Effects of the endocrine disrupting chemical, DEHP, on the mitochondrial metabolism of the detoxification organs

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Humans are exposed to the various synthetic chemicals via industrial products including cosmetics, food packaging, toys, medical devices and pharmaceuticals. DEHP is the most commonly used plasticizer which has both endocrine disrupting and peroxisome proliferator effects on the human and wildlife. Also, endocrine disrupting chemicals are known for their contribution to the elevated levels of oxidative stress and the formation of various diseases including cancer, diabetes, and obesity. There is an increasing concern about human exposure to the DEHP because of its adverse health effects. On the other hand, mitochondria is the major source of the oxidative stress and most affected organelle from disturbance in the oxidative stress metabolism. Impact of the DEHP on the reproductive and endocrine system has been widely studied, however there is no data about its effect on the mitochondrial metabolism of the detoxification organs including liver and kidney. Therefore, we aimed to investigate influence of the DEHP on the mitochondria metabolism of liver and kidney of rats. Therefore, 24 prepubertal male Wistar albino rats were randomly divided into four groups based on the DEHP administration as 0, 100, 200 and 400 mg/kg/day dose groups. Mineral and trace element levels, anti-oxidant enzyme activities, and electron transport chain complexes including complex I-V were investigated in the mitochondria of kidney and liver as the detoxification organs. Our data showed that DEHP can induce changes in the anti-oxidant enzyme activities and mitochondrial complexes involving in the mitochondrial oxidative stress metabolism. Moreover, we observed differences in the mineral and trace element levels upon DEHP administration that may damage biochemical reactions in the cell. In conclusion, DEHP can impair mitochondrial metabolism of the detoxification organs.