EFFECTS OF BISPHENOL-ENDOCRINE DISRUPTORS

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Abstract: Bisphenol A (EDC) is widely used in manufacturing industries. It is commonly detected in environment and was reported to exert oestrogenic effect which may be harmful to the reproductive system. ED chemeical are found in may off the every day product in large quantities for use primarily in the production off poly carbonate plastics and epoxy resins.

The NTP centre for the evaluation of risks to. Human reproduction completed review of BPA in September 2008.

The NTP expressed some concern for effects on the brain, behavior and prostate gland in fetuses, infants and children at current human exposures to bisphenol A. This study suggest that the compound may have caused charges in the developing male germ cells, and that endocrine disruptors may be able to re program or change the expression of gene without mutating DNA.

The role of environmental endocrine disrupting chemical in the transmission of disease from one generation to another is of great research interest to NIEHS.

Keyword: EDC-BPA, health risks, contaminants.

Introduction: A risk assessment of BPA produced in accordance with council regulation (EEC) 973/93 has already been published (EC) 2003 bisphenol A (BPA) is widely used in manufacturing industries.

It is commonly detected in environment various endocrine disrupting chemicals (EDCs) are commonly used in daily life and also present in environment and prove to be harmful to be harmful to human and animals . The environmental contaminants effect normal functions of the endocrine and reproductive system either by mimicking or inhibiting endogenous hormone action or modulating the synthesis of hormone

(sonnenschein and soto,(1998)

A common EDC found in the environment is bisphenol A (BPA) which is widely used in manufacturing polycarbonate and plastic materials BPA has been documented as a potential endocrine disruptors and testicular toxicant (D'cruzet. al.,2012)the present study was undertaken to observe the effect of BPA on the development and hormonal status in experimental animals. Chemical produce adverse effects in laboratory animals, wild life and human. Scientists often refer to these chemicals as "endocrine disruptors".

NIEHS and the national toxicology program (NTP) supports research to understand the effects the may have in various animals and human population with the long term goal of developing prevention and intervention strategies to reduce any adverse effects.edocrine disruptors may turn on shut of ,or modify signals that hormonal carry , which may effect the normal functions of tissues and organs. Many of this substance have been linked with developmental reproductive neural, immune and other problems in wild life and laboratory animals.

Methodolgy: The present synthesis is based on a review of literature on the EDs (BPA) in various journals, informations was also obtained from websites 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'

How do endocrine disruptors work? : From animal studies, researchers have learned much about the mechanisms through which endocrine disruptors influence the endocrine system and alter hormonal functions.

Endocrine disruptors can:

- Mimic or partly mimic naturally occurring hormones in the body like estrogens (the female sex hormone), androgens (the male sex hormone), and thyroid hormones, potentially producing overstimulation.
- Bind to a receptor within a cell and block the endogenous hormone from binding. The normal signal then fails to occur and the body fails to respond properly. Examples of chemicals that block or antagonize hormones are anti-estrogens and anti-androgens.
- Interfere or block the way natural hormones or their receptors are made or controlled, for example, by altering their metabolism in the liver.

What are some examples of endocrine disruptors? : A wide and varied range of substances are thought to cause endocrine disruption.

Chemicals that are known endocrine disruptors

include diethylstilbestrol (the synthetic estrogen DES), dioxin and dioxin-like compounds, polychlorinated biphenyls (PCBs), DDT, and some other pesticides.

Bisphenol A (BPA) is a chemical produced in large quantities for use primarily in the production of polycarbonate plastics and epoxy resins. The NTP Center for the Evaluation of Risks to Human Reproduction completed a review of BPA in September 2008. The NTP expressed "*some concern* for effects on the brain, behavior, and prostate gland in fetuses, infants, and children at current human exposures to bisphenol A." 10

Di(2-ethylhexyl) phthalate (DEHP) is a high production volume chemical used in the manufacture of a wide variety of consumer food packaging, some children's products, and some polyvinyl chloride (PVC) medical devices. In 2006, the NTP found that DEHP may pose a risk to human development, especially critically ill male infants.11

Phytoestrogens are naturally occurring substances in plants that have hormone-like activity. Examples of phytoestrogens are genistein and daidzein, which can be found in soy-derived products.

Physico-Chemical Properties: The key physico-chemical property values are presented in Table 1.1 (EC, 2003). No values have been revised as a result of the updated literature search for this addendum. Shareef *et al.* (2006a) reported the determination of the solubility of bisphenol-A in water at a range of pHs and a range of ionic strengths. The solubility of bisphenol-A in pure water was measured as 300±5 mg/l at 25.0±0.5 °C, with no significant variation over the pH range of 4 to 10, and no change with ionic strength (up to 0.1 moles/litre KNO_3). This further supports the value used in the published assessment.

Table 1.1 Key physico-chemical properties for bisphenol-A

Parameter	Value
Physical state at normal temperature and pressure	White solid flakes or powder
Vapour pressure	5.3 x10^{-9} kPa at 25°C used in environmental models
Solubility in water	300 mg/l used in environmental models
n-Octanol-water partition coefficient (log Kow)	3.4 used in environmental models
Flash point	~ 207°C
Autoflammability	~ 532°C
Explosive limits (in air)	Minimum explosive concentration 0.012 g/l with oxygen > 5%
Oxidising properties	Not an oxidizing agent

Conclusions: The National Toxicology Program (NTP) Center for the Evaluation of Risks to Human Reproduction, which is part of the National Institute of Environmental Health Sciences, is conducting an evaluation of bisphenol A.

The NTP also has some concern for bisphenol A exposure in these populations based on effects in the prostate gland, mammary gland, and an earlier age for puberty in females.

Although BPA is a component of a number of common consumer products, including those that come into contact with food, exposures of humans of all ages are very limited. The emergence of studies that provide more direct measures of these exposures reveals that early estimates of exposures based on more indirect approaches overstated human intake.

References:

1. D'Cruz SC, Jubendradass R, Jayakanthan M, Rani SJ, Mathur PP. Bisphenol A impairs insulin signaling and glucose homeostasis and decreases steroid genesis in rat testis: an in vivo and in silicon study. Food Chemical Toxicol 2012; 50:1124-
2. EC (2003) European Union Risk Assessment Report: 4, 4'-Isopropylenediphenol (bisphenol-A). 3rd Priority List, Volume 37. European Commission Joint Research Centre, EUR20843 EN.
3. NIEHS 2013 endocrine disruptors.
4. WHO (world heath organization) /UNEP (United Nations environment programme) the state of the science of endocrine disrupting chemical 2012Geneva UNEP/WHO 2013.
5. Sonnenschein C, Soto AM. An updated review of environmental estrogen and androgen mimics and antagonists. J Steroid Biochem Mol Biol 1998; 65: 143-50.

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