

Effective light absorption spectra of endogenic porphyrins in soft biotissue

V. P. Sontea, N. D. Abramovich, V. V. Barun,
S. K. Dick, A. Seryakov

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Abstract:

Light action spectra for main skin chromophores are simulated. Endogenic porphyrins (Pp IX, Cp III, and Up III) are selected as target chromophores. They can produce singlet oxygen (SO) under tissue irradiation, which acts as a natural photosensitizer. The SO is toxic for, e.g., cancer cells. This process is known to be widely used in photodynamic therapy (PDT). It is shown by way of examples that skin irradiation by red light, where the porphyrins have local maxima of light absorption, can improve the generation of SO as compared with the irradiation at a wavelength corresponding to the absolute maximum of light absorption. We obtained that the said improvement of SO generation can be about 5 to 10 times at specific depths inside tissue and 2 to 12 times integrally for the whole dermis thickness. The presented results can provide new opportunities for the selection of the irradiation wavelengths under application of traditional PDT methods.

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