

**20TH CONGRESS OF THE INTERNATIONAL UNION FOR PURE  
APPLIED BIOPHYSICS (IUPAB)**

**50TH ANNUAL MEETING OF THE BRAZILIAN SOCIETY FOR  
BIOCHEMISTRY AND MOLECULAR BIOLOGY (SBBQ)**

**45TH CONGRESS OF BRAZILIAN BIOPHYSICS SOCIETY (SBBF)**

**13TH BRAZILIAN SOCIETY ON NUCLEAR BIOSCIENCES CONGRESS**



**PROGRAM AND ABSTRACT BOOK**

October, 2021

20<sup>th</sup> International Congress of the International Union  
for Pure Applied Biophysics (IUPAB)

50<sup>th</sup> Annual Meeting of the Brazilian Society for  
Biochemistry and Molecular Biology (SBBq)

45<sup>th</sup> Congress of Brazilian Biophysics Society (SBBf)

13<sup>th</sup> Brazilian Society on Nuclear Biosciences Congress  
(SBBN)

São Paulo, Brazil  
October 4<sup>th</sup> to 8<sup>th</sup>, 2021

Copyright © 2021 Sociedade Brasileira de Bioquímica e Biologia Molecular (SBBq)

All abstracts published in this book were reproduced from texts supplied by their authors. The content of these abstracts is the responsibility of these authors. SBBq, SBBf, SBBN, IUPAB, its directors, staff and ad hoc reviewers are not responsible for the consequences of the use of data published in this book.

Ilustração da Capa: Alexandre Takashi

**EB.03 - Effects of photodynamic inactivation mediated by Zn(II) porphyrin on promastigote and amastigote forms of *Leishmania amazonensis***

**Tiago Henrique dos Santos Souza**<sup>1,5</sup>, Camila Andrade<sup>1</sup>, Fernanda Cabral<sup>2</sup>, José Sarmiento-Neto<sup>3</sup>, Júlio Rebouças<sup>3</sup>, Beate Santos<sup>4</sup>, Martha Ribeiro<sup>2</sup>, Regina Figueiredo<sup>5</sup>, Adriana Fontes<sup>1</sup>

<sup>1</sup>Departamento de Biofísica e Radiobiologia, Universidade Federal de Pernambuco (Brazil), <sup>2</sup>Centro de Lasers e Aplicações, Instituto de Pesquisas Energéticas e Nucleares (São Paulo, Brazil), <sup>3</sup>Departamento de Química, Universidade Federal da Paraíba (Paraíba, Brazil), <sup>4</sup>Departamento de Ciências Farmacêuticas, Universidade Federal de Pernambuco (Brazil), <sup>5</sup>Instituto Aggeu Magalhães, Fundação Oswaldo Cruz (Pernambuco, Brazil)

Photodynamic inactivation (PDI) has been attracting attention as an innovative technology to treat topical diseases, such as cutaneous leishmaniasis (CL) and infections caused by multidrug-resistant microorganisms. Zn(II) meso-tetrakis(*N*-*n*-hexylpyridinium-2-yl)porphyrin (ZnTnHex-2-PyP<sup>4+</sup>) is a lipophilic water-soluble Zn(II) porphyrin with improved photophysical properties, high chemical stability, and cationic/amphiphilic character that can enhance its interaction with cells. Thus, this study aimed to investigate the PDI effects mediated by ZnTnHex-2-PyP<sup>4+</sup> on *Leishmania amazonensis*. Confocal fluorescence microscopy was explored to study the interaction of ZnTnHex-2-PyP<sup>4+</sup> with promastigotes. The PDI action was analyzed by cell membrane integrity, mitochondrial membrane potential ( $\Delta\Psi_m$ ), and cell morphology. Promastigotes were incubated with ZnTnHex-2-PyP<sup>4+</sup> for 5 min at 0.62 and 1.25  $\mu\text{M}$  and irradiated by a LED (410 nm) for 1 or 3 min (2.3 and 3.4  $\text{J}/\text{cm}^2$ , respectively). PDI on amastigotes and the cytotoxicity on macrophages were also analyzed (3.4  $\text{J}/\text{cm}^2$ ). Fluorescence microscopy revealed that parasites efficiently uptake ZnTnHex-2-PyP<sup>4+</sup> and displayed a punctate labeling pattern along with the cytoplasm. An intense  $\Delta\Psi_m$  depolarization was also observed, which in association with microscopy results, suggests that ZnTnHex-2-PyP<sup>4+</sup> may accumulate in the mitochondrion, or other well-defined structures close to it. Moreover, ZnTnHex-2-PyP<sup>4+</sup> at concentration as low as 0.62  $\mu\text{M}$  led to the immediate inactivation of >95% of promastigotes, regardless of the light dose used. Loss of the fusiform shape and plasma membrane wrinkling were also observed. After a single treatment session in amastigotes, PDI led to a reduction of 70% in the infection index. No considerable toxicity was observed on mammalian cells. Thus, PDI of *Leishmania* parasites showed *in vitro* efficiency at a submicromolar concentration of ZnTnHex-2-PyP<sup>4+</sup>, with short pre-incubation and irradiation times. The results encourage further studies in CL pre-clinical assays and PDI of other microorganisms.

**Keywords:** Cutaneous leishmaniasis, photodynamic therapy, ZnTnHex-2-PyP<sup>4+</sup>

**Supported by:** CAPES, CNPq, FACEPE, FAPESP, IAM/FIOCRUZ, FINEP and INCT-INFO.