Iron isotopic composition of blood serum in anemia of chronic kidney disease

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Abstract

Chronic kidney disease (CKD) is a general term for disorders that affect the structure and function of the kidney. The variations in the disease expression depend on the cause and pathology, severity, and rate of progression[1]. Iron deficiency and anemia occur in the vast majority of CKD patients [2], most of whom are elderly individuals (30% is older than 70)[3]. However, determining the cause of anemia in CKD and therefore, making adequate decisions concerning the patient's treatment is still a challenge.
Recently, high-precision isotopic analysis of whole blood/serum Fe showed to be an interesting approach to assess an individual's iron status and consequently, an interesting approach for establishing Fe depletion or Fe overload as a result of diseases[4].Hence, the Fe isotopic composition of blood serum was evaluated in patients with CKD combined or not with anemia and/or iron deficiency. Serum samples from an elderly male cohort suffering from CKD and from age-matched supposedly healthy males (reference population) were analysed. High-precision Fe isotopic analysis was performed via multi-collector inductively coupled plasma-mass spectrometry (MC-ICP-MS), after acid-digestion and chromatographic isolation of the analyte element. Significant differences in the isotopic composition of Fe were observed between the reference population and the patients. Patients with iron deficiency anemia (dFe56/54=-2.18±0.87, n=16) showed a significantly heavier serum Fe isotopic composition than the reference population (dFe56/54=-2.67±0.44, n=23). Many clinical parameters used for the diagnosis and monitoring of CKD, i.e. estimated glomerular filtration rate, and Fe status parameters, such as hemoglobin, ferritin, transferrin, TSAT, TIBC and soluble transferrin receptor, correlated significantly with dFe56/54.

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