HBM4EU science and policy for a healthy future

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PHTHALATES: WHAT YOU NEED TO KNOW

WHAT ARE PHTHALATES?

Phthalates[1] are a group of industrial chemicals that are widely used as plasticisers in order to make plastics flexible and durable. The group includes a large number of chemicals with different properties and applications.

How are phthalates used?

A major use of phthalates is to soften polyvinyl chloride (PVC) plastic for use in a wide range of consumer goods likely to be present in your home. These include vinyl flooring, adhesives, detergents, air fresheners, lubricating oils, food packaging and clothing. Phthalates are used in personal-care products, including soaps, shampoos, hair sprays, perfumes and nail polishes.
Phthalates are also used in a range of children's toys, with examples including crayons, inflatable toys, modelling clay and inks. Some phthalates are used as coatings on pharmaceuticals, herbal preparations and nutritional supplements.
In addition, PVC containing phthalates is used in the packaging, construction, furniture, automobile and telecommunications sectors. Certain uses bring significant benefits to society, such as the use of flexible PVC in medical devices and as insulation on wires and cables in electronic equipment and in buildings.
Some phthalates are banned in Europe. However, they are not regulated the same way outside of the EU due to their different applications. Therefore, products containing these phthalates may still be found in the EU market.

How can phthalates enter your body?

There are a number of ways that people can be exposed to phthalates, linked to the different uses of these chemicals.
One route is through consuming foods and drinks that have been held in containers containing phthalates. Children can be exposed by sucking on plastic toys or products that contain phthalates.
Another important exposure route is through the use of personal care products that contain phthalates. Exposure may also result through contact with fabrics and medical devises that contain these substances.
To a lesser extent, people can also breath in small amounts of phthalates in indoor air or in dust released from plastic products in the home or the workplace. Children are more likely to be exposed to phthalate particles in dust due to their hand to mouth behaviour.
Once phthalates enter the human body, they are broken down into metabolites and pass out of the body rather quickly in urine.

UNDERSTANDING CHEMICAL RISK

The **risk** of harm from any chemical results from the hazard associated with the chemical, combined with exposure to the chemical.

Hazard refers to the properties of the chemical that make it toxic, meaning it can cause harm to human health.

Exposure describes the amount of a chemical that an individual comes into contact with, as well as the frequency of exposure.

The term **threshold** is used to indicate the concentration, or level, of a chemical to which people can according to current knowledge be exposed without suffering negative health effects. Exposure up to this level is considered safe. Some chemicals can cause health effects at any concentration and are considered as having no threshold. For such chemicals, no level of exposure is safe.

How might phthalates affect health?

Given their wide use and the likelihood of human exposure to phthalates on a daily basis, scientists have undertaken research to investigate possible impacts on health. There is evidence that certain phthalates are toxic and as such can contribute to a number of chronic diseases. Other phthalates do not exhibit these properties and current uses are considered safe.
Certain phthalates[2] have been found to affect the reproductive system of animals in scientific studies and were therefore classified as toxic to reproduction, meaning that they may damage human fertility and cause harm to the unborn child. In addition, some of the reprotoxic phthalates can alter the function of the hormonal system and consequently causes adverse health effects in an intact organism, or its progeny. These effects are also relevant in humans, leading the European Union to classify certain phthalates[3] as substances that affect the hormonal system, known as endocrine disrupting compounds. The European Union has taken measures to minimise exposure to these chemicals, as described below.
Epidemiological studies have found exposure to certain phthalates to be associated with obesity, insulin resistance, asthma, attention deficit disorder and attention deficit hyperactivity disorder.
It has been observed that the overall toxicity of a mixture containing several distinct phthalates with similar properties can be calculated by adding together the doses or concentrations of each individual chemical, taking into account potency (relative toxicity).
Certain people in society are more vulnerable to the health impacts of exposure to phthalates with toxic properties, in particular young children and pregnant women.

[1] - Phthalates are also known as phthalate esters or esters of phthalic acid
[2] - The following phthalates have been classified in the European Union as toxic for reproduction: DEHP, BBzP, DnBP, DiBP, DCHP, DnPeP, DiPeP, DMEP, PIPP, DnHP, 1,2-Benzenedicarboxylic acid, dipentyl ester, branched and linear
[3] - The following phthalates have been classified in the European Union as endocrine disrupting compounds: DEHP, BBzP, DnBP, DiBP, DCHP

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Human exposure to phthalates in Europe

To understand human exposure to phthalates, their breakdown products are measured in urine.

Human biomonitoring studies have found phthalates metabolites in the blood or urine of the populations surveyed, suggesting that the large majority of the European population is continually exposed to low doses of phthalates. Phthalate metabolites are detected in a very high percentage of the populations surveyed, in some population representative studies present in each and every individual.

Recent studies demonstrate declining exposure to the most hazardous phthalates after bans came into force, showing that chemical regulation is effective in protecting human health. However, in a recent population representative study of German children, some of the phthalates can still be found in all samples tested.

Detecting phthalates in a person's urine does not necessarily mean that their health has been harmed. This depends on the concentration, the duration of exposure and the age and health status of the particular individual.

Human biomonitoring involves taking small samples of blood, urine or hair and measuring the concentration of a chemical in the sample. The measurement determines the total amount of a chemical in the body, representing input from all possible sources. Samples are taken preferably from large numbers of people, in order to get a picture of exposure in a certain population.

What is HBM4EU doing on phthalates?

HBM4EU is working to answer the following key questions on phthalates to inform an evaluation of possible risks to human health and support safe use.

- What is the current exposure of the EU population to phthalates?
- Is this level of exposure a concern for health?
- Do available alternatives to phthalates also pose a risk to public health?
- Are children more at risk?
- What are the main sources of exposure to phthalates?

For more information please see the HBM4EU webpage on phthalates.

How can you reduce your exposure to phthalates?

If you are concerned, you can take the following steps to reduce your exposure.

- Read product labels and choose to use phthalate-free products when possible.
- Clean and air your home regularly to remove dust, which may contain phthalates released from products and furnishings.
- Choose fresh produce rather than prepacked and processed food and drink.
- Note that consumer products made with flexible PVC are more likely to contain phthalates.

How is the European Union protecting citizens?

The European Union has taken action to reduce citizens' exposure to phthalates known to cause risks to health.

- Several phthalates (DEHP, BBZP, DiBP and DNBP) cannot be used in the EU without authorisation for specific uses.
- DEHP, DNBP, DIBP and BBZP are banned in all toys and childcare articles, while DINP, DIDP and DNOP are banned in toys and childcare articles that can be placed in the mouth.
- The use of phthalates classified as toxic to reproduction is prohibited in cosmetics.
- The European Union is setting legal limits for the concentration of certain phthalates (DEHP, BBZP and DNBP) in materials intended to be in contact with food.

Looking forward, the use of the phthalates, DiPeP, DnPeP, PIPP and DMEP will be banned in consumer products on the EU market from July 2020. Further efforts are underway to further restrict the use of certain phthalates in the EU.

However, when assessing human exposure to phthalates it is important to note that goods imported from countries outside the EU with weaker controls may contain phthalates that are banned in the EU.
In addition, older goods in use in people's homes and workplaces that were produced prior to the entry into force of controls described above may contain phthalates that are now banned. Phthalates, including phthalates with hazardous properties, are therefore still present in our everyday environment.

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