Determination of heavy metal content in baby food samples with the method of ICP-MS

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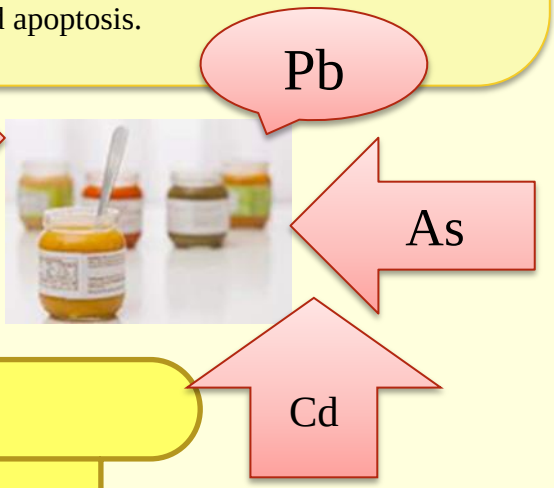
Introduction

Heavy metals are of particular importance in factory-made baby food. Lead, cadmium, mercury and arsenic are considered non-essential heavy metals and pose a danger to the organism if they are ingested in concentrations higher than allowed. Lead has the ability to strongly bind to sulfhydryl groups of proteins, competitively binds to Ca2+, and it contributes to the formation of reactive oxygen species in vivo, which causes a decrease in internal antioxidant defense and disorders in the exchange of electrolyte ions across cell membranes. Lead also inhibits certain phases in heme synthesis. Cadmium is classified as a carcinogen by the International Agency for Research on Cancer and belongs to the 1st group of carcinogens, it affects the cell development cycle, proliferation, differentiation, DNA repairation, replication and apoptosis.

Aim of study

To check the contents of heavy metals (As, Pb, Hg, Cd) in random samples of children's food found on the market of the Republic of Serbia.



Materials and methods

ICP –MS was used to determine the content of heavy metals in samples of baby food. The content of heavy metals lead, cadmium, mercury and arsenic was determined in 7 samples of different types of flour, and in 14 baby food samples in total, produced by 7 different manufacturers.. The results were compared against the allowed limits from the Rulebook on health safety of dietary products. The measurement is performed in Realab laboratory, using the iCAP RQ ICP-MS instrument.

Results and discussion

The content of heavy metals Pb, Cd, Hg and As was determined in 7 samples of different types of flour. The Pb and Hg content in the analyzed flour samples did not exceed the allowed limit. One sample of rice flour contained the boundary value for cadmium of 0.02 mg/kg.

In two types of rice flour samples As was above the permitted level (0.109 mg/kg and 0.138 mg/kg).

Analyzed: 8 types of instant flakes, 6 samples of different types of porridge, 3 different types of fruit puree and 4 samples of fruit juice had a content of lead, cadmium, mercury and arsenic below the permitted values prescribed by the Rulebook on health safety of dietary products.

Conclusion

Although most of the obtained results were within the allowed limits, continuous monitoring of children's food in terms of heavy metal content is necessary due to increased sensitivity in children to exposure of heavy metals, compared to the adults

The Rulebook on health safety of dietary products (Official Gazette of RS No. 45/10, 27/11, 50/12, 21/15, 75/15, 7/17, 103/18, 45/22, Annex 17, 2022.