Cu isotopic signature in blood serum of liver transplant patients: A follow-up study

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Abstract

End-stage liver disease can lead to life-threatening complications and liver transplantation (LTx) is often the treatment of choice. Patients with liver disease mostly have an altered Cu metabolism caused by obstructions in the bile flow or by an impaired protein synthesis. Recently, the potential of the Cu isotopic composition in blood serum as a diagnostic tool for diseases affecting Cu metabolism has been suggested.1

The aim of this research project was to investigate the Cu isotopic signature in blood serum of patients with end-stage liver disease pre-LTx and its evolution post-LTx to evaluate the potential of this parameter for monitoring patients after transplantation. For this, the Cu isotopic composition in serum samples of 32 liver-transplant patients was determined via multi-collector ICP-mass spectrometry (MC-ICP-MS) after acid digestion of the serum and chromatographic isolation of Cu. For each patient, at least 1 blood serum sample collected pre- and post-transplantation was analysed. For some patients, serum samples collected at several time points post-LTx (up to $>$ 1 year post-LTx) were included.

The isotopic composition of serum Cu in patients with end-stage liver disease was fractionated in favour of the lighter isotope. After transplantation, a general normalization in the Cu isotopic composition was observed. This normalization in δ65Cu observed can be related to a restored biosynthetic capacity of the liver, a restored hepatic metabolism and/or to restored biliary secretion pathways. Patients that were not following the expected trends in Cu isotopic signature, mostly had an abnormal liver function after transplantation. The results of this study show that Cu isotopic analysis could be a valuable tool for follow-up of patients after liver transplantation and for establishing the potential recurrence of liver failure.

1M. Costas-Rodríguez, J. Delanghe and F. Vanhaecke, TrAC Trends in Analytical Chemistry 76, 182-193 (2016).

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