

PERSISTENT ORGANIC POLLUTANTS and CVD

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Abstract

Chronic exposure to environmental chemicals has been linked to many chronic diseases including cardiovascular diseases (CVD) through multiple mechanisms at low doses. As humans are continuously and simultaneously exposed to a tremendous number of environmental chemicals through food, air, water, and consumer products, this issue requires a much broader viewpoint than current prevailing individual chemical- or exposure source-based approaches. In fact, outdoor air pollution should be considered as one example of environmental chemical mixtures. Another common example of chemical mixture is persistent organic pollutants (POPs). As strong lipophilic chemical mixtures, when individual compounds belonging to POPs enter into our body from various exposure sources, they are mainly stored in adipose tissue and released to circulation through controlled and uncontrolled lipolysis. Therefore, there are multidimensional interrelationships between POPs and adipose tissue. In particular, chronic exposure to low dose POPs can play a more fundamental role in the development of obesity-related metabolic dysfunction rather than obesity itself. For example, POPs are involved in key mechanisms linking obesity and obesity-related diseases, such as chronic inflammation of adipose tissue and lipotoxicity with ectopic fat accumulation. Also, POPs can explain puzzling human findings which suggest benefits of obesity such as obesity paradox because healthy adipose tissue can be protective by reducing the amount of POPs reaching other organs. Besides obesity and obesity-related metabolic diseases, POPs are closely related to common CVD risk factors such as physical inactivity and unhealthy diet. Although POPs are well-known endocrine disrupting chemicals (EDCs), mitochondrial dysfunction would be a more plausible mechanism due to unpredictability of EDC mixtures. As adipose tissue plays a role as an internal exposure source of POPs, how to manage POPs inside us would be essential to protect against harms of POPs.

Keywords

Cardiovascular diseases; Chemical mixture; Diabetes; EDCs; Obesity; Persistent Organic Pollutants