

Endocrine Disrupting Chemicals: How these Affect Humans

Endocrine disrupters are a group of chemicals or toxins that interfere with endocrine/hormonal functions. Emerging data suggest that bisphenol S (BPS) that in development as a substitute for bisphenol A (BPA) may also cause endocrine-disrupting effects similar to BPA. BPA may facilitate development of certain cancers.

In addition to acute toxicity, that is dose-dependent, long-term exposure to BPA, phthalates and certain pesticides even in small quantities may have cumulative effects and negative consequences in humans. There are more than 1,000 endocrine disrupting chemicals currently in the Endocrine Disruption Exchange's list and the majority of new chemicals coming into the market are not tested for their toxicity. For example, children who exposed to higher contents of polyfluorinated compounds (PFCs), a chemical present in water repellents, paints, carpets and furniture may develop metabolic syndrome, type 2 diabetes, and cardiovascular disease in later life.

Because of the complexity, interactions, and the sheer numbers of these chemicals present in the environment, it is becoming impossible to pinpoint anyone of these chemicals causing a specific disorder or a disease. Disorders that can aggravate by these chemicals include cardiovascular disease, type 2 diabetes, obesity, precocious puberty, memory impairment, thyroid and adrenal disorders, reproductive disorders, and impairment of other hormonal actions.

The degree of exposure and the duration determine whether someone develop a disease. Therefore, if the person is removed from the adverse environment or the adverse environmental condition is improved [e.g., provided with clean water instead of drinking polluted water in the case of chronic kidney disease of unknown aetiology (CKDu)], in theory, the condition should reverse, at least in the early stages of the disorder. The lag period from the time of exposure to these chemicals to the development of chronic disabilities may take months to years. When exposed as a foetus to *endocrine disruptive chemicals*, adverse effects can manifest during the childhood or even as an adult.

A similar situation may exist with escalating non-communicable diseases worldwide, including CKDu that is affecting agricultural communities in equatorial dry zones. Considering the interactions of a variety of toxic agrochemicals that are dumped into the environment, it is difficult to identify what component is causing such diseases. Therefore, research programs focussing on one potential source among many and ignoring chemical interactions would likely lead to misleading conclusions.

Recent data suggests that instead of the conventional idea of classic, dose-dependent exposure effects (i.e., threshold mediated effects), some of these chemicals may initiate harmful processes even at very low exposure especially in combination with other chemicals in a synergistic way,

or at a philosophical maximum. Such a concept is likely to have a broader implication on human health. These concepts weight in favour on the side of caution when environmental damage and human health are at stake.

Therefore, one can argue to ban or restrict endocrine disruptors and other toxic components, unless their manufacturers provide data that they are safe, at least at the recommended levels or what is putting into the environment that a given chemical is not harmful to human. Worldwide, only a handful of chemical are banned to-date. Examples such bans include banning of BPA in infant bottles and cups.

Chemical industry needs to take this mater seriously and engage in educating people to minimize health hazards, in-depth research to develop less harmful chemicals, facilitating preserving the environment human species for generations to come.