JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

DIOXIN IMPACTS ON LIVING ORGANISIM: A BRIEF REVIEW

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Abstract: In this article, we briefly focused on the impacts on developmental, reproductive digestive and many health issues produced by the dioxin like compound. The Dioxin is super toxic chemicals. It exhibits serious health effects when it reaches in body fat and produces deleterious effects on many biologically activities like, modifying genetic mechanisms of the cell, causing a wide range of effects, from cancer to reduced immunity, nervous system disorders, miscarriages and birth deformity. Various studies prove that exposure to dioxins results in multiple toxic effects on humans and experimental animals. The effects of dioxin may last long after exposure. However, most of the mechanisms are not clear, thus several number of studies are ongoing trying to elucidate them in order to protect the public by reducing these adverse effects.
Keywords: Dioxins, reproductive, contamination, hormones

Introduction: Human can be exposed to dioxins through environmental, occupational, or accidental pollution. In the human body, most dioxins are metabolized and eliminated while the rest are stored in body fat (Marinkovic N. *et al.*, 2010). Many effects attributed to 2, 3, 7, 8-tetrachlorodibenzodioxin (TCDD), such as lethality, lymphoid and gonadal atrophy, hepatotoxicity, adult neurotoxicity, and cardio toxicity, are associated with high doses of the chemical. Exposure to dioxins also results in abroad spectrum of biological responses including altered metabolism, disruption of normal hormone signaling pathways, reproductive and developmental effects, cancer development (Spencer *et al.*, 1999), and immune effects (Birnbaum & Tuomisto, 2000; Fracchiolla *et al.*, 2011).

Dioxins contain a heterocyclic 6-membered ring compound are known to exhibit toxicity. The term 'dioxin' may also refer to the basic chemical unit of more complex dioxin molecules (Pohjanvirta and Tuomisto, 1994). Dioxins compound that share certain chemical structures and biological characteristics. Over According to Thornton (1997) dioxins were first discovered as the cause of severe health problems among workers who had been exposed to the byproducts of explosions in chemical plants that manufactured certain chlorine-based pesticides in the 1950s. In these accidents dioxin was formed and released into the work-place environment, causing systemic health problems among workers. Toxicological and epidemiological studies showed that dioxin was an extraordinarily potent carcinogen and caused damage to a variety of organ and system in laboratory animals Thornton (1997). Hence from the above discussion it is clear that Dioxin like compound is very toxic and produces deleterious effects on living organism so in the present article we will try to focused on the few effects on the various living organism as following-

Experimental analysis: The data on female rats decrease of dioxin concentration during lactation Korte *et al.*, (1990). Dioxin in the human body is transported by lipids in blood serum to the liver and fat tissue where it accumulates. In the hepatocyte TCDD they bind to aryl hydrocarbon receptors, forming the complexes which are subsequently transported to the nucleus. These complexes then bind the dioxin response element (XRE) of DNA, which results in stimulation of genes for P 450 and P 448 cytochrome and consequently enhances their production. The formed cytochromes participate in the further metabolic processes of dioxins. Long-lasting accumulation of dioxins in the liver and their interaction with DNA influence metabolism of protein in liver and also in the hematopoietic system Całkosiński (2005). Exposure of monkeys to just 5 parts per-trillion of 2, 3, 7, 8 – TCDD concentrations caused impaired neurological development and endometriosis Belazzi and Pexa (2001). Pregnant rats receiving a single dose of 2, 3, 7, 8 – TCDD on day is of pregnancy had male off springs which appear normal at birth, but at puberty were demasculinized with altered reproductive anatomy, reduced sperm count, feminized sexual behaviour Enan et al., (1992). The recent finding that the genome of the HIV – 1 virus contains regulatory sequences that bind the dioxin receptor complex and active transcription of viral genes is a cause for concern that dioxin-like chemicals may also play a role in the expression of infectious disease Enan *et al.*, (1992). Dioxins clearly cause cancer. All 18 studies on the carcinogenicity of 2, 3, 7, 8 – TCDD have been positive demonstrating that dioxin is a multi-site carcinogen in both sexes in the rat, mouse, and hamster by all routes of exposure EPA (1994b). EPA has estimated that current background exposures pose cancer risks as high as one-in-one thousand, a level that exceeds 'acceptable' risk standards by up to a thousand times and, if accurate, could correspond to as many as 3,500 U.S cancer deaths per year due to dioxin exposure EPA (1994a).

Effects on Thyroid-function: Recent studies demonstrated that thyroid diseases are increasing and neurodevelopmental damage due to thyroid-disrupting chemicals has also been observed (Langer, 2008; Radikova *et al.*, 2008; Patrick, 2009). There is significant evidence that PCBs, dioxins, and furans cause hypothyroidism in animals and disrupt human thyroid homeostasis; even small changes in thyroid homeostasis may adversely affect human health (Crofton *et al.*, 2005; Suzuki *et al.*, 2007; Boas *et al.*, 2009). A previous study also uncovered possible effects of exposure to dioxin-like chemicals in maternal milk including reduced vitamin K levels, increased thyroxin concentrations, and mild liver enzyme changes in children (Pohl & Hibbs, 1996).

Immune System: Immune system development is very sensitive to Immunotoxic reagents. TCDD, a well-known immuno toxicant, has been shown to produce adverse effects in rodents and humans, and is considered a prototypical developmental immuno toxicant (Van Loveren *et al.*, 2003). A recent investigation has expanded the physiological role of dioxin molecular pathways to include modulation of hematopoietic progenitor production and immune regulation (Smith *et al.*, 2011).

Cancer and Cardiovascular Disease: It is notable that in all models, dioxin-associated cardio teratogenicity is associated with increased cardiovascular apoptosis and decreased cardiocyte proliferation (Kopf & Walker, 2009). in animal it has confirmed that dioxin exposure during adulthood is associated with hypertension and cardiovascular disease (Kopf & Walker, 2009). Dioxins and DCLs contamination in fish are associated with increased risk of cardiovascular disease (Bushkin-Bedient & Carpenter, 2010). Exposures to TCDD in utero and

through breast milk in C57BL/6 mice alter cardiac gene expression as well as cardiac and renal morphology in adults, thus increasing the susceptibility to cardiovascular dysfunction (Aragon *et al.*, 2008). The (IARC) has classified dioxins as a human carcinogen although they are not associated with the development of specific tumors (Donato & Zani, 2010). Recently, dioxin was shown to be a developmental toxicant in the mammary gland as well as a sensitivity chemical to potential carcinogens in rodents (Birnbaum *et al.*, 2003). TCDD also induce changes in estrogen metabolism and may alter the growth of hormone-dependent tumor cells, thus producing a potential carcinogenic effect (Gierthy *et al.*, 1993). Furthermore, *in vitro* dioxin exposure leads to accelerated cell differentiation, increased cell proliferation, and decreased senescence in differentiation processes (Ahn *et al.*, 2005; Kumar, 2011). These changes are accompanied by decreased levels of several regulatory proteins (p53), indicating that dioxins may exert cancer-promoting effects through this mechanism (Ray and Swanson, 2003).

Conclusion: Hence from the above discussion it is clear exposure of dioxins may result in multiorgan functional and morphological disorders, including multiple teeth disorders, especially if the exposure takes place in developmental stage of life. There is an urgent need for a control and monitoring assessment. There is low awareness about the health consequences and environmental impacts of dioxins. The adverse effects of this compound on human health cannot be over emphasized.

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