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Development of a dispersive liquid-liquid micro-extraction (DLLME) method for preconcentration and determination of Al in biological fluids

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Background and Aims: Determination of trace elements in biological fluids is an important issue in biomedical analysis and controlling some diseases. Al is one of trace elements in human body and its levels are increased in renal failure. Direct measurement in biological samples is not accurate and precise due to the low concentration of Al and complex matrix. In this work, a new dispersive liquid-liquid micro-extraction (DLLME) method for preconcentration of Al in biological fluids was developed and the extracted solution was analyzed using a graphite furnace atomic absorption spectroscopic method.
Methods: 10 ml of urine sample was taken, sodium nitrite was added and pH of the solution was adjusted to 6-7, then 8-hydroxyquinoline solution was added and the hydrophobic complex was extracted using 100 µl of chloroform + 600 µl acetonitrile. After centrifugation, 20 µl of collected organic phase was injected into the graphite furnace.
Results: The influences of different analytical parameters including pH, amounts of reagents, type and volume of the organic solvents and time of reaction were studied. Due to the high selectivity of the developed method, results showed that the other co-existing ions in urine cannot interfere in determination of Al. The linear range of 1-150 ppb and the detection limit of 0.3 pbb were obtained.
Conclusions: A simple, cheap, fast, sensitive method was developed and validated for routine analysis of Al in urine samples.

Keywords: Aluminum; DLLME; GFAAS; Biological fluids