Biochemical Study on the Effect of Some Environmental Estrogen Compounds in Male Albino Rats

Thesis Submitted by

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دراسة كيميائية حيوية لتأثير بعض مركبات الأستروجين البيئية علي ذكور الجرذان البيضاء

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SUMMARY

Descriptions of endocrine disruption have largely been associated with wildlife and driven by observations documenting estrogenic, androgenic, anti-androgenic, and anti-thyroid actions. These actions, in response to exposure to ecologically relevant concentrations of various environmental contaminants, have now been established in numerous vertebrate species. However, many potential mechanisms and endocrine actions have not been studied. As with wildlife, a number of studies report an association between contaminant exposure and alterations in the development and functioning of the male reproductive system **(Toppari *et al*. 1996; Sharpe and Irvine 2004).** However, numerous studies also document the difficulty of establishing the link between exposure and health outcomes in human populations **(Guillette, 2006)**.

Di-(2-ethylhexyl) phthalate (DEHP) is used in the manufacturing of a wide variety of polyvinyl chloride (PVC) products. DEHP is known to produce adverse effects on liver, kidneys, reproductive organs and endocrine system **(Akingbemi *et al*., 2004; Ryu *et al*., 2007)**. In particular, DEHP was found to induce cell proliferation, suppression of apoptosis, production of reactive oxygen species (ROS), and increased oxidative DNA damage in liver **(Pogribny *et al*., 2008)**. DEHP belongs to a class of chemicals classified as the peroxisome proliferators (PP), attributed to stimulation of hepatic peroxisomes to proliferate and

Biography

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I DECLARE THAT THIS THESIS HAS BEEN COMPOSED BY MYSELF AND THE WORK THEREIN HAS NOT BEEN SUBMITTED FOR A DEGREE AT THIS OR ANY OTHER UNIVERSITY

Marwa Mokhtar Abd Rabo

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National Organization for Drug Control and Research

Abstract

In the present study, the effect of oral administration of low and high doses of di-(2-ethylhexyl) phthalate (DEHP; a plasticizer) and propyl paraben (PP; a preservative) to adult male rats for 2 and 4 consecutive weeks was investigated. Both compounds significantly decreased serum testosterone (T) level and in contrast increased serum estradiol (E_2), luteinizing hormone (LH), follicle stimulating hormone (FSH), as well as prolactin (PRL) levels as compared with age matching controls. Biochemical and histopathological results indicated severe liver dysfunction as demonstrated by the significant increase in serum marker enzymes, along with suppression of protein biosynthesis. A dose- and duration-dependent deterioration in kidney function was also noticed following treatment of adult male rats with both compounds. Furthermore, signs of oxidative stress induction by means of DEHP and PP were observed, which were responsible for hepatic and testicular toxicity. In conclusion, the endocrine disruption potential of 2 synthetic xenoestrogens was verified in the present model by inducing disturbances in the normal feed-back regulation of the hypothalmo-pituitary-gonadal axis probably by eliciting an oxidative stress and subsequent alteration in the normal oxidant/antioxidant balance.

Key words: *Di-(2-Ethylhexyl) phthalate, hormones, liver, oxidative stress, propyl paraben, testis.*

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