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STABILITY OF CYCLODEXTRINS AND mTHPC PHOTOSENSITIZER COMPLEX FOR PHOTODYNAMIC THERAPY

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Introduction. Photodynamic therapy (PDT) is one of the most topical methods of treating oncological diseases. A targeted accumulation of a photosensitizer (PS) in the tumor has high priority in development of medicines for photodynamic therapy. One of the best substances for photodynamic therapy is a complex of m-tetrahydroxyphenylchlorin (mTHPC) with cyclodextrins. One of the most important characteristics of this complex is its linking strength.

Aim of the study: the aim of the current study was to determine the type of β-cyclodextrin which would provide the best linking with the photosensitizer using the method of measuring its photobleaching speed.

Materials and methods. The research was carried out in Biophysics and Biotechnology research laboratory of Belarusian State University. Different complexes of the photosensitizer and cyclodextrins were studied. The diode laser LAND with a wave length of 200mkm was used during photobleaching. The fluorometric and absorbing spectra for these compounds were plotted.

Results. The characteristics of mTHPC and cyclodextrins (methyl-β-cyclodextrin and trimethyl-β-cyclodextrin) complexes (the linking strength and photobleaching speed as a result of stability of the complexes) were explored. It is necessary to mention that photostability of these complexes can guarantee the stability of its targeted delivery. This encapsulation allows the photosensitizer to be equally distributed in the damaged tissue and to start its activity only during photoirradiation, which becomes selective and guided.

The assessment of the photosensitizer and cyclodextrins linking quality was made using normalized graphs of the substance absorption spectra and photosensitizer fluorescence.

The study revealed a correlation between the photosensitizer and cyclodextrins linking strength and the photosensitizer concentration. For mTHPC the speed of photobleaching becomes 2 times higher when the photosensitizer concentration changes from $3 \cdot 10^{-5}$ to $3 \cdot 10^{-6}$ mol/l. This correlation has an exponential shape for both types of cyclodextrins.

Besides, it was found that for mTHPC with a concentration of $3 \cdot 10^{-5}$ mol/l its linking efficiency with trimethyl-β-cyclodextrin was 3-4 times higher than the linking efficiency with methyl-β-cyclodextrin, therefore, complexes with trimethyl-β-cyclodextrin are far more effective than complexes with methyl-β-cyclodextrin.

Conclusion. The research shows that trimethyl-β-cyclodextrin is more efficient in complexes with the mTHPC photosensitizer. It can be used for regulation of the mTHPC photosensitizer biodistribution processes during photodynamic therapy.