

Endocrine Disruptors as a SAICM Emerging Issue: IPEN Position

Background

An endocrine disruptor is a chemical, or mixture of chemicals, that interferes with hormone signaling. Hormones enable cells in one part of an organism to communicate with cells in other parts of the organism. Interference with these signals has both direct and indirect consequences for the health of humans and wildlife, including the increased susceptibility to certain diseases. The adverse effects that have been linked with exposure to chemical(s) with endocrine disrupting properties include:

- Reproductive effects, such as reduced semen quality and quantity, infertility due to endometriosis, ovarian failure, and polycystic ovarian syndrome;
- Neurological effects, affecting cognition, behavior, stress, growth, lactation, metabolism and energy balance;
- Cardiovascular effects;
- Diabetes and obesity;
- Deformities, including reproductive tract abnormalities;
- Cancers, such as breast, mammary, testicular and prostate cancers; and
- Immune system effects.

The timing of exposure is critical. One of the most tragic aspects of EDCs is the vulnerability of young children, particularly unborn and newborn infants. During highly sensitive periods of development, the young are highly susceptible to endocrine disruptors in the environment, including exposure while inside a mother's womb; through food, including breast milk; from drinking water contaminated with pharmaceutical and/or other chemical pollutants; and through the indoor environment—even toys. The consequences of exposure during development may not be apparent until adulthood or later in life, and may affect not just the exposed individual but also their children and subsequent generations.

Unlike some toxic chemicals that follow a linear relationship between dose and response, the body's response to various doses of EDCs is often non-linear. Both U-shaped and inverted U-shaped dose-response curves may be observed for EDCs. In other words, low doses may exert stronger effect than higher doses. This concept has been known for neurotransmitter actions, but only in the past decade have they begun to be more widely appreciated for EDCs.

Even infinitesimally low-levels of exposure to EDCs may cause adverse effects. Developing babies and children are likely to be exposed to not just one hazardous chemical, but a mixture of actual and suspected EDCs and other toxicants. The combined effect of exposure to many EDCs may be additive (or perhaps even synergistic), such that exposure to various chemicals at dose levels which by themselves are not predicted to cause adverse effects, together the cumulative exposure may result in adverse effects. This "cocktail effect" of chemical mixtures in our bodies can therefore further magnify the effects of exposure to EDCs at low doses.

Priorities for Cooperative Action on EDCs as an Emerging Policy Issue

One of the functions of the International Conference on Chemicals Management is “to focus attention and call for appropriate action on emerging policy issues as they arise and to forge consensus on priorities for cooperative action.”¹ In agreeing on priorities for cooperative action, SAICM requires:

- (1) That new and emerging issues of global concern be sufficiently addressed by means of appropriate mechanisms; and
- (2) An acceleration of the pace of scientific research on identifying and assessing the effects of chemicals on human beings and the environment.²

IPEN fully supports the nomination of EDCs as an emerging policy issue under SAICM. IPEN recommends that SAICM stakeholders ensure that the following cooperative actions on EDCs are prioritized.

Establish a global watch list of chemicals with potential endocrine disrupting properties

Currently, a global watch list of chemicals with potential endocrine disrupting properties does not exist. The proposed list would include chemicals currently being used around the world in everything from detergents and cosmetics, to computers and toys, to pesticides, regardless of whether they have been banned as an EDC in any particular jurisdiction. It would facilitate information exchange for all stakeholders and should be regularly updated. The list could build on pre-existing lists, such as the TEDX list of Potential Endocrine Disruptors, and the *Sin List 2.0*, which Members of the European Parliament have used to encourage the European Commission to accelerate its efforts to identify and assess the effects of chemicals with endocrine disrupting properties.

Such a list would help to ensure that all EDCs are sufficiently addressed globally by means of appropriate mechanisms. The list would enable governments to take action with speed and urgency to protect the health of the most vulnerable. It would also enable preventative action by businesses. The list would provide downstream users of chemicals with a helpful list of chemicals to substitute, and progressive retail companies a list of hazardous chemicals to avoid. In doing so, it would steer chemical manufacturers to phase-out EDCs.

Provide information on uses of EDCs and corresponding lists of safer chemical and non-chemical alternatives for these uses

This information would help to enable the transition away from EDCs. The identification of alternatives would enable both businesses and the public to take the initiative to reduce the use of EDCs. In particular, this information would help pregnant women and mothers to avoid the exposure of children. To minimize the likelihood of regrettable substitutes, both non-chemical and safer chemical alternatives should be included. Moreover, the precautionary approach

¹ Paragraph 24 of the Overarching Policy Strategy of the Strategic Approach to International Chemicals Management, available at: http://www.saicm.org/documents/saicm%20texts/SAICM_publication_ENG.pdf

² *Id.* at Paragraphs 14 (g) and 15 (g) of the Overarching Policy Strategy.

should be considered, taking into account concerns that certain “environmentally friendly” substitutes have similar or different concerns for human health or the environment, such as bioaccumulation. The action could draw on already existing models for identifying and facilitating substitution such as the Danish Catalogue of Substitutions, the French National Reference Platform for substitution, and the Substitution Support Portal.

Raise global public awareness of endocrine disruption and EDCs, through broad outreach, information exchange and capacity building campaigns, with the participation of environmental and health NGOs and scientific institutions

Public awareness can help to generate data for assessing the effects of EDCs, enable vulnerable populations to take steps to prevent exposure, and can ensure that appropriate mechanisms are in place to prevent harm to human health or the environment. However, due to a lack of information on EDCs, public-awareness around the world is patchy. Furthermore, even when information is available, a language barrier exists as this information is typically available only in English. In order to disseminate and generate information to raise public awareness, broad outreach and capacity building campaigns are needed, which include the participation of scientific institutions and health and environmental NGOs.

Utilize monitoring information generated by scientists and public interest NGOs in information exchange programs.

Monitoring information provides clear and convincing evidence of exposure, raises awareness and enables further research. Thus, generation and use of monitoring information would accelerate the pace of scientific research on identifying and assessing the effects of chemicals on human beings and the environment.

Ensure that UNEP and WHO’s proposed international network on EDCs retains SAICM’s multi-stakeholder nature and includes experts in endocrinology as well as representatives of public interest NGOs, trade unions, and the health sector.

Endocrinologists serve a vital role in ensuring that EDCs are sufficiently addressed, particularly with respect to the unique features of endocrine disruptors for environmental and health hazard assessments. Public interest NGOs serve as a valuable link between communities, stakeholders and policy makers. Likewise, trade unions and the health sectors bring valuable contributions to minimizing exposure. SAICM’s structure has embraced the valuable contributions of all relevant stakeholders in achieving the sound management of chemicals by 2020.

Prioritize eliminating the effects of EDCs on the most vulnerable, including women, unborn children, and children

Endocrine disruption may affect not only the exposed individual but also their children and subsequent generations. Data indicate that vulnerable developing unborn and newborn babies

are readily exposed to EDCs through chemicals present in their mother's body. Even infinitesimally low levels of exposure—indeed, any level of exposure at all—may cause developmental abnormalities, particularly if exposure occurs during a critical developmental time window. Given the likely developmental effects of EDCs—such as increased susceptibility to cancer, female and male reproductive impairment, and behavioral disabilities— particular attention should be given to critical exposure windows for the most vulnerable, especially the developing fetus.

Improve how the characteristics of EDCs are addressed in human health and environmental hazard assessments and support management decision-making and prioritization with better scientific understanding, including the definition of different EDC endpoints, attention to the effects of chemical mixtures, and the development of assessments based on a life-cycle, precautionary approach

Hazard assessments must give due regard to the principles of endocrinology. Traditional hazard determination methods, based on linear dose-response assumptions, are not applicable to the unique features of endocrine disruptors. First, low doses may exert more serious effects than higher doses. Second, EDCs may exert nontraditional dose-response curves, such as inverted-U or U-shaped curves. Third, the combined effect of exposure to many EDCs may be additive or even synergistic. Fourth, EDCs may affect not only the exposed individual but also their children and subsequent generations. Using traditional risk assessments for EDCs —particularly those based on out-of-date or standardized assays methods—runs the danger of missing important hazards. Scientists with expertise on EDCs should be fully engaged in this process in order to accelerate the pace of scientific research relating to EDCs in identifying and assessing the effects of chemicals on human beings and the environment.

Develop tools, resources and guidelines for national assessment of production, import and export, use, and disposal of EDCs and potential EDCs, including private sector obligations, with particular attention to the use and disposal phase, that could lead to exposure of those most vulnerable. Assemble available best practices on environmentally sound management of wastes containing EDCs.

Compiling information on EDC and potential EDC production, import, use and disposal would enable the identification of gaps in national legislation giving rise to exposure. Activities that give rise to exposure of those most vulnerable should be emphasized. Information such as this would enable the adoption and implementation of appropriate mechanisms by all countries— particularly developing countries and countries with economies in transition—to minimize exposure to EDCs.

Additional Resources

Diamanti-Kandarakis *et al.* *Endocrine Disrupting Chemicals: An Endocrine Society Scientific Statement* (2009), available at: http://www.endo-society.org/journals/scientificstatements/upload/edc_scientific_statement.pdf

IPCS, *Global assessment of the state-of-the-science of endocrine disruptors*, WHO/PCS/EDC/02.2 (2002), available at: http://www.who.int/ipcs/publications/new_issues/endocrine_disruptors/en/

Kortenkamp, *State of the Art Assessment of Endocrine Disruptors* (2nd interim report, 2011), available at: http://ec.europa.eu/environment/endocrine/documents/summary_state_science.pdf