Photophysical study and in vitro approach against Leishmania panamensis of dicloro-5,10,15,20-tetrakis(4-bromophenyl)porphyrinato Sn(IV)

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Abstract

Background: Photodynamic therapy activity against different biological systems has been reported for porphyrins. Porphyrin modifications through peripheral groups and/or by metal insertion inside the ring are main alternatives for the improvement of its photo-physical properties. In this study, we synthesized and characterized 5,10,15,20-tetrakis(4-bromophenyl)porphyrin and the dicloro-5,10,15,20-tetrakis(4-bromophenyl)porphyrinato Sn(IV). Methods: Metal-free porphyrin was synthesized using the Alder method, while the Sn(IV)-porphyrin complex was prepared by combining metal-free porphyrin with stannous chloride in DMF; the reaction yields were 47% and 64% respectively. Metal-free porphyrin was characterized by UV-Vis, FT-IR, ESI-mass spectrometry and 13C-NMR. Additionally, the Sn(IV) -porphyrin complex was characterized using UV-Vis and FT-IR. Cyclic voltammetry tests in four different solvents. The fluorescence quantum yield (f) was measured using fluorescein as a standard, the singlet oxygen quantum yield (D) was estimated using the standard 5,10,15,20-(tetraphenyl)porphyrin (H2TPP) and the quencher of singlet oxygen 1,3-diphenylisobenzofuran (DPBF). Results: UV-Vis assay showed typical Q and Soret bands for porphyrin and its metallo-porphyrin complex. Compounds showed photoluminescence at the visible range of electromagnetic spectrum. The inclusion of the metal in the porphyrin core changed the f from 0.15 to 0.05 and the D increased from 0.55 to 0.59. Finally, the effect of the compounds on the viability of L. panamensis was evaluated by means of the MTT test. The results showed that both compounds decreased the viability of the parasite; this inhibitory activity was greater under light irradiation; the porphyrin compound had IC 50 of 16.5 M and the Sn(IV)-porphyrin complex had IC 50 of 19.2 M. Conclusion: The compounds were synthesized efficiently, their characterization was carried out by different spectroscopy techniques and their own signals were evidenced for both structures, both compounds decreased the cell viability of L. panamensis. © 2021 Espitia-Almeida F et al.

Author keywords
In vitro; Leishmania panamensis; Photodynamic therapy; Photophysical study; Porphyrin; Porphyrinato