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# COMMENTARY

# It's the Plastic!

**Commentary on the article by Vetrano *et al.* on page 134**

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Recently, plastics and the components they release have become an area of significant public concern. From their advent in the 1930s, petroleum-derived plastic polymers have been generally regarded as a safe, durable, and inert alternative to household glass and ceramics. However, over the past two decades, an increasing body of information led to the identification of substances released from plastics that may present various risks to human health. Potential toxicants released from hydrocarbon-derived plastic materials include pthalates (pthalate esters), bisphenol A, and styrene (1,2).

Phthalate esters are components of many commercial plastic products, used to increase the flexibility of the materials, and are composed of the dialkyl or alkyl aryl esters of phthalic acid (1,2-benzenedicarboxylic acid). Phthalates are used in numerous consumer products, including building materials, household and personal furnishings, clothing, cosmetics, personal care products, pharmaceutical products, nutritional supplements, medical devices and tubing, dentures, children's toys, food packaging, and cleaning materials and insecticides (3).

In this issue of Pediatric Research, Vetrano *et al.* (4) present evidence that the pthalate DEHP has immune-modulatory effects in neonates. Bis(2-ethylhexyl)phthalate, DEHP, is widely used as a plasticizer in manufacturing of articles made of poly vinyl chloride (PVC) plastics. PVC products created using DEHP may be composed of 1–40% DEHP. The compound investigated in the studies, mono(2-ethylhexyl) phthalate (MEHP), is the primary metabolite of DEHP produced in humans (5). Although there have been scattered reports of immune modulation in response to pthalates (6,7), this article is the first establishing mechanisms underlying alteration of neutrophil function in human neonates. In this study, the authors found that although proinflammatory oxidants were up-regulated after exposure to MEHP, chemotaxis and the production of chemotactic peptides required for the recruitment of additional immune cells necessary for the attenuation and resolution of inflammation were inhibited. Furthermore, the results of these investigations indicate that MEHP acts to interfere with the activity of the nuclear receptor PPAR-g, a potent regulator of the resolution of inflammation, and that neonates are particularly sensitive to this effect.

Although initial concerns about pthalate plasticizers were focused on endocrine disruption, emerging studies indicate that an array of biochemical, metabolic, and physiologic responses are initiated by exposure to the chemical (1,2,8). In addition to being linked to hormonal disruption, exposure to MEHP has been found to mediate responses as diverse as embryo lethality in rats and obesity, metabolic disorders, and asthma exacerbations in humans (9–11). Although, in many instances, the exposure of children to plasticizers can be largely avoided through careful surveillance, this is not the case in critical care situations. Hospitalized newborns are often ventilated and infused i.v., at times receiving virtually all of the fluids, nutrients, and gasses required to sustain them through pthalate containing plastic materials. The results of the studies conducted by Vetrano *et al.* underline the importance of the plasticizer MEHP-mediated immune dysfunction and reinforce the need to enhance efforts to limit the exposure of neonates to pthalates.

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