

Photodynamic Effect Of 5,10,15,20-Tetrakis(4-Methoxyphenyl) Porphine (TMP) on Hep-2 Cell Lines

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Abstract: The photodynamic effect of 5,10,15,20-tetrakis(4-methoxyphenyl)porphine (TMP) on Hep-2 cell line is reported. The incorporation of TMP was analyzed at different times and photosensitizer concentrations. The irradiation of cell cultures produces cell mortality, while no toxicity was observed in dark condition.

Introduction

Photodynamic therapy (PDT) is based on the administration of a photosensitizer that becomes concentrated in tumor cells and upon subsequent irradiation with visible light in the presence of oxygen, specifically destroy the tumors. Porphyrins and their analogs have attracted much attention as photo-therapeutic agents, for the treatment of tumors in combination with visible light.[1] The photodynamic process of the sensitizers on neoplastic tissues is still not well understood, although it is generally accepted that singlet oxygen (1O_2), produced after the exposure of the sensitizer to light, is the main species responsible for cell inactivation. Therefore, the photodynamic effects of porphyrin derivatives on cells are very interesting for the development of new photosensitizers to PDT.[2]

Experimental

Cell cultures. Hep-2 larynges carcinoma human cell line.

Photosensitizer uptake. The incorporation of TMP by Hep-2 cells was determined by fluorescence spectroscopy as described in reference [3].

Irradiation. Visible light. Slide projector with lamp of 150 W (26 mW/cm²).

Citotoxicity. The viability of the cells was estimated by microscopy using trypan blue (TB).

Results and Discussion

Uptake of TMP. TMP was incorporated for different times of incubation with Hep-2 cells. Several concentrations of TMP (1-10 μM) were used in the medium. The uptake increases initially very rapid at low incubation times (<5h) and tends to a saturation value after long incubations ($\geq 24\text{h}$). The kinetic of incorporation increases with TMP concentration reaching a similar value after 24 h of incubation.

Citotoxicity under dark. Cell toxicity induced by TMP was analyzed in dark condition at different concentrations of photosensitizer (1-10 μM) and several incubation periods. No toxicity, in terms of cell survival, was detected at any evaluated time for 24 h.

Citotoxicity under irradiation conditions. The cells were irradiated with visible light, after incubation with TMP for different periods. The results show an increase in the cell inactivation with an increase in the irradiation time. A higher effect was observed when the cells were longer treated with TMP. Thus, when TMP was incorporated for 45 min, a mortality of ~50% was reached in 30 min of irradiation, while this value increases to ~90% of lethality when the TMP was incorporated for 24 h. On the other hand, no toxicity was observed in dark condition or by irradiation de cell cultures without TMP. Therefore, the cell mortality, obtained after irradiation with visible light of the cell cultures, correspond to the photosensitized effect of TMP produced by the visible irradiation.

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References and Notes

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