

EVALUATION OF ENVIRONMENTAL RISK FACTORS – RESEARCH QUESTIONS

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Abstract

There is a wide range of substances in the environment that, depending on their physical and chemical properties, can have harmful effects after interacting with a living system. Chemical substances that are produced every year in millions of tons as a result of human activity and that can represent a genetic risk for living organisms deserve the greatest attention. In recent years, significant evidence has emerged that preconception and prenatal exposure to toxic substances found in the environment can have a fundamental and lasting effects on the reproductive health of animals and the human population. A non-negligible part of the spectrum of xenobiotics that can affect reproductive health are xenohormones, known as endocrine disruptors (EDs). These are mainly pesticides, chlorinated hydrocarbons, phthalates, persistent organic pollutants and other organic compounds. However, the health burden of the human body is also related to the lifestyle of individuals and can be influenced, for example, by foreign substances entering the body through the food chain. Significant attention must be paid to substances that represent a health risk for the reproductive group of populations and may cause the occurrence of birth defects. Scientific studies have proven that mother's occupational exposures to pesticides, lead, aliphatic acids cause an increased incidence of congenital malformations. Among the most frequent occupations in which workers were exposed to endocrine disruptors with clear link to birth defects (e.g. cryptorchidism, hypospadias, facial clefts) were cleaners, laboratory technicians, hairdressers and agricultural workers.

Classes of herbicides, fungicides, insecticides, nematocides, dioxins, PCBs, and other chlorinated chemicals, such as octylphenol, bisphenol A, may have weakly estrogenic, antiestrogenic, antiandrogenic effect or may affect thyroid hormone functioning. Other chemicals i.e. some phthalates esters, glycol ethers appear to be endocrine disruptors by indirectly altering steroid hormone activity at a post receptor site action. Evidence that a number of chemicals affects wildlife population via interaction with endocrine systems has been increasing in recent years. Estrogenic activity of environmental contaminants is thought to account for feminization of fish, reptiles, and reduced reproductive capacity in several wildlife species.

EDs can affect transcriptional activity of nuclear receptors by modulating proteasome (*phthalic acid*), can act as hormone sensitizers by inhibiting histone deacetylase activity and stimulating mitogen-activated protein kinase activity (glycol ethers-*EGME*, *valproic acid*). Some can have genom-wide effects on DNA methylation status and may lead to transgenerational effect on fertility, by reprogramming DNA methylation in male germ line, e.g. metoxychlor, vinclozolin

or can modulate lipid metabolism and adipogenesis (obesogens), contributing to the current epidemic of obesity.

Employers and employees should be aware of possible teratogenic effects when working with endocrine disruptors, e.g. solvents in the workplace. Therefore, it is important that both clinicians and occupational health professionals provide women with expert advice regarding exposures to EDs and other teratogenic pollutants already in the preconception period to reduce the risk of congenital malformations. The urgent requirement of these days is the necessary expansion of research in this area.

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