Development of an Online Bioanalytical Device for Acetylcholinesterase Inhibitors Screening

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Résumé

Alzheimer's disease (AD) is a chronic and progressive brain disorder that is responsible for 75% of all cases of dementia. Numerous studies indicate that limiting the hydrolysis of acetylcholine (ACh) through acetylcholinesterase (AChE) inhibitors is an important way of treating Alzheimer's disease. However, the traditional methods for screening AChE inhibitors have the disadvantage including being time-consuming, expensive, labor-intensive and unstable. In this study, a device for Online AChE inhibition evaluation by high-temperature liquid chromatography-mass (HTLC) spectrometry hyphenated with an immobilized enzyme reactor (IMER) was developed. HTLC is a green analytical tool that can be applied to achieve rapid separation of compounds with fewer organic solvents. Firstly, 3 known AChE inhibitors (galanthamine, huperzine A, and tacrine) were selected. A separation method based on HTLC was established. AChE inhibitors were rapidly separated in 7.5 minutes with 10% EtOH solvent by utilizing a combination of gradients of temperature and flow rate. Then, an IMER was connected to HTLC. The AChE inhibitory activities were evaluated and compared based on the acetylcholine peak areas (mass signals) obtained after chromatographic separation and elution through the IMER. Finally, this bioanalytical device will be applied to natural plant extracts, which are known to contain AChE inhibitors. This device can be used to qualitatively compare the anticholinesterase activities of AChE inhibitors and may also aid in the discovery of new inhibitors.

Mots-Clés: Alzheimer's disease, High, temperature liquid chromatography, Acetylcholinesterase inhibitor, Green analytical chemistry

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