EXTRACTION OF AFLATOXINS FROM LIQUID FOODSTUFF SAMPLES WITH POLYDOPAMINE COATED SUPERPARAMAGNETIC NANOPARTICLES FOR HPLC-MS/MS ANALYSIS

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Abstract: A facile magnetic solid phase extraction (MSPE) of aflatoxins (AFs) from liquid samples was developed using polydopamine coated magnetic nanoparticles (PD-MNPs) as the adsorbent. PD-MNPs were prepared from amine-terminated MNPs and dopamine via an in situ oxidative self-polymerization approach. Due to a high affinity for aflatoxins (AFs) through a combination of charge transfer, π-π stacking, and hydrogen bonding interactions these nanoparticles are very useful to serve as a highly effective MSPE adsorbent for extracting these toxic compounds from solutions. Under the selected MSPE conditions extraction yields ranging from 59.3% for AF G\textsubscript{2} to 89.0% for AF B\textsubscript{1} were obtained with good repeatability. Coupled with HPLC-MS/MS quantification, the MSPE procedure serves not only for sample clean-up, eliminating any potential matrix effects, but also for AFs enrichment by a factor of 100 that is highly desired for trace analysis. The proposed MSPE-HPLC-MS/MS method had a linear calibration curve in the concentration range from 0.00600 to 3.00 ng/mL aflatoxin and limits of detection of 0.0012 ng/mL for AF B\textsubscript{1}, AF B\textsubscript{2}, and AF G\textsubscript{1}, and 0.0031 ng/mL for AF G\textsubscript{2}. The method was applied to determine AFs in red wine samples. The results indicated that the assay was selective, accurate, and effective for analyzing samples containing AFs at levels as low as of 0.0100 ng/mL.

Keywords: Aflatoxin quantification, HPLC-MS/MS, sample pretreatment, magnetic solid phase extraction, polydopamine coated magnetic nanoparticles, wine analysis.

Acknowledgement: Financial supports from National Institutes of Health (GM 089557 to YML) and National Natural Science Foundation of China (No. 81173536 and 21202161 to XL) are gratefully acknowledged. CM is a scholar of U.S. Department of Education /Title III program at Jackson State University (Grant #P031B090212-13).