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# Superparamagnetic graphene oxide-based dispersive-solid phase extraction for preconcentration and determination of tamsulosin hydrochloride in human plasma by high performance liquid chromatography-ultraviolet detection

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## Abstract

In the present study, superparamagnetic graphene oxide-Fe<sub>3</sub>O<sub>4</sub> nanocomposites were successfully prepared by a modified impregnation method (MGO<sub>mi</sub>) and their application as a sorbent in the magnetic-dispersive solid phase extraction (M-dSPE) mode to the preconcentration and determination of tamsulosin hydrochloride (TMS) in human plasma was investigated by coupling with high performance liquid chromatography-ultraviolet detection (HPLC-UV). The structure, morphology and magnetic properties of the prepared nanocomposites were characterized using X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX), and vibrating sample magnetometry (VSM). Some factors affecting the extraction efficiency, including the pH value, amount of sorbent, extraction time, elution solvent and its volume, and desorption time were studied and optimized. Magnetic nanocomposites plasma extraction of TMS following HPLC analyses showed a linear calibration curve in the range of 0.5-50.0ngmL<sup>-1</sup> with an acceptable correlation coefficient (R<sup>2</sup>=0.9988). The method was sensitive, with a low limit of detection (0.17ngmL<sup>-1</sup>) and quantification (0.48ngmL<sup>-1</sup>). Inter- and intra-day precision expressed as relative standard deviation (n=3) and the preconcentration factor, were found to be 5.6-7.2%, 2.9-4.2% and 10, respectively. Good recoveries (98.1-101.4%) with low relative standard deviations (4.2-5.0%) indicated that the matrices under consideration do not significantly affect the extraction process. Due to its high precision and accuracy, the developed method may be a HPLC-UV alternative with M-dSPE for bioequivalence analysis of TMS in human plasma.

**Keywords:** Graphene oxide-Fe(3)O(4) nanocomposites; HPLC-UV; Human plasma; Magnetic-dispersive solid phase extraction; Tamsulosin hydrochloride.

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