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Photodynamic therapy: An emerging treatment modality for melanoma

Surendra Lalwani
Dr.H S Gour University, India

Introduction:
Cancer is known to occur in all societies and in all parts of the world. It affects animals as well as humans. However, the types of cancer most prevalent in a community will vary with the age, sex distribution and race of people in the community, as well as the geographical situation, the economic and environmental situation and habits of the people including their diets. In developed countries, cancer is responsible for about 25-30% of deaths. Skin cancer is one of the most widespread tumors. However, despite the progress achieved in all clinical diagnostic techniques, the most severe of different tumors is cutaneous melanoma, whose frequency continues to climb. Photodynamic therapy (PDT) is a modality of cancer treatment based on light-induced killing of cells after administration of a photosensitizer. It gives good cure rates for superficial skin tumors.

Objectives:
The tissue homogenates and supernatants from tumor-bearing mouse were prepared and the cell viability was checked by trypan blue exclusion test using trypan blue stain. Approximately 100 cells were counted at various fields in hemocytometer for each experiment. Melanoma cells (1×106) were suspended in PBS (50 µL) and injected subcutaneously into previously shaved right flank of adult female BALB/c mice (4-6 weeks old), through a gauge no.18 needle under general anesthesia (ketamine hydrochloride i.p., 80 mg/kg). Tumor cells were injected in healthy mice in the laminar air flow bench.

Results:
The results of PDT in the treatment of hyper-proliferative diseases, especially in the skin are most encouraging and have the potential of becoming the treatment of choice. Porphyrins are powerful photodynamic agents that render cells vulnerable to light. Hematoporphyrin (Hp) is one of the most widely used PSs in PDT of tumors. It is widely reported in literature that the hematoporphyrin (Hp) accumulate preferentially in tumor tissues. The Hp has cytotoxic and antitumor actions which is light and oxygen dependent. Four to six weeks old female BALB/c mice (20-25 g) was used for implanting B16F10 melanoma tumor model. Melanoma cell line (B16F10) was maintained by serial transplantation in female BALB/c mice. The cells were subcutaneously injected (50 µL, 0.5×106 cells per mice) in the previously shaved right flank of female BALB/c mice under general anesthesia (ketamine hydrochloride i.p., 80 mg/kg). After 10-15 days, the mice developed black tumor having around 100±10 mm3 of volume.

Conclusion:
After 10-15 days, the mice developed black tumors having around 100±10 mm3 of volume. After development of tumor, mice were randomly sorted into different groups: The group-1 which served as control group having no tumor and received vehicle (5 mL/kg), Group-2 also received vehicle (5 mL/kg), Group-3 received PDT (630±10 nm), Group-4 received Hp in dark, and Group-5 received Hp along with PDT. Each mouse was placed underneath an aperture that controlled the area of light illumination on the tumor site. Each mouse was received a total dose of 150 J/cm2. Individual tumor volumes were measured and effectiveness of the treatment was compared among the groups on alternate day. It may be concluded that after PDT treatment, a remarkable damage of tumor vasculature and secondary necrosis of tumor tissue was observed along with a significant inhibition of tumor growth in presence of photodynamic treatment. It indicates that Hp has more efficacies the presence of PDT.