Capsule phase microextraction combined with high performance liquid chromatography for the determination of amphotericin B in human serum

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Abstract

Capsule phase microextraction (CPME) is a novel sample preparation technique that was proposed by Kabir and Furton in 2017 [1]. CPME eloquently integrates the filtration and stirring mechanisms into a single unit, and it simplifies the sample preparation procedure. As a result, fast extraction kinetics and high extraction efficiency can be achieved. In this study, CPME combined with high performance liquid chromatography-ultraviolet detection (HPLC-UV) was used for the isolation and quantification of amphotericin B from human serum. This drug is widely used for the treatment of invasive fungal infections. For the development of the CPME protocol, different sol-gel sorbent encapsulated microextraction capsules were investigated and sol-gel Carbowax 20 M encapsulated media were finally chosen. The main factors that affect the sample preparation protocol were evaluated by means of face-centered central composite design to obtain high extraction performance. Method validation was conducted in terms of linearity, selectivity, limit of detection (LOD), limit of quantitation (LOQ), precision and accuracy. The linear range of the CPME-HPLC-UV method was 0.10 – 10.0 μg mL^{-1}. The LOD and LOQ values for amphotericin B were 0.03 μg and 0.10 μg mL^{-1}, respectively. The relative recovery was 87-113% showing good accuracy, while the relative standard deviation of the repeatability and within-laboratory reproducibility were <12.4%, demonstrating satisfactory method precision. The sol-gel Carbowax 20 M encapsulated media were found to be reusable for at least 10 extraction/elution cycles. The developed procedure could be used in bioanalysis for research purposes, quality control, and therapeutic drug monitoring.

References

[1] Kabir, A.; Furton, KG. (2017) Microextraction Capsules and Method of Making. In: U.S.P.A.T Office (Ed.), USA.