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## Zinc phthalocyanine loaded poly (lactic acid) nanoparticles by double emulsion methodology for photodynamic therapy against 9 L/LacZ gliosarcoma cells

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### ABSTRACT

Development delivery systems, such as nanoparticles, represent a growing area in biomedical research. Nanoparticles (NP) were prepared using a double-emulsion method to load zinc(II) phthalocyanine (ZnPc). NP were obtained using poly (lactic acid) (PLA). ZnPc is a second generation of photosensitizer used in photodynamic therapy (PDT). ZnPc loaded PLA nanoparticles (NPLA-ZnPc) were prepared by double-emulsion method, characterized and available in cellular culture. The mean nanoparticle size presented particle size was  $384.7 \pm 84.2$  nm with polydispersity index (PDI) of  $0.150 \pm 0.015$ , and the encapsulation efficiency was of 83%. The nanoparticle formulations presented negative zeta potential values ( $-27.5 \pm 1.0$  mV), explaining their colloidal stability. ZnPc loaded nanoparticles maintain its photophysical behavior after encapsulation. Photosensitizer release from nanoparticles was sustained over 168 h with a biphasic ZnPc release profile. An *in vitro* phototoxic effect in range of 80% was observed in 9 L/LacZ gliosarcoma cells at laser light doses ( $10 \text{ J cm}^{-2}$ ) with  $3.0 \mu\text{g mL}^{-1}$  of NPLA-ZnPc. All the physical-chemical, photophysical and photobiological measurements performed allow us to conclude that ZnPc loaded PLGA nanoparticles is a promising drug delivery system for PDT.

### ARTICLE HISTORY

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Photodynamic therapy;  
polymeric nanoparticles;  
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## Introduction

Photodynamic therapy (PDT) is a less invasive therapeutic mode for cancer treatment and has been recognized as an attractive oncotherapy treatment [1–3]. PDT has emerged as an effective treatment modality for various malignant neoplasia and tumors. In PDT, the photochemical interaction combined of specific wavelength light,

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