

“Cobalt quantification from erythrocytes and urine: Complementation of the ABP and definition of contributions by Vitamin B12-derived cobalt”

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Project Overview

Due to the erythropoiesis-stimulating effects, the misuse of cobalt and cobalt salts in sports is prohibited both in- and out-of-competition. While total urinary cobalt levels can be determined by means of inductively coupled plasma-mass spectrometry (ICP-MS), there are currently no assays for the detection of inorganic cobalt which exclude cobalt-containing molecules such as Vitamin-B12. But especially in cases of atypical findings with elevated cobalt concentrations, the analysis of Vitamin-B12-depleted urine is required to provide accurate information on the ionic cobalt content of the sample. Therefore, a quantitative test method for inorganic urinary cobalt will be developed within this study by using different depletion approaches such as solid phase extraction (SPE) or liquid chromatography (LC) in combination with ICP-MS. In particular during prolonged exposure to high concentrations, cobalt was found to be irreversibly incorporated into red blood cells. As the determination of the cobalt content in erythrocytes could be highly relevant to uncover long-term cobalt exposure in a doping control context, an assay for the quantitative determination of cobalt from a defined amount of erythrocytes will be additionally set up. Both assays will eventually be used to analyze blood and urine samples collected within two administration studies with cobalt chloride and Vitamin-B12 (dose: 1 mg/day over a period of 14 days). The Vitamin B12 administration study will provide important insights into the influence of Vitamin-B12 supplementation – which is legitimately used by many athletes – on urinary cobalt levels