Fabrication of water compatible and biodegradable super paramagnetic molecularly imprinted nanoparticles for selective separation of memantine from human serum prior to its quantification: An efficient and green pathway

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Abstract:

A novel green magnetic molecularly imprinted solid phase extraction (MMI-SPE) for separation of memantine (MEM) from complicated matrices was proposed. The nanomaterial was synthesized via crosslinking of chitosan (CHIT) with [3-(2,3-epoxypropoxy)-propyl] trimethoxysilane (EPPTMS) in presence of MEM as a template. The nanocomposites, in all steps, were characterized by SEM, FTIR and PXRD techniques. The adsorbed drug was removed from magnetic molecular imprinted polymer (MMIP) cavity by ethanol: acetic acid (8:2, v/v) and then, coupled with sodium 1, 2-naphthoquinone-4-sulphonate (NQS) in iodine/alkaline medium to yield highly fluorescent product, after reduction with potassium borohydride (KBH₄). Variables affecting extraction of MEM from imprinted sites and its fluorometric analysis were studied. The linearity was achieved over concentration range of 1.84–95.0 ng mL⁻¹ with LOD of 0.6 ng mL⁻¹. The method was successfully applied for determination of MEM in its pharmaceutical tablets and human serum with recoveries of 100.8 ± 3.0, 97.6 ± 2.9, respectively.

Keywords:

Memantine, Magnetic molecular imprinted polymer, Sodium 1, 2-naphthoquinone 4-sulphonate, Fluorimetry, Human serum

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