Evaluation of the photodynamic activity of porphyrin derivatives

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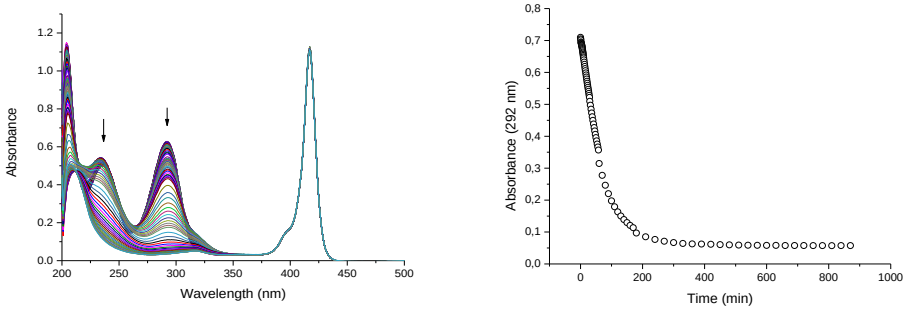
Photodynamic therapy (PDT) uses light-actives drugs, photosensitizers (PS), producing reactive-oxygen species (ROS). PDT has been successfully applied for treatment of local and topical diseases such as macular degeneration, skin lesions, cancer and antibiotic-resistant infections. *Meso*-tetraarylporphyrins are compounds of interest in PDT due to their photophysical properties. The evaluation of the efficiency of PS to generate toxic species that damage biological tissues is essential to PDT. The uric acid (UA) exhibits very interesting properties as a chemical probe for photodynamic dosimetry. This work evaluated the photodynamic activity of porphyrins H_2TDFSPP and ZnTDFSPP using UA and a polychromatic LED light source. To investigate the photoxidation of UA was prepared a solution of UA and three solution different concentrations of porphyrins. These solutions irradiated with LED and the photoxidation accompanied by decay through the absorption in 292 nm (k_1). The process of UA oxidation by photo-excitation of the porphyrin can be observed in Figure 1. The chemical photodynamic efficiency (γ_Δ) and the quantum yield of the singlet oxygen ($\Phi_\Delta{}^1O_2$) were determined based on equations described by Gerola *et al.*, 2012, using the benzoporphyrin BPMA® with standard.

Figure 1 – (a) Spectral variations of UA (50 μmol.L^{-1}) in presence of H_2TDFSPP (1 μmol.L^{-1}) in buffer solution with illumination (0 a 870 min) with green LED. The arrows show the absorbance behavior during irradiation. (b) Absorbance variations at 292 nm as a function of time.



The photoxidation with violet LED is the most efficient in the H_2TDFSPP $\Phi_\Delta{}^1O_2$ 0,94, otherwise in ZnTDFSPP the photoxidation with green LED is more efficient, $\Phi_\Delta{}^1O_2$ 1,11. This behavior can explained due the overlap between the emission and the absorption PS. For the violet LED and green LED the values of γ_Δ and Φ_Δ approaches commercial compounds, indicating potential use in PDT.

References

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