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Dietary Manganese Intake and Risk of Chronic Kidney Disease: Insights from the UK Biobank Study

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Objectives : Manganese, an essential trace element crucial for various physiological processes, has been linked to metabolic syndrome and cardiovascular health. Despite these associations, the relationship between dietary manganese intake and incident chronic kidney disease (CKD) remains unclear. In this study, the connection between dietary manganese consumption and the development of CKD in individuals with normal kidney function was investigated.
Methods : A total of 135,577 participants enrolled in the UK Biobank were assessed. Dietary manganese intake was determined through a 24-hour dietary recall questionnaire and categorized into quartiles. Individuals with prevalent CKD or an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m^2 at baseline were excluded. The primary outcome was incident CKD diagnosed using ICD-10 and OPCS-4 codes. Incident CKD, defined as eGFR <60 mL/min/1.73 m^2 or a urine albumin-to-creatinine ratio (UACR) ≥30 mg/g, was also evaluated in a sub-cohort that included eGFR and UACR follow-up data.
Results : During a follow-up period of 1,492,228 person-years (median, 11.2 years), incident CKD occurred in 4,900 (3.6%) participants. The incidence of CKD exhibited a progressive increase among individuals with low manganese intake (2.3, 3.0, 3.6, and 4.2 events per 1000 person-years in Q4–Q1, respectively). In a multivariate Cox proportional hazard model, the adjusted hazard ratios (95% confidence intervals) for the lowest, second, and third quartiles were 1.39 (1.26–1.54), 1.22 (1.11–1.34), and 1.12 (1.02–1.23), respectively, compared to the highest quartile. Similar findings were observed in relation to eGFR or UACR-defined CKD outcomes.
Conclusions : Lower dietary manganese consumption was found to be associated with an elevated risk of incident CKD in adults with normal kidney function. This implies that a deficiency in dietary manganese intake may contribute to an increased risk of CKD development.