

Analytical Methods for the Quantification of Selenium Species in Biological Matrix: Where are We?

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Objective: Over the years, scientific investigations have proven the importance of selenium as an essential element for mammals, emphasizing its activity against many diseases and even its prophylactic effects. It is also established now that a malconsumption of selenium can be harmful. Therefore, the nature and the concentration of selenium and its derivatives found in the diet, the body, and even in the environment, for example, in the soil, should be determined carefully.

Methods: In this review, analytical methods for speciation and determination of selenium concentrations in biological samples are summarized.

Results: Methods ranging from routine to cutting-edge are explored, focusing on their analytical characteristics, such as specificity for discrete selenium species, sensitivity, accuracy, reproducibility, and skills required.

Conclusion: There are already numerous studies regarding the analysis of selenium species. Beyond the method employed for actual measurements, we propose to review the preanalytic steps for sample handling in biological matrices, which directly affect results that will be more accurate with careful pretreatment. Furthermore, to reach better outcomes in terms of the identification of selenium species, different combinations of techniques might be the answer. We highlight here the last and the cutting-edge methods to identify and quantify selenium such as, high-performance liquid chromatography combined to inductively coupled plasma mass spectrometry (HPLC-ICP-MS), hydride generation atomic absorption spectrometry (HG-AAS), hydride-generation combined to atomic fluorescence spectrometry (HG-AFS), or to inductively coupled plasma optical emission spectrometry (HG-ICP-OES). This review emphasizes the importance of such investigations and the need to achieve reliable, safe, and effective quantification and methods of determination.

Keywords: Analysis, biological samples, essential elements, health benefits, matrices, selenium.