ENDOCRINE DISRUPTORS: A GLOBAL THREAT FOR THE 21ST CENTURY

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Abstract:Human and wildlife health depends on the ability to reproduce and develop normally. This is not possible without a healthy endocrine system. Endocrine disruptors are compounds that interfere with some aspect of the endocrine system of an organism or its progeny. Endocrine disruptors may do this through multiple mechanisms, including: (1) mimicking or enhancing the action of an endogenous hormone; (2) blocking a hormone receptor, thereby preventing the action of an endogenous hormone; or (3) affecting the synthesis, transport, metabolism, or excretion of an endogenous hormone. Evidences of endocrine disruption in wild life and experimental animals are available, but there is limited knowledge of the association of human disorders with exposure to endocrine disrupters. The available data suggest that many adult diseases have fetal origins, but the causes have remained unexplained. Improving fetal and child health will influence the whole life of an individual and reflect the wellbeing and future of our society. Human exposure to EDCs occurs via ingestion of food, dust and water, via inhalation of gases and particles in the air and through the skin. EDCs can also be transferred from the pregnant woman to the developing foetus or child through the placenta and breast milk.

In conclusion, the systematic screening of environmental chemicals and the chemicals present in human foods and water is needed to identify. This is a global threat that needs to be resolved. Better information on how and when EDCs act is needed to reduce exposures during development and prevent disease. We hope that thisreview inthis proceeding enriches the knowledge of our readers and scholars interested in the influence of xenobiotics on human health.

Keywords: EDCs, health risks, contaminants.

Introduction: ndocrine disruptors are chemicals that may interfere with the body's endocrine system and produce adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife. A wide range of substances, both natural and man-made, are thought to cause endocrine disruption, including pharmaceuticals, dioxin and dioxin-like compounds, polychlorinated biphenyls, DDT and other pesticides, and plasticizers such as Bisphenol A [1]. Endocrine disruptors may be found in many everyday products including plastic bottles, metal food cans, detergents, flame retardants, food, toys, cosmetics, and pesticides.Endocrine disruption represents one of the most controversial environmental issues despite the fact that many substances, both natural and artificial, have been recognized to interfere with endocrine signaling pathways. Such interactions have been documented both in laboratory animal studies as well as in wildlife.

The report of WHO and UNEP[2] demonstrates a strong likelihood that exposure to EDCs during fetal life and/or puberty plays a role in the proliferation of male and female reproductive problems, endocrine-related cancers, infections, asthma, obesity, diabetes, and behavioral and learning disorders, including attention deficit/hyperactivity disorder (ADHD). The incidences of these conditions have increased significantly not only in the United States but across the globe. Because genes do not change fast enough to explain this increase, environmental causes must be involved. The environmental contribution to disease is estimated to be 24–33% of the global disease burden [3].

Animal studies have shown that males exposed to antiandrogens during a specific perinatal period can be demasculinized in morphology, physiology, and behavior [4]. Endocrine disruptors also can affect the nervous system through receptors expressed on neuroendocrine cells or on neurons[5].Exposure to compounds with endocrine activity can have effects that persist for more than one generation. For example, the pesticide vinclozalin produces epigenetic modifications leading to heritable changes in gene function that occur in the absence of changes to the nucleotide sequence. Because such changes can be maintained and transmitted through the germ cells, these modifications can affect gene activity across generations [6].

Methodology: The present synthesis is based on a review of literature on the endocrine disruptors in various journals. Information was also obtained from web sites and articles addressing environmental issues which are of direct interest for the health sector. In addition, many press releases have been reviewed on a regular basis. Meetings with experts and researchers have also been a useful source of information and have provided opportunities for exchanging views.

Route of Exposure: Food, water and air are a major mechanism by which people are exposed to pollutants. Consumer goods are another potential

source of exposure to endocrine disruptors.Parabens, a class of chemicals that has been associated with reproductive-tract issues, were detected in seven of the "chemical free" products, including three sunscreens that did not list parabens on the label. If a consumer used the alternative surface cleaner, tub and tile cleaner, laundry detergent, bar soap, shampoo and conditioner, facial cleanser and lotion, and toothpaste [he or she] would potentially be exposed to at least 19 compounds: 2 parabens, 3 phthalates, MEA, DEA, 5 alkyl phenols, and 7 fragrances[7].

Types of Disruptors: Endocrine disrupting chemicals (EDCs) are found in low doses in housands of products. Chemicals commonly detected in people include DDT, polychlorinatedbiphenyls (PB's),bisphenol A (BPA), polybrominated diphenyl ethers (PBDE's), and a variety of phthalates [8]. Some researchers are investigating the health risks to children of endocrine disrupting chemicals. Bisphenol A, until 2010 a common component in the plastic used to manufacture plastic baby bottles, has been banned in most countries. Several states in the United States had banned its use by 2011, and in 2012 a nation-wide ban was put in place [9].

Other suspected endocrine disruptors: Some other examples of putative EDCs are polychlorinated dibenzo-dioxins (PCDDs) and furans (PCDFs), polycyclic aromatic hydrocarbons(PAHs), phenol derivatives and a number of pesticides and DDT and its derivatives, the herbicide atrazine, and the fungicide vinclozolin, the contraceptive 17-alphaethinyl estradiol as well as naturally occurring phytoestrogens such as genistein and mycoestrogens such as zearalenone. The molting process the marine penaeid shrimp *Litopenaeus vannamei*, exposure toendosulfan resulted increased susceptibility to acute toxicity and increased mortalities in the post molt stage [10].

Dose Response: One major objection to the theory of endocrine disruptors is the dosage effect. There is a large gap between high exposures seen in a laboratory experiment versus the relatively low levels found in the environment [11]. The very low-dose effects of endocrine disruptors cannot be predicted from high-dose studies, which contradicts the standard 'dose makes the poison' rule of toxicology. Nontraditional dose-response curves are referred to as nonmonotonic dose response curves [12].

Future research: According to FDA hazard assessment is designed to determine whether a material has the capacity to induce a deleterious effect at any exposure level without regard to actual human exposures. We need the fields of toxicology, endocrinology and other stakeholders to work together to address these issues, not engage in recriminations. Future research must examine (i) the interactive nature of EDCs, particularly whether the threshold concept as developed in traditional toxicological research applies to these chemicals; (ii) when and how EDCs act at the physiological level, particularly how they may organize the neural substrates of reproductive physiology and behavior; (iii) the various effects these compounds have on different species, individuals, and even tissues; and (iv) how adaptations may evolve in natural populations with continued exposure to EDCs. Several predictions are offered that reflect these new perspectives.

Conclusions: EDCs are a global problem and will require global solutions. EDCs have contaminated the world via the natural flow of air and water. Several hundred EDCs have been measured in humans and wildlife, even in remote places such as the Arctic. Thus, it is now impossible to examine an -unexposed population anywhere on Earth. To improve health, environmental health scientists and toxicologists need to work more closely with colleagues in endocrinology, genetics, developmental biology, epigenetics, and clinical medicine to bring EDC research into the mainstream of science.

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