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Editorial

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Pediatric Exposures to Persistent Environmental Chemicals

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Traditional risk factors are responsible for about 70% of the population attributable risk of Cardiovascular Disease (CVD).[1] Common environmental exposures are known to be responsible for some portion of the remaining 30%. Therefore, it is important to study chemicals like the class known as Perfluoroalkyl Chemicals (PFCs) or Perfluoroalkyl Substances (PSASs). Two of the most highly studied PFCs are Perfluorooctanoic Acid (PFOA or C8) and Perfluorooctane Sulfonate (PFOS or C8S). PFCs are persistent in the environment and associations have been shown with a whole host of negative health outcomes in laboratory animals, including endocrine-disrupting properties as well as developmental effects.[2] To make matters worse, PFCs have been detected in the blood of >98% of the US population[3] and epidemiological studies have demonstrated associations between PFOA and PFOS, and many negative health outcomes such as cancer,[4] CVD,[5] osteoarthritis,[6] hyperuricemia,[7] pregnancy-induced hypertension,[8] endocrine disruption,[9] dyslipidemia,[10,11] and reproductive effects,[12,13] often times even at baseline levels typical of the general population's exposure level.

Children are an ideal sample for studies examining the relationship between common environmental exposures and health outcomes because as a group they are largely devoid of cumulative lifestyle risk factors typically experienced by adults; this phenomenon results in associations less subject to confounding. Perhaps more importantly, pediatrics populations are one of our most vulnerable and should be studied with particular rigor in terms of health effects resulting from virtually unavoidable environmental exposures.

In this field of research, the trajectory tends to move from animal studies to occupational epidemiological studies to highly exposed community-based, to population-based, and finally to pediatrics, before possibly moving on to longitudinal study design. Although associations between PFCs and health outcomes among children have not yet been extensively studied, there is a small and growing body of existing literature in this area.

Intermediate cardiovascular disease outcomes among children are known risk factors for earlier onset of more severe forms of CVD, as well as other types of intermediate CVD that tend to cluster together.[14] In this context, Frisbee et al., using C8 Health Project data (n=12,476) noted a significant positive association among highly exposed children between PFCs and total cholesterol and Low-Density Lipoprotein Cholesterol (LDL-C).[15] Another study by Geiger et al. confirmed the associations among children using nationally representative US data, showing an overall positive, significant association between both PFOA and PFOS, and total cholesterol and LDL-C.[16] Geiger et al. also examined associations between PFCs and serum uric acid levels and results indicated a strong, significant relationship independent even after complex multivariate adjustment.[17] Finally, a cross-sectional study by Hoffman et al.[18] found a modest association between PFOA (OR 1.12; 95% confidence interval [CI]: 1.01-1.23) and PFOS (OR 1.03; 95% CI: 1.01-1.05) and attention deficit hyperactivity disorder among children (n=571).

Needless to say, more research, particularly of longitudinal study design, is needed on child exposure to this class of chemicals as well as other persistent organic pollutants such as Polychlorinated Biphenyls (PCBs) as well as semi-persistent organic pollutants such as Bisphenol-A (BPA).

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