Chapter 16
Environmental Phthalate Exposure in Relation to Reproductive Outcomes and Other Health Endpoints in Humans

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ABSTRACT

Phthalates are the class of chemicals that exhibit numerous adverse effects to health. These non-persistent chemicals are produced in high volume annually and are used in a wide array of industrial consumer products. The overall exposure of phthalates to humans is via ingestion of contaminated food from wrapped materials or dermally via consumer care products. Pthalates are anti-androgenic compounds, so for this reason, they obtrude with the expression of testosterone by manipulating gene expression of proteins and enzymes involved in production of testosterone. The primarily exposure of Pthalates during fetal development stage results in number of harmful effects in male offspring in humans, like abnormalities of the sperm-producing organs, abnormal development of penile, hypospadias, reduced anogenital distance, as well as a risk for prostate cancer and cryptorchidism. The purpose of this chapter was to review the environmental impact of phthalate exposure in relation to reproductive behavior and other health problems in humans.

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INTRODUCTION

The advancement of civilization resulted in foundation of new and progressive technologies, consumer products and goods whose manufacture needs new raw materials and chemical compounds. Most of the compounds among them are long-lasting and are not degraded after releasing in to the environment. They get deposited in the food chain and are then migrated across countries or even continents (Ziolkowska and Wyszkowska, 2010). Environmental pollutants affect soil properties (Wyszkowska and Wyszkowski, 2002; Wyszkowski and Sivitskaya, 2012) and exert a generally negative influence on flora, fauna and other forms of life (Ziolkowska and Wyszkowska, 2010; Wyszkowska and Wyszkowski, 2009). They can result in the endocrinological and reproductive problems. Selected chemical substances have androgen synthesis (Adamsson *et al.,* 2009). Phthalates, or esters of phthalic acid, are environmental pollutants (Grynkiewicz, 2011). Those leading plasticizers are added to polyvinyl chloride in order to enhance its hardness and flexibility. Phthalates are used almost in every industry, and they can be found in construction materials, food packaging, pharmaceuticals, varnish, cosmetics, printing inks, latex paint, medical products clothing,, such as intravenous cannulas, and insecticides (Koniecki *et al.,* 2011; Fierens *et al.*, 2012).

The aim of this study was to differentiate phthalates, to find out the sources of phthalate pollution in the environment, and to describe their affect on living organisms.

MODE OF ACTION, MECHANISM OF ACTION AND COMMON ADVERSE OUTCOMES (NATIONAL RESEARCH COUNCIL, 2008)

Mode of action and mechanism of action are terms that are often used in risk assessment and usually used interchangeably. Both these terms refer to the bio-logic pathway to some final health outcome; the difference between the terms is the level of detail used to describe the pathway. Typically, mode of action is used to describe the key events along the pathway and mechanism of action is used to describe the pathway at the molecular level, Although the committee identifies the distinction and does not want to contribute to over confusion regarding the use of the terms, mechanism of action is used in this report to explain the biologic pathway.

Currently, the concentrate in cumulative risk assessment has been on those chemical compounds that have common mechanisms of action. As described below in greater detail, the committee finds that the concentration in cumulative risk assessment must be on the health outcomes and not on the pathways that lead to them, whether defined as modes of action or as mechanisms of action. Several pathways can result to a common outcome, and a focus on only an accurate pathway can lead to limit an approach in conducting a cumulative risk assessment. Accordingly, the chemicals that should be considered for cumulative risk assessment must be ones that cause the same types of health outcomes or the same health outcomes such as specific effects on development of male reproductive system not ones that cause the health issues only by a specific pathway. The committee refers to the health outcomes of interest as common adverse outcomes.