Human mercury exposure and health risks in China

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Methylmercury (MeHg) exposure can lead to adverse impacts on human beings. Previous studies confirmed that fish and rice consumption are the main pathways of human MeHg exposure. To evaluate the health risks of human mercury (Hg) exposure in China, we selected four typical Hg contaminated areas and four aquatic food production and coastal areas for this study. Aquatic food products, rice, and human hair samples were collected for total mercury (THg) and MeHg analysis to evaluate human mercury exposure levels. Generally, rice and fish samples indicated relative low Hg levels except rice samples collected from Wanshan Hg Mining Area. Hair THg concentrations in typical Hg contaminated areas averaged at 0.33 μg/g (0.10-2.92 μg/g, n=144), 0.22 μg/g (0.08-11.9 μg/g, n=156), 0.61 μg/g (0.13-1.82μg/g, n=125), and 2.23 μg/g (0.41-34.1 μg/g, n=168) in Gold Mining Area, Coal-fired Power Plant Area, Zinc Smelting Area, and Wanshan Hg Mining Area, respectively. Hair THg concentrations averaged at 0.39 μg/g (0.09-2.24 μg/g, n=137), 0.45 μg/g (0.05-5.40 μg/g, n=150), 0.81 μg/g (0.11-9.18 μg/g, n=160), 1.37 μg/g (0.13-29.7 μg/g, n=142) in Wuhan, Qingdao, Xiamen, and Zhoushan City, respectively. Hair THg concentrations were significantly elevated in Wanshan Hg Mining Area and Zhoushan Island, and the average values exceeded USEPA reference limit of 1 μg/g. In the coastal area, fish consumption is the main route of human MeHg exposure. However, the relative contribution of human MeHg exposure from rice consumption increased significantly from coastal to inland area. Diet structure has a significant effect on the pathways of MeHg exposure. In conclusion, the population in coastal area with large fish consumption and the population in Hg contaminated areas have health risks of MeHg exposure.