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Determination of Vinpocetine in Tablets with the Vinpocetine-Selective Electrode and Possibilities of Application in Pharmaceutical Analysis

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Abstract : Vinpocetine (Vin) is an ethyl ester of apovincamic acid and is a semisynthetic derivative of vincamine, an alkaloid from plants of the genus Periwinkle (plant) vinca minor. It was found that this compound stimulates cerebral metabolism: it increases the uptake of glucose and oxygen, as well as the consumption of these substances by the brain tissue. Vinpocetine enhances the flow of blood in the brain and has a vasodilating, antihypertensive, and antiplatelet effect. Vinpocetine seems to improve the human ability to acquire new memories and restore memories that have been lost. This drug has been clinically used for the treatment of cerebrovascular disorders such as stroke and dementia memory disorders, as well as in ophthalmology and otorhinolaryngology. It has no side effects, and no toxicity has been reported when using vinpocetine for a long time. For the quantitative determination of Vin in dosage forms, the HPLC methods are generally used. A promising alternative is potentiometry with Vin- selective electrode, which does not require expensive equipment and materials. Another advantage of the potentiometric method is that the pills and solutions for injections can be used directly without separation from matrix components, which reduces both analysis time and cost. In this study, it was found that the choice of a good plasticizer an electrode with the following membrane composition: PVC (32.8 wt.%), ortho-nitrophenyl octyl ether (66.6 wt.%), tetrakis-4-chlorophenyl borate (0.6 wt.%) exhibits excellent analytical performance: lower detection limit (LDL) $1.2 \cdot 10^{-7}$ M, linear response range (LRR) $1 \cdot 10^{-3}$–$3.9 \cdot 10^{-6}$ M, the slope of the electrode function 56.2±0.2 mV/decade). Vin masses per average tablet weight determined by direct potentiometry (DP) and potentiometric titration (PT) methods for the two different sets of 10 tablets were (100.35±0.2–100.36±0.1) mg for two sets of blister packs. The mass fraction of Vin in individual tablets, determined using DP, was (9.87 ± 0.02–10.16 ±0.02) mg, while the RSD was (0.13–0.35%). The procedure has very good reproducibility, and excellent compliance with the declared amounts was observed.

Keywords : vinpocetine, potentiometry, ion selective electrode, pharmaceutical analysis
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