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News and resources for environmental justice.

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WARNING ON MALE REPRODUCTIVE HEALTH

The Danish Environmental Protection Agency in Copenhagen, Denmark released a report April 18th entitled MALE REPRODUCTIVE HEALTH AND ENVIRONMENTAL CHEMICALS WITH ESTROGENIC EFFECTS. The 175-page English-language report, which we have obtained, says male reproductive health is deteriorating in many countries, and that the most likely cause is exposure to low levels of industrial chemicals that contaminate food, water, and many consumer products.

The Danish report says many industrial chemicals mimic sex hormones (chiefly the female hormone, estrogen) and thus interfere with the normal development of creatures (including humans) that become exposed before, or shortly after, birth. The report identifies many consumer products as sources of such hormone-like chemicals: pesticides, detergents, cosmetics, paints, and packaging materials, including plastic containers and food wraps. [1] The report calls for an aggressive, coordinated international research effort to describe the extent of the problem, and to design programs of "prevention and intervention."

Meanwhile in the U.S., the Chemical Manufacturers Association (CMA) has funded a report by a scientist who says these problems are not real. "The suggestion that industrial estrogenic chemicals contribute to an increased incidence of breast cancer in women and male reproductive problems is not plausible," the CMA's 6-page study concludes. [2]

In contrast, the Danish report says, "It is now evident that several aspects of male reproductive health have changed dramatically for the worse over the past 30-50 years. The most fundamental change has been the striking decline in sperm counts in the ejaculate of normal men; recent evidence from Paris indicates that this decrease amounts to about two percent per year over the last two decades. The result is that many, otherwise normal, men now have sperm counts so low that their fertility is likely to be impaired. Over the last half-century, the incidence of testicular cancer has increased progressively in

many countries to become now the most common cancer in young men. Other disorders of the male reproductive tract may also be increasing in incidence, with several European countries reporting a progressive rise in hypospadias (a malformation of the external genitalia) and an apparently emerging trend towards an increasing incidence of testicular maldescent [undescended testicles]....

"While the etiologies [causes] underlying these apparent changes are currently not clear, both clinical and laboratory research suggest that all of the described changes in male reproductive health appear inter-related and may have a common origin in fetal life or childhood. This means that the increase in some of the disorders seen today originated 20-40 years ago and that the prevalence of such defects in male babies born today will not become manifest for another 20-40 years or more," the report says.

The Danish report was prepared by 19 scientists and physicians, including 13 from Denmark, two from France, one from England, one from Scotland, and two from the U.S.

The report says that declining reproductive health has also been widely observed in wildlife: "Trends in the reproductive health of species other than man also raise the possibility of environmental factors as partial etiologic [causal] contributions in a decline noted in the male reproductive health of wildlife. For example, wild panthers in the United States have been reported to have an increase in undescended testes and a decrease in semen quality, whereas male alligators in some lakes in Florida have been shown to have abnormalities in their sex hormone levels (tending towards femaleness) and to have smaller than normal genitalia. Male fish in some parts of the United Kingdom have been shown to express a 'female-like response' when studied in a relatively natural setting. Earlier studies of fish eating birds in the United States demonstrated nests containing male hatchlings that were apparently feminized. A recent report of lactating [milk-producing] male fruit bats suggested that the males were, in some way, exposed to a female sex hormone. Recent laboratory studies showed that when estrogenic forms of polychlorinated biphenyls (PCBs) were painted on turtle eggs, the male hatchlings were sex-reversed to females. Taken together, this growing body of evidence suggests that environmental factors that resemble female sex hormones may be having an adverse effect on the reproductive capacity and wellbeing of diverse species," the report says.

The report summarizes evidence indicating that all of these problems have a common origin: the exposure of male fetuses to estrogen-like chemicals before birth. "The wealth of experimental [laboratory animal] results and associated clinical [human] reports suggests strongly that prenatal exposure to exogenous [external] estrogens may play an etiologic role in the trends observed in male reproductive health," the report says.

The report lists many ways in which humans become exposed to chemicals that mimic hormones: "Estrogen effects are not restricted to a small group of therapeutic agents but appear in several groups of compounds that are in daily use in industry, agriculture or in the home," the report says. "A major problem is determining which chemicals are estrogenic... At present, tens of thousands [of] man-made chemicals are used, yet the effects on the endocrine [hormone] system have been studied for only a few of these. The estrogenic activity of most chemicals (e.g., alkylphenols, phthalate esters, bisphenol-A) has

been detected by accident, not by intent; that is, no systematic screening, even on individual groups of chemicals, has been attempted. Hence it is highly possible that other estrogenic chemicals remain unidentified... Thus, the present situation is that man and wildlife are exposed to a very wide range of chemicals, and for the majority of them we do not know whether these chemicals are, or are not, estrogenic, whether their effects are additive, or even what the true exposure to these chemicals is."

The report points out that even weakly estrogenic chemicals may be of concern if they remain in the bodies of humans and wildlife for long periods. Natural hormones are created by the body, circulate in the blood stream very briefly to carry out a particular task, and are then destroyed by natural mechanisms. In contrast, many industrial chemicals that enter the body are not readily broken down so they circulate in the blood for long periods --in some cases many years --mimicking natural hormones.

The Danish report lists the following chemicals and classes of chemicals as known to have estrogenic activity:

Organochlorine pesticides: DDT, DDD, DDE, dicofol, perthane, methoxychlor, chlordane, oxychlordane, trans-nonachlor, heptachlor, heptachlorepoxyde, aldrin, dieldrin, hexachlorobenzene, hexachlorocyclohexanes, lindane (gamma HCH), mirex, and toxaphene. Although these chemicals have been banned in several industrial countries, including the U.S., some of them are still manufactured [in the U.S. or overseas, by U.S. corporations--PM] and sold in developing countries where they are "widely used" today, the Danish report says.

Other known estrogenic chemicals include:

** Many of the 109 types of PCBs (polychlorinated biphenyls);

** Dioxins and furans (unwanted by-products of all incinerators; paper-making mills; metal smelters; and the manufacture of some chemicals and pesticides);

** Alkylphenols, the breakdown products of alkylphenol polyethoxylates (APEs) which are widely used in detergents, paints, herbicides and cosmetics. Some 300 million kilograms (660 million pounds) of APEs are produced each year and ultimately released into the environment.

** Phytoestrogens, or plant-produced estrogens, including isoflavones and coumestans found in rye, wheat, cabbage, sprouts, spinach and soybeans. "Soybean is far and away the richest source of plant estrogens and is used ubiquitously [everywhere] in the food industry as a protein source including the production of infant milk formula substitutes," the Danish report says. Depending upon the dose, phytoestrogens have an estrogenic, or an anti-estrogenic, effect, the Danish report says. Unlike many of the other estrogenic chemicals identified in the Danish report, phytoestrogens do not bioaccumulate or biomagnify, but are readily metabolized and excreted.

** Many common chemicals found in plastics, including bisphenol-A, phthalate esters (butylbenzyl

phthalate and di-n-butylphthalate): "Phthalates are the most abundant man-made environmental pollutants, and human intake per day via various routes, especially via the diet, is measured in tens of milligrams," says the Danish report. Some plastics contain up to 40% phthalate esters (by weight). These esters leach out of, or volatilize out of, the plastics as time passes. Many foods in the U.S. and elsewhere are packaged in phthalate-containing plastics. Even blood for transfusions is sometimes packaged in phthalate-containing plastics.

** Herbicides, such as the popular crab-grass and dandelion killer, 2,4-D, and the now-banned 2,4,5-T, both of which were widely used by U.S. forces in Vietnam. (See [REHW #436](#).) Other herbicides with estrogenic effects include: alachlor; amitrole; atrazine; metribuzin; and trifluralin.

** Fungicides: benomyl and its principal breakdown product, carbendazim, used on apples and bananas, among other food crops; and ethylene bis dithiocarbamates (EBDCs, including mancozeb, maneb, metiram, and zineb).

** Hexachlorobenzene. Although this pesticide was banned in many countries in the 1970s, it "continues to be released to the environment as a byproduct and contaminant in many other chlorinated chemicals including chlorinated solvents," the Danish report says.

** Tributyltin compounds. Tributyltin compounds, until very recently, were used in large quantities as antifouling paints on ships, boats, and mariculture pen nets. Now banned in many countries.

** Malathion, heavily sprayed around residential areas of the U.S. to kill nuisance mosquitoes.

And finally the Danish report warns that exposure to low levels of many chemicals may be harming the reproductive health of humans and wildlife by mechanisms that have nothing to do with estrogen: "Although not the subject of this report, in considering and evaluating the possible role of estrogenic chemicals in male reproductive disorders, it should not be forgotten that many chemicals may have a detrimental effect on male reproductive health through other mechanisms than an estrogenic effect," the Danish report says.

--Peter Montague

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[1] Our thanks to Lisa Finaldi of Greenpeace International for helping us obtain a copy of the Danish EPA report.

[2] Stephen H. Safe, "Environment and Dietary Estrogens and Human Health: Is There a Problem?" ENVIRONMENTAL HEALTH PERSPECTIVES Vol. 103, No. 4 (April, 1995), pgs. 346-351.

Descriptor terms: endocrine disrupters; strogen; hormones; reproductive system; pesticides; detergents; cosmetics; paints; packaging materials; plastics; packaging; cma; chemical manufacturers association; denmark; sperm count; hypospadias; undescended testicles; testicular cancer; cryptorchidism; wildlife; panthers; alligators; penis size; fish; birds; bats; turtles; pcbs; chlorine; organochlorine compounds;

pesticides; DDT; DDD; DDE; dicofol; perthane; methoxychlor; chlordane; oxychlordane; trans-nonachlor; heptachlor; heptachlorepoxyde; aldrin; dieldrin; hexachlorobenzene; hexachlorocyclohexanes; lindane (gamma HCH); mirex; toxaphene; dioxin; furans; alkylphenols; alkylphenol polyethoxylates; apes; metal smelting; paper mills; incineration; phytoestrogens; bisphenol-A; phthalate esters; herbicides; 2,4-d; 2,4,5-t; agent orange; vietnam veterans; alachlor; amitrole; atrazine; metribuzin; trifluralin; benomyl; carbendazim; ethylene bis dithiocarbamates; ebdc; mancozeb; maneb; metiram; zineb; hexachlorobenzene; tributyltin; malathion;

[Next issue](#)