

Long-Term Effects of Developmental Exposure to Phthalates on Metabolism and Body Weight in Female Rats

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Phthalates are plasticizers that are commonly found in cosmetics, food packaging, and medical equipment. One of the most commonly used phthalates is diethylhexyl phthalate (DEHP). Due to its inhibitory effects on androgen production (i.e., antiandrogenic effects) in developing males, diisononyl phthalate (DINP) was proposed as a DEHP replacement. While developmental effects of phthalates in males are relatively well known, their effects in females are less known. This study was aiming to observe any metabolic functions that might be affected by phthalates in female rats. Phthalates act on peroxisome proliferator-activated receptors (PPARs) with roles in development and metabolism; these effects are also better known in males than females. The objective of this study is to examine the effect of DINP and DEHP on glucose metabolism in females. Therefore, timed-pregnant female rats (F0) were orally treated with 24, 240, and 500 mg/kg DINP and DEHP in corn oil (vehicle control) between E11 and PND 7. Their offspring (F1) had their body weights monitored weekly between PND 1 and 63 and then monthly. The F1 females underwent OGTT and ITT at PNM 4, and their visceral fat and liver weights were measured at PNM 6. In order to confirm the antiandrogenic effects, anogenital index (AGI) was determined on PND3 and PND8. This confirmed that the doses were enough to have an effect on the development of the rats. Despite this, body weight up until 8 months, OGTT and ITT at PNM 4, and organ weights at PNM 6 were not significantly affected. It is a possibility that effects will appear at later ages. Therefore, we will perform OGTT/ITT at PNM 10 and determine organ weights at PNM 12. In order to examine potential molecular changes in relevant organs, we will examine gene expression in fat, liver and pancreatic tissues in future studies. Supported by NIH R21ES439590, P30ES005022 and R25ES020721.

