

Abstract Type : Oral

Abstract Submission No. : OR-1247

Environment-wide Association Study of Metabolic Syndrome

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Objectives: Environmental chemicals might be possible factors for metabolic syndrome. We aimed to identify environmental chemicals that are associated with the prevalence of metabolic syndrome.

Methods: We analyzed the data obtained from a total of 46,748 adults who participated in the National Health and Nutrition Examination Survey (NHANES, 1999-2016). Metabolic syndrome was defined following the NCEP ATP III 2005 criteria. Associations of chemicals measured in urine or blood (n = 262) with metabolic syndrome were tested and validated using the environment-wide association study (EWAS) approach.

Results: Among 262 environmental chemicals, 66 (25.2%) chemicals showed significant associations with metabolic syndrome. Among them, 13 chemicals (5.0%) of chemicals were associated with increased risk of metabolic syndrome. Discovered and validated environmental chemical are as follows: seven chemicals in serum dioxin or polychlorinated biphenyl group (PCB74, PCB118, 1,2,3,4,6,7,8,9-ocdd, 1,2,3,4,7,8-hcxd, heptachlor epoxide, oxychlorane, 3,3',4,4',5-pncb), 4 blood pesticides (Beta-hexachlorocyclohexane, Dieldrin, p,p'-DDT, Trans-nonachlor), 1 polycyclic aromatic hydrocarbons (2-phenanthrene), and 1 blood volatile organic compound (nitromethane).

Conclusions: A number of chemicals were identified as potential risk factors for metabolic syndrome among the general US population.