Toxicology: Open Access

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Reproductive Toxicology

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Abstract

Human reproduction and development is a succession of symbiotic events. Nearly, at every point of this phenomenon found to be the principle target of one or more reproductive toxicants. Chemical agents, physical factors, as well as biological intruders can pose antagonistic effects on reproductive potential of an organism. The pathways are different viz., either damaging embryo and sometimes fetus or inducing mutation in a parent's germ cell. The outcomes are declined fertility to impulsive abortion, functional discrepancies, developmental retardation, structural anomalies, etc. It is a now essential to establishing proper databases for reproductive and developmental toxicity chemicals, physical and biological factors including appropriate awareness among the society. Although many in vitro and in vivo toxicology studies are in pipeline which are independent studies but combination with other hazardous studies could give us an accurate numbers.

Keywords: Reproduction; Toxicity; Fertility; Infertility; Mutagens

Introduction

Reproductive toxicity

Since a decade, human reproductive disruption by various factors including xeno biotics such as drugs, occupational, and environmental exposures leading to reproductive toxicity which is has become a growing concern. Reproductive toxicity defined as: "the antagonistic effects of a substance on any characteristics of the male or female sexual reproductive cycle, together with an impairment of reproductive function, and the induction of adverse effects in the embryo, such as growth retardation, malformations, and death which would interfere with the production and development of normal offspring that could be reared to sexual maturity, capable in turn of reproducing the species [1]."

Classes of reproductive toxicity include

- Male fertility
- Female fertility
- Parturition
- Lactation

Developmental toxicity

According to Globally Harmonized System the developmental toxicity is defined as, "adverse effects induced during pregnancy, or as a result of parental exposure," which "can be manifested at any point in the life span of the organism". The exposure to specific exogenous substances prior to conception in either of the parent, exposure during gestation, or exposure during prenatal or postnatal development from birth to sexual maturation may result in developmental toxicity. Developmental toxicity has varied end points such as impulsive abortions, still-births, deformities, and early postnatal mortality, reduced birth weight leading to structural anomaly, altered growth, functionally deficit, and death of the developing organism [2].

Classes of developmental toxicity include

- Mortality
- Dysmorphogenesis (structural abnormalities)
- Alterations to growth
- Functional impairment.

Due to the fact that, male and female reproductive anatomy and biologic mechanisms are differing, they have a speckled result for reproductive toxicants. It is therefore essential to recognize reproductive toxins and their mechanisms and sites of action and to learn about species (especially human) vulnerability to them. Reproductive toxicants or repro toxicant are chemical, biohazardous (e.g., viruses), or physical (e.g., radiation), agents that can impair the repro-Drugs of abuse and chronic medication may have adverse effect on the fertility potential of men by disturbing HPG axis, gonadotoxic activity, or by upsetting sexual performances (ejaculation, erection, and libido) [3]. Prolonged treatment with immunosuppressive drugs (sirolimus and ciclosporine), corticosteroids, immunomodulators (mAbs and TNFα inhibitors), thyrosine kinases inhibitors, opi-ates (morphine and cocaine), hormonal agents (anabolic steroids and testosterone), antiandrogenic drugs (cyproterone acetate and flutamide), antibiotics (erythro-mycine and tetracyclines), antimicrobial drugs (metronidazole and chloroquine), antidepressant (imipramine and buspirone), antipsychotic (phenothiazines and butyrophenones), etc., will present a drastic drop in sperm count, motility and morphology, inhibition or lowl Level of testosterone , hindering acrosomal reaction and shrinking fertility potential of spermatozoa, toxic effect on gonads, drop in testicular size, weight and volume, inhibiting dopamine synthesis there by causing erectile dysfunction, decreased libido, sedation and delayed ejaculation, anejaculation/retrograde ejaculation which will result in impotency or male infertility ductive capabilities in men and/or women [4]. Developmental toxicants interfere with proper growth or health of the child acting at any point from conception to puberty. The chemical agents which elevate the occurrence mutations above natural level by damaging the genetic material of an individual are known as mutagens. Incidences of defective cells or cancerous cells found when these are inherited. As the name suggests, embryotoxins are lethal to embryos, where they may exterminate, distort, impede

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the growth and development of embryo, and may cause postnatal problems. The compounds like, mercury, lead, other heavy metals, and organic compounds viz., formamide are some of the well-known examples of embryotoxins. Additionally, agents which can interrupt or leads to deformity in the development of an embryo or fetus are called as teratogens, which have the potential to miscarriage or cause children with birth defects.

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