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The silent troublemakers... disruptors!

Since the 1960s, the environments in which children grow up have undergone profound changes, with plastics, food packaging, cosmetics, treated textiles, toys and building materials becoming commonplace. Among the tens of thousands of chemicals that surround us, it is estimated that between 800 and 1,400 possess endocrine-disrupting properties. These endocrine disruptors (EDs) are exogenous substances capable of interfering with the synthesis, secretion, transport or action of hormones. The paradox of their toxicity is that it does not follow the classic dose-response pattern: a low dose can be more harmful than a high one, effects can occur long after exposure and above all, the window of exposure rather than the dose often determines the type of damage. This is precisely why children, and even more so foetuses, are the most vulnerable. The first 1000 days, from conception to around the age of two, constitute a critical period of hormonal development, including sexual differentiation, brain maturation, and the establishment of the thyroid and metabolic axes. In utero, the placenta is not an impermeable barrier to these substances. In infants, diet and feeding containers, teether and toys brought to the mouth and the greater skin contact relative to body mass are additional factors of exposure. The effects of transgenerational exposure via parental gametes are also under discussion. Biomonitoring studies carried out in Belgium such as the Vlaams Humane-Biomonitoring Programme (VHBP) in Flanders and the biomonitoring campaign by the Public Service Scientific Institute (ISSEP) in Wallonia have confirmed the observation done in many countries: the entire population is impregnated with many substances such as bisphenols, phthalates, parabens, perfluorinated compounds (PFAS), flame retardants and glycol ethers and the higher impregnation levels are found in children (1, 2).

The paediatric data is gradually accumulating. Associations are described as plausible and, for certain substances, probable with cryptorchidism or hypospadias, precocious puberty (particularly in girls), neurodevelopmental disorders (ADHD, autism spectrum disorders, reduced IQ), obesity and metabolic disorders, thyroid diseases, and even certain types of leukaemia and childhood cancers (3, 4). None of these associations amounts to perfect experimental causality, but all call for caution, responsibility and greater awareness. This issue of the Belgian Journal of Paediatrics aims to address this concern. Our "Made In Belgium" section summarises the thesis of Christophe Barrea on the "Impacts of antenatal exposure to a mixture of endocrine disruptors on cognitive and neuromotor functions in preschool children". His work supports negative associations between prenatal exposure to EDs and specific cognitive functions in children. As often reported in the literature, his findings illustrate a sex-specific effect and highlight the value of analyses that more closely reflect real-world health scenarios by assessing the effects of mixtures rather than the effect of an isolated substance. The journal also wants to highlight the awareness campaign recently launched by the Federal Public Service for Public Health, Food Chain Safety and the Environment on protecting children from endocrine disruptors (5).

Due to the complexity of this subject, it is essential that first-line practitioners and the entire paediatric community are involved. Three potential pitfalls must be avoided. The first is denial: using the lack of absolute proof as an excuse to say nothing, when, as toxicologists remind us, the absence of evidence of harm must not be confused with evidence of the absence of harm. The second is alarmism: turning every consultation into a catalogue of dietary restrictions, making parents feel guilty for not having chosen the chemical composition of their environment. The third, undoubtedly the most insidious, is delegation: treating this as an issue for toxicologists and regulators alone and failing to pass the message on to our patients and their families. Paediatricians have an irreplaceable

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role that neither the epidemiologist nor the legislator can fulfil. They know the history of the child and the family, they watch the windows of vulnerability pass one by one — conception, pregnancy, breastfeeding, complementary feeding, starting school — and they remain a trusted source of health information for parents. Counselling on environmental health should gradually achieve the same status as advice on nutrition, sleep, or screen time. Concrete levers exist and only need to be relayed: prefer glass and stainless steel to plastics, in particular when heating food; limit young children's contact with non-essential cosmetics; ventilate and dust interiors, where EDs accumulate in household dust; favour fresh, minimally processed foods, less exposed to food-contact materials. These simple, realistic messages must be accompanied by an essential reminder: the benefits of breastfeeding far outweigh the risks associated with the low levels of contamination in breast milk.

This approach by local stakeholders does not absolve health authorities and regulators of their responsibility. For a long time, the European Union has been a pioneer in introducing regulations based on a reversal of the burden of proof, requiring the industry to demonstrate the safety of a substance before it is placed on the market. Today, the European Commission has launched a series of legislative simplification "Omnibus packages". Some amendments have been introduced or are under discussion to relax labelling requirements, facilitate temporary derogations for previously banned substances and weaken the precautionary principle on which European plant health regulations were founded (6,7).

EDs call for a paradigm shift: at a time when we are gaining ever better control of the infectious and nutritional diseases in children, it is their chemical environment that is silently becoming one of the major determinants of their future health. Paediatrics still has a role to play in raising awareness of this issue and ensuring it is heard at every consultation and at all levels of our societies. With this editorial introduction, we hope you enjoy reading our autumn issue and find it informative.

Christophe Chantrain and Marc Raes

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