THE ENZYMATIC DETERMINATION OF DEQUALINIUM CHLORIDE IN TABLETS "DEKVADOL"

M. Ye. Blazheyevskiy, O. V. Koval'ska,

National University of Pharmacy,
6100, Kharkiv, st. Valentinivs'ka 4; e-mail: lena05021985@ukr.net

High efficiency, fast and long-term analgesic effect, convenient form of application that provides long-term exposure to active drugs on the mucous membrane pharynx, high safety profile allowed to consider the drug Dekvadol as a first-line agent for the treatment of inflammatory diseases of the pharynx and give grounds recommend it for widespread use in patients with this pathology.

Dequalinium chloride (DCh) is API of the local antiseptic Dekvadol (*lat*. Dequadol). The proven effectiveness of the drug and its widespread use necessitate the development of an alternative rapid method of analysis that can be implemented in quality control laboratories and pharmacies. Literature review reveals reported with respect to HPLC method which includes normal-phase HPLC and reverse phase-HPLC, gas-liquid chromatograph. The literature search for spectrophotometric methods of dequalinium chloride reports the need of chromophoric reagent and indication agent for its determination. These methods require a long sample preparation, and they are high costs. Considering this, a new kinetic photometric method for DCh determination based on an inhibition of the enzymatic (cholinesterase - ChE) reaction was proposed.

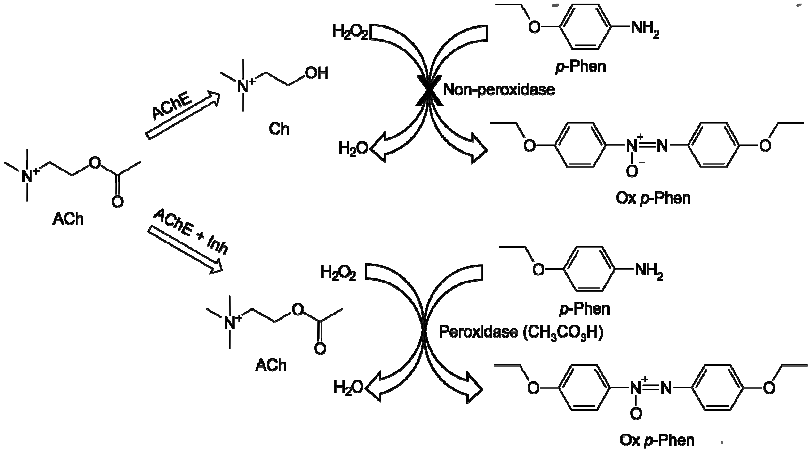

Fig.1 The scheme of processes of the analytical determination

The reaction rate was detected at unhydrolised acetylcholine (ACh) residue, which is determined by the amount of peracetic acid, wich was produced during the impact of H_2O_2 on it. The indication reaction is a reaction of interaction peracetic acid with 4-ethoxyaniline that leads to the formation of azoxyphenetole with λ_{max}=350 nm (lgε=4.18). The measurement velocity of changing of light absorption *vs*. time ($\Delta A/\Delta t$, min^{-1}) gives a chance to quantitatively deter-

mination of DCh. Kinetic curves of the analytical reaction of oxidation 4-ethoxyaniline by hydrogen peroxide in the presence of the systems ACh+ ChE, ACh + (ChE + DCh), ACh watching the first 15 minutes were lines. This makes it possible to use the tilt angle (angular tilt coefficient) of the obtained kinetic lines constructed in the coordinates of optical density (A)/time (*t*, min) to estimate the reaction rate as the value of the analytical signal corresponding to a certain DCh content in the sample. Determination of DCh content in the drug was performed using a calibration graph, taking into account the dilution. The calibration graph was constructed as *U*, (%) *vs*. *c*, (mol/L) - the degree of inhibition *vs*. concentration of DCh in the model solution. It was used the values had obtained after five single determination of the content of DCh in the samples. Determination of content in the drug was performed using a calibration graph, taking into account the dilution.

The degree of inhibition of enzymatic hydrolysis of acetylcholine U, %, in the presence of DCh was calculated by the formula:

$$U = \frac{tg\alpha_{C_i} - tg\alpha_{min}}{tg\alpha_{v_{max}} - tg\alpha_{min}} \cdot 100\%$$

where $tg\alpha_{Ci}$ - slope of the kinetic curve A *vs* time for a procedure [(ChE + Inh) + Ach] +H_2O_2 + 4-ethoxyaniline, (min^{-1}); $tg\alpha_{min}$ – slope of the kinetic curve A *vs* time for a procedure [(ChE + ACh) + H_2O_2 + 4-ethoxyaniline], (min^{-1}); $tg\alpha_{Vmax}$ – slope of the kinetic curve A *vs* time for a procedure [(ACh + H_2O_2) + 4-ethoxyaniline], (min^{-1}). The results confirmed that the method is linear at concentrations ranging from 1.0×10^{-6} mol/L to $5.0\cdot10^{-6}$ mol/L. Depending calibration equation $\Delta A/\Delta t$, min^{-1} from the village DCh has the form: tgα = 11,09 *c* + 11.378 (r = 0,999). LOD was 0.1 μg/ml. The method was satisfactorily applied to the determination of DCh in pharmaceutical preparation « Dekvadol ». The relative standard deviation was 2.7 % (*n*=5; P=0.95). This method is beneficial because high sensitivity and selectivity can be achieved using relatively simple technical equipment.

Bil B.N. A.S. Kushnir, M.O. Ovsienko Zastosuvannia preparatu Dekvadol dlia mistsevoho likuvannia zapalnykh zakhvoriuvan hlotky. Otolarynolohiia. № 3 (400), 2017.
Patent na korysnu model 117474 Ukraina, MPK G01N 33/68 (2006.01), G01 N 21/79(2006.01). Sposib vyznachennia aktyvnosti kholinesterazy krovi / Blazheievskyi M. Ye., Kovalska O. V., Diadchenko V. V. № u 2017 00721; zaiavl. 26. 01. 17; opubl. 26. 06. 17, Biul. №12. 4 s.