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- Three phthalates among the seven chemicals EU agency describes as being of "very high concern"

Risky assessments: how chemical safety testing fails to anticipate harmful effects on health and the environment

It is often assumed that chemicals are only manufactured and marketed following a rigorous assessment of the risk they pose to health and the environment.

However, experts are starting to question the reliability of risk assessment, the standard method of testing new chemicals.

Risk assessment was developed as a way of testing specific structures in a context where most of the facts are known or can be accurately measured. However, this model is now being applied to a completely different set of risks.

For example, chemicals can combine in wastewater, in ways that cannot be predicted in laboratories. Substances act on certain species in unexpected ways. Current methods only assess the acute risks of the substance in isolated circumstances, where in reality there will be knock-on effects in complex ecosystems.

The limitations of risk assessment are starkly illustrated by the painkiller diclofenac, which is given by many farmers in Asia to their cattle so they can work the land while in pain. However, when vultures eat the carcasses of cattle treated with diclofenac they succumb to acute renal failure.

An estimated 95% of Asia's vultures have been wiped out by this. The knock-on effects are disastrous: widespread hygiene problems occur as cattle carcasses, no longer tidied up by vultures, rot in the heat or are scavenged by rodents or wild dogs. Such animals are carriers of rabies, which is a major health threat in India.

Risk assessment is not equipped to predict the effects of different chemicals mixing together in the environment. Wastewater in particular collects a vast cocktail of chemicals, including those derived from natural excretion, and household products.

New research from Brunel University, UK, suggests a possible link between exposure to chemical



IMAGE BY TARIQUE SANI

95% of Asian vultures have been killed by the use of diclofenac in farm animals. Results include spread of rabies.

mixtures and decrease in fertility in humans, with a recent study concluding that feminisation of fish is perhaps best explained by exposure to combinations of estrogens and antiandrogens. [[EHP 117 797-802](#); Jobling et al.]

Because it anticipates such synergistic effects by grouping chemicals according to biological effect, cumulative risk assessment (CRA) is gaining support as an improvement on current standards. However, risk assessment and CRA share the same basic limitation of being unable to model the complexity of chemical interactions within natural systems.

Another approach with growing credibility is the precautionary principle. Although long a favourite of environment groups, the European Environment Agency has in recent years repeatedly referred to this approach for managing chemical environmental hazards.

The precautionary principle broadens the inputs for appraisal in any assessment of risk, introducing systemic monitoring of real-life cases and cross-disciplinary approaches in order to mitigate the current methods hobbled by over-simplification.

Chemical combinations, unexpected acute effects, and knock-on effects in ecosystems are just three reasons for reassessing risk assessment itself.

By James Black

THREE PHTHALATES AMONG SEVEN CHEMICALS EU AGENCY DESCRIBES AS BEING OF “VERY HIGH CONCERN”

The European Chemicals Agency (ECHA) has singled out seven substances from a candidate list of 15 to be prioritised for authorisation under new REACH chemical legislation. Of these, three are phthalates, all three of which have been categorised as toxic for reproduction.

The three phthalates are BBP, DBP and DEHP. They are added to PVC to make it flexible. Recent research into the phthalates BBP and DBP suggests its endocrine-disrupting effects can cause bone damage, inhibiting the ability of osteoblasts to mineralise bone matrices. [Journal of Cellular Biochemistry 107:316-327; Sabbieti MG et al.]

The phthalate DEHP is particularly widely used, especially in medical devices. Concerns focus on potential harm DEHP might cause in premature and neonatal care, as the chemical easily leaches out of medical devices, resulting in very high exposure levels for babies.

The authorisation process will not, however, affect the use of DEHP in medical devices, as this is covered under the Medical Devices Directive. This is a separate piece of legislation which, although requiring devices containing hazardous chemicals to be labelled, does not allow potential harm to health to be used as a criterion for revoking authorisation to use a chemical in a medical device.

Go to [the H&E blog](#) for analysis of the ECHA recommendations, based on discussion with the Health and Environment Alliance.

Animal research associates BPA exposure with vaginal cancer

Prenatal exposure to bisphenol-A (BPA) could increase the risk of female offspring developing cancers of the reproductive tract, new research into the common chemical's carcinogenicity has revealed.

The study [[EHP 117:879–885](#); Newbold et al.], which exposed pregnant mice to environmentally-relevant doses of BPA, discovered a range of abnormalities in female offspring, with changes to the uterus, vagina and ovary.

The study is one of the first to look at possible carcinogenic effects of prenatal BPA exposure on the female reproductive tract. Most BPA studies focus on effects on mammary tissue and the prostate.

The new research into BPA's effects on the female reproductive tract was inspired by BPA's structural similarity to diethylstilbestrol (DES), a highly problematic early synthetic oestrogen given to pregnant women to prevent miscarriage between the 1940s and 80s.

In 1971, researchers reported an association between pregnant women being prescribed DES and elevated rates of adenocarcinoma of the vagina, a rare cancer, in their daughters. [[N Engl J Med. 284\(15\):878-81](#); Herbst AL et al.]

The authors suggest BPA acts in a similar way to DES, by apparently delaying the expression of genes that guide the development of the reproductive tract.

RECENT NEWS AND SCIENCE ABOUT THE ENVIRONMENT AND HEALTH

Lower POPs blood levels in pregnant US women after chemical ban (EHN): A new study suggests legal restrictions on the use of a selection of toxic chemicals has been effective in lowering their levels in people's blood. <http://is.gd/1msGa>

Addressing childhood roots of health disparities may be more effective than later attempts to cure (JAMA): Study concluding that "confronting the origins of disparities in physical and mental health early in life may produce greater effects than attempting to modify health-related behaviors or improve access to health care in adulthood" <http://is.gd/1msHe>

Newborn girls, boys behaviour differs after prenatal phthalate exposure (EHN): Newborn girls exposed prenatally to phthalate chemicals scored very differently from boys, most likely because the chemicals are endocrine disruptors. <http://is.gd/1msIV>

It's Time to Learn From Frogs (NYT): Outline of growing concerns that hormone-like chemicals could be increasing incidence of genital birth defects and other problems; refers to an exceptional publication by the US Endocrine Society. <http://is.gd/1msJS>

AMA says: Eat Local, Organic (Huffington Post): The AMA has issued a blanket endorsement of organic and local foods, recognizing that the way food is produced affects health, the environment, even the conditions of workers. <http://is.gd/1msMy>

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