

Antitumor activity in L-diphenylalanine/phthalocyanine conjugates

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Introduction

Recently, we have demonstrated that it is possible to improve the generation of reactive oxygen species (ROS) upon conjugation of hypericin with L-diphenylalanine microtubes (FFMTs) [1, 2]. In this work, we extend these pioneer investigations by exploring the use of hybrid systems formed between FFMTs and zinc phthalocyanines (ZcPCs) in photodynamic therapy. *In vitro* assays were conducted to assess the viability of tumor cells in presence of the conjugates after laser irradiation. The effects of their morphology on photophysical performance were investigated by using a combination of microscopy and spectroscopy methods.

Results and discussions

FFMT/ZcPC conjugates were synthesized using a liquid phase approach [1, 2]. The ZcPC used here possess three protected glycerol groups and a methyl moiety as indicated in Fig. Fig.1A. AFM and SEM images, Figs.1B and 1C, show that upon conjugation the hollow tubular morphology usually found in L-diphenylalanine assemblies is replaced by solid needles with sharp ends and faces separated by well-defined edges.

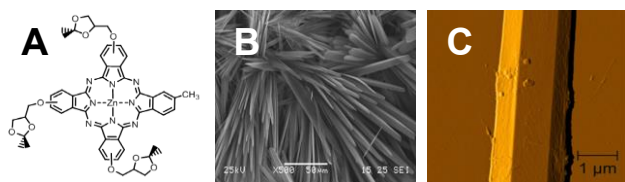


Figure 1. (A) General structure of the phthalocyanine used in this work. (B) SEM from FFMT/ZcPC conjugates and (C) AFM showing sharp edges separating flat faces.

For cytotoxicity assays, the conjugates were diluted into DMSO and only the supernatant of the suspensions was used. The viability rate was measured on breast cancer MCF-7 cell lines, using the MTT method based on colorimetric analysis of MTT salt converted into formazan blue by mitochondrial enzymes. All assays were performed in triplicates for better statistics.

In Figure 2, we show the viability rates for cells kept in the dark and for cells irradiated with laser (660 nm) during 10 minutes. One observes that under both conditions FFMTs and PCs induce cell death; however, the rate of mortality is systematically higher in conjugates containing both species associated. These findings suggest that the efficiency of phthalocyanines as inductor of cell death is boosted in presence of FFMTs, indicating a potential synergism between these compounds.

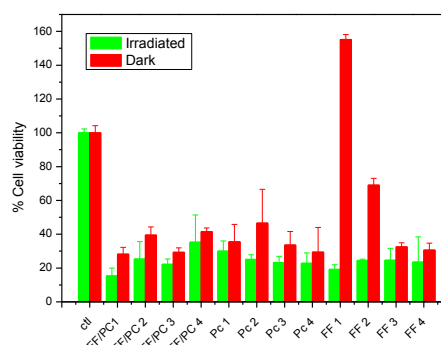


Figure 2. Cytotoxicity assays on MCF-7 cells associated to breast cancer.

Conclusions

Preliminary assays on the evaluation of the potential of FFMT/ZcPC as a death inductor on tumor cells suggest that both PC and FFMT alone are able to trigger cell death. Nevertheless, the effect is improved when these species appear conjugated.

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