Preparation and characterization of a lamotrigine imprinted polymer and its application for drug assay in human serum

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A molecularly imprinted polymer (MIP) against lamotrigine (LTG) was prepared, characterized, and its recognition properties were compared with a blank non-imprinted polymer (NIP). Two classes of binding sites were found in the MIP – high affinity (K_D = 16.2 μM) and low affinity (K_D = 161.3 μM). Selectivity of the synthesized MIP was examined using compounds with similar structures or therapeutic uses to LTG. In compounds which had structural similarity to LTG, the presence of amine groups appeared to affect binding to the MIP, however overall shape of the molecule was also important. Under the optimal conditions developed, other anticonvulsant drugs tested did not bind the MIP. A molecularly imprinted SPE (MISPE) procedure was developed which had a recovery of 84–89%, interday variation of less than 3.4% and intraday variation of less than 2.8%. The MISPE procedure was compared with a routine liquid –liquid extraction (LLE) procedure used for the HPLC determination of LTG in serum from patients. The data indicated that the MIP synthesized showed both good selectivity and high affinity for LTG and could be used for the extraction of the drug from serum samples or as the receptor layer for an LTG selective biosensor.

Key words: molecularly imprinted polymer, lamotrigine, affinity, selectivity