Features of the reactive oxygen species generation using cationic chlorin photosensitizers

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Enhancement of the quantum yield (Φ_Δ) of singlet oxygen ($^1O_2$) and other reactive species (ROS) of macroheterocyclicphotosensitizers (PS) is one of an important tasks for photodynamic therapy (PDT) optimization. Cationic PSs, containing, particularly, trialkylammonium groups, are of interest as highly versatile drugs for photoinactivation of pathogenic bacteria [1] and tumor cells. For this reason, we have studied [1–3] the features of $^1O_2$ generation by cationic derivatives of chlorin e_6 with different number and mutual arrangement of charged groups by means both direct luminescent measurements and chemical traps approach. Good convergence of the results obtained by different methods was demonstrated for all compounds studied, excepting PSs with a close intramolecular arrangement of two cationic groups. Significant increase in Φ_Δ values was demonstrated for these compounds using indirect measurements [3].

It has been established that rise in the rate of the trap oxidation is caused by the occurrence of radical reactions involving $^1O_2$ and accompanied by the formation of molecular iodine. The stability of tricationic chlorin at photooxidation during $^1O_2$ formation was estimated [2]. It was shown that the contribution of this oxidizing agent to the total process of PS photodegradation is estimated as 30%. A detailed discussion of the results will be given in a talk.

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