus statement, expressing great concern that many synthetic (human-created) industrial chemicals can interfere with hormones in wildlife and humans. (See REHW #263, #264). The 1991 statement focused on the ability of industrial chemicals to interfere with sexual development and behavior in wildlife and humans. The Erice Statement issued last month focuses attention on industrial chemicals that can interfere with the development of the brain and other parts of the central nervous system. The statement is definitely not easy reading, but it is important, so we present it verbatim, with our explanations inside square brackets [].

CONSENSUS STATEMENT (continued from Rachel's #499)

2. We estimate with confidence that:

** Every pregnant woman in the world has endocrine disruptors in her body that are transferred to the fetus. She also has measurable concentrations of endocrine disruptors in her milk that are transferred to the infant.

** There may not be definable thresholds for responses to endocrine disruptors [in other words, any amount may cause some effect]. In addition, for naturally occurring hormones, too much can be as severe a problem as too little. Consequently, simple (monotonic) dose-response curves for toxicity do not necessarily apply to the effects of endocrine disruptors. [See REHW #490.]

** Because certain PCBs and dioxins are known to impair normal thyroid function, we suspect that they contribute to learning disabilities, including attention deficit hyperactivity disorder and perhaps other neurological abnormalities. In addition, many pesticides affect thyroid function and, therefore, may have similar consequences.

** Some endocrine disruptors or their breakdown products are nearly equipotent to [as powerful as] natural hormones. Even weak endocrine disruptors may exert potent effects because they can bypass the natural protection of blood binding proteins for endogenous [natural] hormones. Some disruptors also have a substantially longer biological half-life than naturally produced hormones because they are not readily metabolized, and as a result are stored in the body and accumulate to concentrations of concern. Some man-made chemicals that appear non-toxic are converted by the liver to more toxic compounds. Also, compounds that are not toxic in the mother may be toxic to her developing embryo, fetus or newborn. The exquisite vulnerability of the fetal brain to methylmercury and lead are prime examples of this principle.

** Functional deficits are not as easily measured as physical anomalies or clinical disease, in part because they are typically expressed as continuous measures, such as IQ, rather than the number of cases in a population. Consequently, conventional population surveys may overlook the extent of such deficits.

Moreover, because such surveys tend to express their findings as shifts in mean [average] values even when they are based on appropriate measures, they tend to obscure influences on the more susceptible members of the population.

** Large amounts of man-made chemicals capable of disrupting the endocrine and nervous systems are sold to, or produced and used in, third world countries that lack the resources or technology to properly monitor and control exposure levels. Insufficient and improper training in handling chemicals and ignorance concerning health effects and monitoring strategies leads to the likelihood of very high levels of exposure.

3. There are many uncertainties in our understanding because:

** No one is exposure-free, thus confounding [confusing] studies to determine what is normal. Everyone is exposed at any single time and throughout life to large numbers of man-made chemicals. Relatively few of the man-made chemicals found in human tissue have been identified. Lack of funding has seriously constrained testing these chemicals for their potential to disrupt natural systems.

** Sensitive parameters, including neurological abnormalities, behavioral and neuropsychiatric disorders, and neuroanatomical, neurochemical, and neurophysiologic endpoints need to be investigated. Most important, criteria at the population level need to include the social and economic costs of impairment because the true costs to society of such problems can be significant, e.g., the costs of a 5 point IQ loss across a population. Investigation of potential toxicity typically includes laboratory, population and field studies, clinical reports, and accident reports. However, developmental neurotoxicants produce a spectrum of effects that are not typically evaluated, such as the progression and latency of behavioral and neurological changes. In addition, alteration of other systems can produce subsequent cognitive, behavioral, and neurological dysfunction; i.e. diseases of other organ systems that influence the brain; non-CNS [central nervous system] drugs; other foreign substances such as air pollutants; and immune system involvements that alter behavior.

** Trade secret laws afford industry confidentiality, depriving the consumer and public health authorities of the right to know the components of commercial products so they can be tested.

4. Our judgment is that:

** The benefits of reduced health care costs could be substantial if exposure to endocrine-disrupting chemicals were reduced.

** A trivial amount of governmental resources is devoted to monitoring environmental chemicals and health effects. The public is unaware of this and believes that they are adequately protected. The message that endocrine disruptors are present in the environment and have the potential to affect many people over a lifespan has not effectively reached the general public, the scientific community, regulators, or policy makers. Although this message is difficult to reduce to simple statements without over- or under-stating the problem, the potential risks to human health are so widespread and far-reaching that any policy based on continued ignorance of the facts would be unconscionable.

** The outcome of exposure is inadequately addressed when based just on population averages. Instead, risk should be based on the range of responses within a population --that is, the total distribution. The magnitude of the problem can be better determined by knowing the distribution of responses to endocrine disruptors by individuals within subsets of the population most at risk, such as pregnant women, developing embryos, fetuses, and newborns, teens, the aged, the ill or those with pre-existing endocrine disorders. The magnitude of the risks also depends upon the endpoint [health effect] under consideration. For example, a variety of motor, sensory, behavioral, and cognitive functions,

endpoints which are more sensitive than cancer, must be considered when assessing neurological function. This holds for wildlife and domestic animals, as well as human populations.

right to know;

** Wildlife have been effective models for understanding endocrine disruption at the molecular, cellular, individual, population, and ecosystem levels. Future research to examine diverse wildlife species at all levels of biological organization must be broadened and adequately supported.

** Those responsible for producing man-made chemicals must assure product safety beyond a reasonable doubt. [See REHW #491.] Manufacturers should be required to release the names of all chemicals used in their products with the appropriate evidence that the products pose no developmental health hazard.

** Current panels of scientists who determine the distribution of public research funds often have a narrow scope of expertise and are thus ill-equipped to review the kind of interdisciplinary research that is necessary in this field. Funding institutions should be encouraged to increase the scope of representation on review panels and to develop more appropriate mechanisms for interdisciplinary reviews. Governmental agencies should also increase funding for multidisciplinary extramural projects for surveillance of wildlife and human populations where neurological damage is suspected and follow any leads with laboratory research. In addition, populations of animals consuming the contaminated foods also eaten by humans should be studied for developmental health effects. It is important to observe a variety of vertebrate species through multigenerational studies.

** Strategies for increasing interdisciplinary communication and collaborations to optimize resources and future research are needed. Studies should be designed more economically to include the sharing of material among many collaborators. Interdisciplinary teams should explore neurological and other types of damage at all levels of biological organization from molecular through biochemical, physiological, and behavioral.

** A concerted effort should be undertaken to deliver this consensus statement to the public, key decision makers, and the media. In addition, specially designed messages should be developed for family physicians and others responsible for public health who are often unaware of the possible role of occupational and environmental chemical pollutants as agents underlying or constituting risk factors for "primary" human diseases. Physicians must be trained in medical school about often latent effects of pollutants on human development and health. This training is currently inadequate. A coordinated speakers bureau and on-line systems such as a site on the World Wide Web for endocrine-disruptors should be established. [End of consensus statement.]

The consensus statement developed at Erice has been all but blacked out by the U.S. media. The LOS ANGELES TIMES and the SACRAMENTO (CAL.) BEE reported it May 31, but other papers ignored it entirely. Perhaps the statement challenges too many of our pet assumptions about the safety of our children in this chemically-altered world.

--Peter Montague (National Writers Union, UAW Local 1981/AFL-CIO)

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Descriptor terms: erice statement; hormone disrupters; hormones; brain; central nervous system; dose-response; pcbs; dioxin; attention deficit disorder; add; thyroid; development; methylmercury; mercury; lead; iq; third world; developing countries; trade secrecy; risk assessment; wildlife; burden of proof;