

Evaluation of molecularly imprinted polymers for selective extraction of methotrexate from human plasma prior to its LC determination

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A recent trend in solid-phase extraction (SPE) is the introduction of molecularly imprinted polymers (MIPs) as sorbents due to their tailor-made selectivity for the determination of traces of analytes in complex matrices by liquid chromatography (LC) [1-2].

In order to selectively extract methotrexate (MTX) from plasma samples, MIPs were prepared by using two structural analogues, 2,4-diamino-6,7-diisopropylpteridine and trimethoprim, as templates. Non-imprinted polymers (NIPs) were also synthesized without template. These sorbents, packed in disposable extraction cartridges, were then evaluated for at-line SPE by means of a sample processor (ASPEC system) and coupled directly to LC. The separation was performed on C₁₈ stationary phase with a mixture of 10 mM phosphate buffer (pH 2.5) and methanol (77:23; v/v) as mobile phase. MTX was monitored photometrically at 307 nm.

The MIP selectivity was exploited in the washing step by selecting a suitable washing liquid composed of a mixture of acetonitrile and ammonia to transform non-selective interactions into more selective interactions. The other extraction steps were also evaluated in order to obtain the largest difference in analyte recovery between the MIP and the NIP.

[1] F. Lanza and B. Sellergren, *Chromatographia* 53, 599 (2001)

[2] F. Chapuis, V. Pichon and M.C. Hennion, *LC GC* 17, 408 (2004)