Stand firm on hormone disruptors

Ahead of a key meeting on endocrine-disrupting chemicals, **Leonardo Trasande** *argues that policy must follow the science.*

As the election of Donald Trump promises a bonfire of environmental regulation in the United States, Europe is poised to take a significant and possibly decisive step on how to regulate endocrine-disrupting chemicals (EDCs). These chemicals are everywhere — in food, personal-care products, electronics and furniture — and are widely detected in human blood and urine at levels known to affect health. Yet action on them lags behind controls on hazards such as carcinogens. Early next month, European Union member states will take an important step when they review criteria proposed by the European Commission for identifying and regulating EDCs.

Many pesticides contaminate foods and disrupt hormonal functions that are critical for brain development. Once EDC criteria are formalized, removal of these pesticides could help to prevent autism and loss of cognition, which have been linked to exposures *in utero*. The EDC criteria will also set scientific precedents for other national and global chemical policies.

The state of the science and policy discussions on EDCs are similar to those around climate change a decade ago. Research has suggested a more than 99% probability that these chemicals contribute to disease and disability. International bodies, including the World Health Organization (WHO), the United Nations Environment Programme and the International Council on Chemical Management, list them as an emerging public-health concern. The effects of EDCs cross the entire lifespan, with disease burden and costs of US$217 billion annually in Europe and $340 billion in the United States (T. M. Attina *et al. Lancet Diabetes Endocrinol.* http://doi.org/bs55; 2016). Even the reinsurance industry has advised its clients to reduce financial exposure related to the manufacture and use of EDCs.

In response to this evidence, lobbyists and environmentalists have traded rhetoric and warnings. And as with the debate on climate change, a small group of scientists — many with well-documented links to industry — have endeavoured to manufacture a level of doubt that is out of proportion to the level of scientific disagreement.

The scientists who deny endocrine disruption and dismiss the expert reviews on EDCs make many scientific inaccuracies and misrepresentations. Critics dismiss low-dose, nonlinear and non-monotonic exposure–response relationships for EDCs, even though they are well documented. They select studies with contaminated controls and other methodological problems to claim limited effects. They have argued that many studies of EDCs are based on correlation, not causation.

Endocrine-mediated adverse outcomes are complex. Too often lost in the debate, however, is that findings about the impacts of EDCs carefully control for confounding factors. Results in humans are consistent with those from the laboratory, strengthening the evidence for causation.

What should be discussed when the criteria are reviewed next month? The WHO defines EDCs as "exogenous compounds or mixtures that alter function(s) of the endocrine system and consequently cause adverse effects in an intact organism, or its progeny, or (sub)populations". With a seemingly innocuous edit, the European Commission's draft criteria change the word "consequently" to "are known to" — placing too heavy a burden of proof for a chemical to be classified as an EDC.

Unlike carcinogens, mutagens and reproductive toxicants, which can be identified from animal studies under EU law, the draft EDC criteria require human data on health effects. Given that these can arise years (if not decades) after exposures in early life, an entire generation could suffer the health consequences of a regulatory delay. Animal and laboratory studies should be admissible. Arguably, this is the most important change needed.

Another major error by the commission is to misrepresent the crucial distinction between hazard and risk under EU law. The distinction means that considerations of potency — the traditional exposure–response effect — should not enter into the decision on whether, say, a pesticide exposure presents a hazard. This important principle is crucial to underwriting the regulation of endocrine disruptors, and was sealed as scientific consensus at an April meeting in Berlin. This meeting united the vocal minority of scientists with the leading authors of a scientific statement by the Endocrine Society (A. C. Gore *et al. Endocr. Rev.* http://doi.org/bs69; 2015). Participants agreed that the WHO definition was adequate, and that potency is not relevant to the identification of hazards such as EDCs.

THE EUROPEAN PARLIAMENT SHOULD PROTECT HUMAN HEALTH.

The European Parliament should use science-based criteria to protect human health. EDC criteria should acknowledge the evolving weight of evidence of a chemical's disruption of hormones and its contribution to adverse outcomes. This approach would allow chemicals to be designated as EDCs; suspected EDCs; endocrine-active substances; and endocrine-inactive substances. Like the approach used to re-evaluate potential carcinogens and reproductive toxicants, the designation can be reconsidered as new evidence emerges.

Some authors of the Berlin consensus statement continue to argue against the need for public-health protections, and have resorted to personal attacks, labelling peer-reviewed academic research as pseudoscience. In contrast to the US media, which has been criticized for its difficulty in discerning fact from fiction in the election campaign, we must stand firmly to defend scientific norms. The alternative is that public mistrust makes anti-scientific alternatives acceptable. ■

Leonardo Trasande *is associate professor of paediatrics at New York University School of Medicine, USA.*
e-mail: leonardo.trasande@nyumc.org