

Abstract

Development of an ICP-MS/MS-Based Methodology for the Analysis of (Ultra) Trace Elements in Follicular Fluid Samples of Patients Undergoing IVF Treatment [†]

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Introduction: The presence of heavy metals in the environment has been linked to female infertility. Follicular fluid (FF), which surrounds the developing oocyte in the ovary, can provide valuable insights into the content of a number of elements. However, there is a lack of comprehensive studies that analyze trace elements in FF samples using standardized protocols and methods. The objective of this study was to develop a reliable method utilizing ICP-MS/MS without sample digestion to detect 22 analytes in FF samples.

Methods: Four FF samples ($n = 4$) were obtained from patients undergoing in vitro fertilization (IVF) treatments. These were adequately aliquoted and processed. They were subsequently analyzed via ICP-MS/MS, both in He and no-gas mode. Finally, the data of interest were compiled in a database.

Results: Analyte recovery ranged from 70% to 130%, with better results observed in no-gas mode compared to He mode. Among the 22 elements analyzed, only ⁹Be, ¹⁴⁰Ce, ¹¹¹Cd, ¹³⁹La, ²⁰⁸Pb, and ²³⁸U were not detected. Minor concentrations were observed for ¹³⁷Ba, ²⁰⁹Bi, ⁵⁹Co, ⁵⁵Mn, ⁹⁵Mo, ⁶⁰Ni, ¹²¹Sb, ¹¹⁸Sn, ²⁰⁵Tl, and ⁵¹V, while intermediate concentrations were found for ⁷Li and ⁸⁸Sr. Major concentrations were identified for ⁵²Cr, ⁸⁵Rb, ⁴⁷Ti, and ⁶⁶Zn.

Conclusions: A new procedure was developed in this study, with several advantages. One of them is the good results in terms of the recovery of a wide variety of elements using ICP-MS/MS in the poorly studied biological matrix that is follicular fluid. Another advantage is the low amount of sample required to perform the analysis and the development of a green method where the sample is not digested and not diluted, which allowed us to avoid the excessive dilution of the concentration of analytes. Moreover, the developed method provides a novel approach to diagnose and predict health risks in women with gynecological pathologies and to assess their overall health, including reproductive health.

Supplementary Materials: The presentation materials can be downloaded at: <https://www.mdpi.com/article/10.3390/proceedings2024102038/s1>.

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