# LIMITING EXPOSURE TO PHTHALATES IN PERSONAL CARE PRODUCTS

BY MELISSA KELLEY

*With over a thousand new chemicals produced every year (U.S. Environmental Protection Agency, 2003), potential threats to public health are continually emerging. In fact, the World Health Organization estimates up to 25% of all diseases are from prolonged exposure to environmental pollutants (United Nations Environment Programme, 2006). With numerous weaknesses in current U.S. policy, updates to U.S. chemical regulation are necessary to better protect human and environment health from exposure to phthalates in personal care products.*

*Phthalates are present in many personal care products.*

THE UNITED STATES PRODUCES or imports 42 billion pounds of chemicals for commercial and industrial use every day (Vogel & Roberts, 2011). We are exposed to many of these chemicals through the products we use, the foods we eat, and the air we breathe. Biomonitoring studies have shown that virtually all people living in the industrialized world have numerous chemicals in their blood serum (Betts, 2007; Centers for Disease Control and Prevention, 2017), which has lead to growing scientific and public concern over the potential health implications from exposures.

Social and cultural practices can disproportionally expose women to petrochemicals, such as phthalates (Oertelt-Prigione, 2012). Since their development in the 1920s, phthalates have been the most widely used plasticizer (that is, an additive to increase a material's strength, transparency, flexibility, and durability) worldwide. Clothing, bags, food packaging, toys, and hoses/tubing made from polyvinyl chloride plastics (PVC) often include phthalates. Besides being used as plasticizers, phthalates are utilized as solvents and additives in consumer products, such as flooring, furniture, construction materials, cosmetics, personal care items, pharmaceuticals, and pesticides (Frederiksen, Skakkebaek, & Andersson, 2007; Serrano et al., 2014). Due to their chemical properties, phthalates are susceptible to leaching, migration and evaporation (meaning they are not longer bound to the material they were originally added to) resulting in significant exposure to those that come in contact with them (Heudorf, Mersch-Sundermann et al. 2007; Zota et al., 2014).

Phthalates are a concern because animal and human studies suggest they are harmful. For instance, phthalates are associated liver cancer (Kamrin, 2009) and breast cancer (López-Carrillo, 2010). Besides cancer, phthalates are suspected endocrine disruptors or modulators that may interfere with development and essential biological functions (Huang, Liou, et al., 2012). Other studies have found associations between phthalates and pulmonary function, thyroid function, and allergies (Jurewicz & Hanke, 2011; Meeker et al., 2009).

Gaining a better understanding of exposure distributions and associated health effects is essential. Additionally, studies are needed to document the physical as well as social situations that generate, mediate, and/or modify phthalate-related effects in women, including variances in population-related exposure, knowledge of health promotion, and access to care.

## CRITIQUE

The first law enacted to protect human and environmental health against exposures to commercially used chemicals (other than pesticides) in the United States was the Toxic Substances Control Act (TSCA) in 1976. However, weaknesses in the law have led many to agree that the TSCA has failed to protect public health over the past four decades (Markell, 2010; Silbergeld, Mandrioli, & Cranor, 2015; Trevisan, 2011). The law did not, for example, require chemical producers to prepare information on health and safety (Wilson, Chia, & Ehlers, 2006). It also grandfathered approximately 62,000 existing chemicals, protecting them from regulation unless the EPA could demonstrate an "unreasonable risk" of injury to health or the environment. Since its establishment, fewer than 200 existing chemicals have been reviewed for human health risks. Only five—polycholorinated biphenyls (PCBs), chlorofluorocarbons, dioxin, asbestos and hexavalent chromium—have been controlled. Of those controlled substances, only some uses of PCBs and asbestos have been banned through TSCA (Hall, Iles, & Morello-Frosch,

2012).

Chemicals created or modified after 1976—an estimated 21,000—were subject to pre-manufacture review by the EPA (Markell, 2010; Vogel & Roberts, 2011; Wilson, Chia & Ehleres, 2006). Yet, manufacturers were not obligated to generate toxicological data as part of the application process. As a direct result of regulation's deficiency, 85% of applications provided no information on health effects (Hall et al., 2012). Further, if the EPA suspected potential health risks, it had only 90 days to request additional information before a chemical could go onto the market. If a manufacturer has no information to begin with, it had nothing to submit to the EPA (Silbergeld, Mandrioli, & Cranor, 2015). Because the EPA could not deny any approval of a chemical because it lacked information, most have been approved. Consequently, we know very little about the health risks of most chemicals in use today.

Even when there was evidence of health and safety concerns, the regulatory process was extensive and required a high burden of proof. It took, for example, nearly ten years of risk assessments on asbestos before the EPA issued a regulation to ban all uses. Asbestos producers subsequently appealed, and the Fifth Circuit Court of Appeals ruled that the EPA failed to meet TSCA's burden of proof of "unreasonable risk" and only allowed regulation and banning of some of asbestos uses (Vogel & Roberts, 2011). Thus, the EPA primarily has relied on voluntary programs to evaluate health risk and control chemicals suspected to be or deemed dangerous. Additionally, TSCA had proprietary provisions that allow nearly 20% of all chemicals and their properties to remain trade secrets (Layton, 2010).

There have been attempts to reform the TSCA since the 1970s, but all failed to gain bipartisan support until recently. In June 2016, the Frank R. Lautenberg Chemical Safety for the 21st Century Act (LCSA) was signed into law to amend the TSCA. The new law addresses much needed regulatory improvements including:

- Mandatory risk-based evaluation of new and existing chemicals
- Increased transparency of chemical information available to the public
- Protection of vulnerable populations, like pregnant women and children
- Establishment of an independent scientific advisory board
- Timelines for EPA decisions and actions
- Consistent sources of funding to aid the EPA in fulfilling its new obligations

Since most of the new requirements of the LCSA are being phased in over the coming years, it is too soon to know the impact of these new policies on human and environmental health.

*Table: Phthalates and their common usages*

| Pthalate name | Abbreviation | General Uses |
|---|---|---|
| Diethyl phthalate | DEP | Personal care products and cosmetics; pharmaceuticals coatings, dyes; perfume solvents; medical tubing; car parts; insecticides |
| Dibutyl Phthalates | ∑ DBP | Cosmetics and pharmaceuticals coatings; lacquers and varnishes |
| Di-n-octyl phthalate | DOP | Medical equipment, bags, and tubing |
| Benzylbutyl phthalate | BzBP | PVC, vinyl flooring, adhesives, car-care products, toys, imitation leather, solvents, personal care products |
| Di-2-ethylhexyl phthalate | ∑ DEHP | PVC, building material, clothing, medical devices, food packaging; toys |

## RECOMMENDATIONS

With the passage of the Frank R. Lautenberg Chemical Safety for the 21st Century Act, there is hope for improved chemical safety in the United States. Besides improved testing, there is a requirement for more transparency of information and a focus on protecting vulnerable populations. Since women disproportionately use personal care products that contain numerous chemicals, new labeling and required toxicity testing could decrease risks from exposure. Because it will take some time before any protections will be in place, public health professionals should make a concerted effort to educate consumers on the risks of phthalates and other petrochemical exposures in personal care products.

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REFERENCES


Betts, K. S. (2007). Perfluoroalkyl acids: what is the evidence telling us? *Environmental Health Perspectives,* 115(5), A250-256.

Centers for Disease Control and Prevention (2017). Chemicals in the Fourth Report: Updated Tables. Department of Health and Human Services Centers. Atlanta, GA.

Frederiksen, H., Skakkebaek, N. E., & Andersson, A.M. (2007). Metabolism of phthalates in humans. *Molecular Nutrition & Food Research,* 51(7), 899-911.

Hall, L., A. Iles & R. Morello-Frosch (2012). "Litigating Toxic Risks Ahead of Regulation: Biomonitoring Science in the Courtroom." *Stanford Environmental Law Journal,* 31(1): 3.

Heudorf, U., Mersch-Sundermann, J. & Angerer, J. (2007). "Phthalates: toxicology and exposure." *International Journal of Hygiene and Environmental Health,* 210(5): 623-634.

Huang, P.O., Liou, S.H., Ho, I.K., & Chiang, H.C (2012). Phthalates Exposure and Endocrinal Effects: An Epidemiological Review. *Journal of Food and Drug Analysis,* 20(4 ), 719-733.

Jurewicz, J. &, Hanke, W (2011). Exposure to phthalates: reproductive outcome and children health. A review of epidemiological studies. *International Journal of Occupational Medicine and Environmental Health,* 24(2):115-41.

Kamrin, MA (2009). Phthalate risks, phthalate regulation, and public health: a review. *Journal of Toxicology and Environmental Health Part B: Critical Reviews,* 12(2):157-74.

Layton, L. (2010). Use of potentially harmful chemicals kept secret under law. *The Washington Post,* January 4, 2010: Washington, DC.

López-Carrillo, L., Hernández-Ramírez, R.U., Calafat, A.M., Torres-Sánchez, L., Galván-Portillo, M., Needham, L.L., Ruiz-Ramos, R., & Cebrián, M.E. (2011). Exposure to phthalates and breast cancer risk in northern Mexico. *Environmental Health Perspectives,* 118(4):539-44.

Markell D. (2010). An overview of TSCA, its history and key underlying assumptions, and its place in environmental regulation. *Washington University Journal of Law and Policy,* 32: 333–75

Meeker, J. D., S. Sathyanarayana & S. H. Swan (2009). "Phthalates and other additives in plastics: human exposure and associated health outcomes." *Philosophical Transactions of the Royal Society B: Biological Sciences,* 364(1526): 2097-2113.

Oertelt-Prigione, S. (2012). The influence of sex and gender on the immune response. *Autoimmunity Reviews,* 11(6-7), A479-485.

Serrano, S.E., Braun, J, Trasande, L., Dills, R., and Sathyanarayana, S (2014). Phthalates and diet: a review of the food monitoring and epidemiology data. *Environmental Health,* 13(43), 1-14.

Silbergeld, E., D. Mandrioli & C. Cranor (2015). "Regulating Chemicals: Law, Science, and the Unbearable Burdens of Regulation." *Annual Review of Public Health,* 36(1): 175-191.

Trevisan, L. (2011). "Human Health and the Environment Can't Wait for Reform: Current Opportunities for the Federal Government and States to Address Chemical Risks Under the Toxic Substances Control Act," *American University Law Review,* 61(2), Article 3.

U.S. Environmental Protection Agency. (2003). Overview: Office of Pollution Prevention and Toxics Programs (pp. 8-11). Washington, D.C.

United Nations Environment Programme (2006). Environmental Pollution and Impacts on Public Health. Nairobi, Kenya: Urban Environment Unite.

Vogel, S. A., & Roberts, J. A. (2011). Why the toxic substances control act needs an overhaul, and how to strengthen oversight of chemicals in the interim. *Health Affairs,* 30(5), 898-905.

Wilson, M., D. Chia & B. Ehlers (2006). Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation, California Policy Research Center, University of California, Berkeley.

Zota, A.R., Calafat, A.M. & Woodruff, T.J. (2014). Temporal Trends in Phthalate Exposures: Findings from the National Health and Nutrition Examination Survey, 2001–2010. *Environmental Health Perspectives;* 122(3), 235-241.