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#665 - Cause for Precautionary Action, August 26, 1999

After four years of study, the National Research Council (NRC) of the National Academy of Sciences on August 4 published its report on hormone-disrupting chemicals in the environment.[1] The report represents a consensus statement by the NRC's Committee on Hormonally Active Agents in the Environment, a committee made up of 16 scientists,[2] including some who are closely aligned with the chemical industry.

The Committee had been asked by Congress and by U.S. Environmental Protection Agency (EPA) to evaluate the hazards posed by hormone-disrupting chemicals in the environment. Dozens, perhaps hundreds, of common industrial chemicals are known to interfere with hormones under some conditions, so the stakes are high.

Hormones are naturally-occurring chemicals that circulate at very low levels in the blood stream of all vertebrate animals including reptiles, amphibians, fish, birds and mammals. (Vertebrates are animals with a backbone.) In all vertebrate species, hormones act as chemical messengers and as switches, turning on and off bodily systems that control growth, development, learning and behavior. Hormones start affecting every animal shortly after it begins life as a fertilized egg. Hormones control growth and development prior to birth or hatching, and hormones continue to influence behavior throughout life. Hormones tell bears when to hibernate, tell salmon when to return to their spawning grounds, and cause women to menstruate every 28 days or so. Hormones profoundly affect the nervous system, the reproductive system, and the immune system. Naturally-occurring hormones are also implicated in some forms of cancer, such as female breast cancer which is widely believed to be linked to a woman's lifetime exposure to estradiol (estrogen), the main female sex hormone.[1,pg.197]

Because of the importance of hormones in the life of all vertebrates, industrial chemicals that can interfere with hormones are exceedingly important from a public health perspective. They also represent major embarrassments and liabilities for

the corporations that put such chemicals into common use without adequate safety tests. The presence of synthetic [human-created] hormone-disrupting chemicals in air, water, sediments, soil and food also represents a major failure of the U.S. Public Health Service and the U.S. Environmental Protection Agency.

Furthermore, if hormone-disrupting chemicals in the environment are identified as an important problem, then someone may be held responsible (at least in the court of public opinion) and confidence in government and in the chemical industry may drop below their present subterranean levels. Therefore, there is powerful pressure from many parts of "the Establishment" to deny the existence of this problem. NEW YORK TIMES writer Gina Kolata has distinguished herself as the main spokesperson for the deniers.[3]

Despite the highly-charged nature of the subject, and despite the presence of chemical industry representatives on the committee, the NRC's consensus report is rather strong, as indicated by these verbatim quotations:

"Adverse reproductive and developmental effects have been observed in human populations, wildlife, and laboratory animals as a consequence of exposure to HAAs [hormonally active agents]."[1,pg.3]

"Most notable are the adverse reproductive and developmental effects that have been observed in birds such as cormorants, herrings gulls, Caspian terns, and bald eagles that feed on contaminated fish, which have led to drastically lowered reproductive success and population declines."[1,pg.9]

"Laboratory studies using male and female rats, mice, and guinea pigs, and female rhesus monkeys have shown that exposure of these animals during development to a variety of concentrations of certain HAAs (e.g., DDT, methoxychlor, PCBs, dioxin, bisphenol A, octylphenol, butyl benzyl phthalate (BBP), dibutyl phthalate (DBP), chlordecone, and vinclozolin) can produce structural and functional abnormalities of the reproductive tract."[1,pg.3]

"There is evidence of suppression of the immune system by exposure to organochlorines (predominantly PCBs) in birds in the Great Lakes region. There is also evidence of suppression of innate and acquired immune responses in seals fed

fish from the PCB-contaminated Baltic Sea. Such immunosuppression is believed to be the reason for the increased incidences of bacterial and viral infections in seals in similarly contaminated waters." [1,pg.5]

"Environmental HAAs [hormonally active agents] probably have contributed to declines in some wildlife populations, including fish and birds of the Great Lakes and juvenile alligators of Lake Apopka [in Florida], and possibly to diseases and deformities in mink in the United States, river otters in Europe, and marine mammals in European waters." [1,pg.6]

"Synthetic HAAs [i.e., HAAs released by chemical corporations] have been detected in all environmental media [air, water, sediments, and soil], although concentrations of some compounds, such as PCBs and DDT, have declined in some regions, because their use has been discontinued in those countries. However, those HAAs and others can persist in some media, such as sediments, for years and can contaminate areas far removed from the original site of contamination (e.g., via atmospheric transport)." [1,pg.7]

"Human dietary intake of synthetic HAAs remains substantial, even intake of HAAs that have not been used commercially for many years. For example, a recent survey of the U.S. diet found detectable residues of DDT in 16% of the food samples. Human exposure is further demonstrated by concentrations of DDT in the adipose (fatty) tissue. Over 95% of adipose tissue samples taken from the U.S. population contained detectable concentrations of some HAA. Although the concentrations were found to be greatest in older individuals, even children were not immune from exposure." [1,pg.76]

"Concentrations of HAAs and other xenobiotics [chemicals foreign to the body] have been measured in milk from humans around the globe." [1,pg.82]

"In the Michigan/Maternal Infant Cohort Study, Fein et al. (1984) evaluated the birth size and gestational age of 242 infants and found that maternal consumption of fish and concentrations of PCBs in cord serum [in blood in the umbilical cord] were correlated with lowered birth weight, shortened gestation [time in the womb], and smaller head circumference. Lower weight was also observed in children from this cohort at 4 yr [years] in a dose-dependent fashion

(Jacobson et al. 1990). Children with cord serum PCB levels of 5.0 ng/mL [nanograms per milliliter] or more weighed 1.8 kg [4 pounds] less on average than the lowest exposed children. Prenatal exposure was also associated with deficits in neurologic development in followup studies of these children at up to 11 yr [years]."[1,pg.125]

"Elevated levels of the herbicide atrazine found in municipal water supplies in Iowa were associated with excess rates of cardiovascular, urogenital, and limb-reduction deficits [birth defects]."[1,pg.130]

"Studies with laboratory animals have shown that prenatal exposure to some HAAs, such as methoxychlor, TCDD [dioxin], and octylphenol and bisphenol A can reduce sperm production."[1,pg.131]

"A neurologic assessment of an aging population of Great Lakes fishers is currently being conducted by Schantz et al. (1996). In all, 104 fishers and 84 nonfishers, age 50 or older, were enrolled in the study.... the fishers performed more poorly on tests requiring cognitive flexibility, word naming, auditory recall, and more complex motor task [sic] compared with individuals who do not eat fish."[1,pg.173]

"Long-term epidemiologic studies of cognitive and neurobehavioral development have been conducted in Michigan, New York, North Carolina, and the Netherlands on children exposed pre- and postnatally to PCBs from maternal consumption of contaminated fish or other food products. Studies of cognitive development (i.e., short-term memory, visual discrimination, and IQ scores) in Michigan show consistent correlations between prenatal exposure to PCBs and deficits at up to 11 yr [years]. Similarly, in the Netherlands, lower cognitive scores were associated with prenatal exposure when tested in 3.5-yr-old children."[1,pg.174]

"Taken together, the results of animal and human studies indicate that prenatal exposure to PCBs can affect neurologic development."[1,pg.175]

"It has been well documented that HAHs [halogenated aromatic hydrocarbons] such as TCDD [dioxin], polychlorinated dibenzofurans (PCDFs), and PCBs, affect immune response, and they appear to affect all functional arms of the immune system (innate immunity and host resistance,

cell-mediated immunity, and humoral immunity)."[1,pg.178]

"There have only been a few studies of the effects of HAAs [hormonally active agents] in humans, but the results of laboratory and wildlife studies suggest that HAAs have the potential to affect human immune functions."[1,pg.194]

The NRC report concludes that, at present, the 70,000 industrial chemicals already in use cannot be tested to see if they are hormone-disrupters or not, because the necessary tests do not exist.[1,pg.414] Meanwhile between 1000 and 2000 new chemicals are being put into commercial use each year, inadequately tested.

Therefore, adequate knowledge of hormone-disrupting chemicals lies many decades in the future, a kind of scientific holy grail. What is not known about hormone-disrupting chemicals is considerably larger than what is known and will remain so for a long time to come.

Yet the NRC report has amply documented, from studies of wildlife, laboratory animals, and humans, that many industrial chemicals, at levels already present in the environment, are currently interfering with hormones, causing problems in reproduction and development, the nervous system (including diminished IQ and learning ability), and the immune system (which protects us all from bacteria, viruses and cancers). Harm is happening now.

Thus hormone-disrupting chemicals meet the two tests established by the precautionary principle: scientific uncertainty, and a reasonable suspicion of harm. (See REHW #657.)

Therefore, while scientific study continues, decision-makers have a duty to take precautionary action to prevent further harm even though scientific certainty has not been established. As a signatory to the Rio Declaration of 1992, the U.S. is legally obligated to take precautionary action. But of course our government will not act spontaneously merely to comply with the law or do the right thing. To put it bluntly, our government will only respond if popular pressure is sufficient to offset inertia, the forces of denial, and election-time bribery from the chemical industry. Building that pressure is up to us.

--Peter Montague(National Writers Union,

UAW Local 1981/AFL-CIO)

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[1] Ernst Knobil and others, *HORMONALLY ACTIVE AGENTS IN THE ENVIRONMENT* (Washington, D.C.: National Academy Press, July 1999). ISBN 0-309-06419-8.

[2] Members of the NRC Committee on Hormonally Active Agents in the Environment included: Ernst Knobil (chair), The University of Texas-Houston Medical School, Houston, Tex.; Howard A. Bern, University of California, Berkeley, Cal.; Joanna Burger, Rutgers University, Piscataway, N.J.; D. Michael Fry, University of California, Davis, Calif.; John P. Giesy, Michigan State University, East Lansing, Mich.; Jack Gorski, University of Wisconsin, Madison, Wis.; Charles J. Grossman, Department of Veterans Affairs Medical Center, Cincinnati, Ohio and Xavier University, Cincinnati, Ohio; Louis J. Guillette, Jr., University of Florida, Gainesville, Fla.; Barbara S. Hulka, University of North Carolina, Chapel Hill, N.C.; James C. Lamb IV, Jellinek, Schwartz & Connolly, Arlington, Va.; Leslie A. Real, Emory University, Atlanta, Ga.; Stephen M. Safe, Texas A&M University, College Station, Tex.; Ana M. Soto, Tufts University, Boston, Mass.; John J. Stegeman, Woods Hole Oceanographic Institution, Woods Hole, Mass.; Shanna Helen Swann, University of Missouri, Columbia, Mo.; Frederick S. vom Saal, University of Missouri, Columbia, Mo.

[3] See REHW #486, #487. And see Gina Kolata, "Study Inconclusive on Chemicals' Effects," *NEW YORK TIMES* August 4, 1999, pg. 16. For less biased coverage of the NRC report, see J. Fialka, "More Clinical Tests of Humans Exposed to Chemicals are Urged in a US Study," *WALL STREET JOURNAL* August 4, 1999, pg. unknown, and Marla Cone, "Hormone Study Finds No Firm Answers," *LOS ANGELES TIMES* August 4, 1999, pg. 3.

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