

## LETTER

## Limitations, uncertainties and competing interpretations regarding chemical exposures and diabetes

Trasande *et al*<sup>1</sup> reported that limiting exposure to alleged endocrine disrupting chemicals would reduce the burden of adult diabetes by 13% and save €4.51 billion/year. On review, however, their paper fails to meet standards for good practices in scientific reporting—stating the limitations of the underlying data, clearly articulating uncertainties, and presenting competing views or interpretations of data.

First, Trasande *et al* based their analysis on an existing data set derived from an epidemiological study with significant limitations<sup>2</sup> that were not fully discussed by the authors. The limitations include: (1) a cross-sectional design; (2) a 50% participation rate, increasing the prospects for selection bias; (3) the relatively small number of diabetes cases (N=114) from which Trasande *et al* extrapolate to the whole of Europe; (4) lack of information on other risk factors and (5) weak and non-statistically significant associations which could be due to reverse causality, chance, bias or confounding. Indeed, the level of uncertainty in the data suggests that the costs of alleged chemical-induced diabetes in Europe may be as low as zero.

Second, Trasande *et al* make a large number of assumptions in order to derive their cost estimates. They assume that: (1) findings among a small sample of Swedish residents can be extrapolated to residents aged 70–75 years throughout Europe; (2) single serum measurements of chemicals in time (rather than multiple, serial

measurements) are adequate to estimate critical lifetime exposures and are representative across Europe; and (3) prevalence rates and costs of diabetes are uniform across Europe. The latter assumption is clearly invalid because the study Trasande *et al* relied on for their cost per case estimate<sup>3</sup> demonstrates a 14-fold difference in costs across European countries.

Finally, the authors made several sweeping, unsubstantiated conclusions about causality, for example, ‘The epidemiological findings are likely to be causal, since they are in line with experimental mechanistic data’. They cited several ‘supporting’ references for this, but failed to cite review articles<sup>4–6</sup> that independently concluded the available evidence was insufficient to establish causation.

Trasande *et al*<sup>1</sup> fail to add to our understanding of the causes of diabetes. What is instead desperately needed<sup>4–6</sup> are better studies exploring interactions of chemicals with  $\beta$ -cell function and/or mass in animal and in vitro models, at concentrations relevant for humans, and prospective epidemiology studies with questionnaire-based and serial biomarker-based assessments of exposure.

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