Original Articles

The Capabilities of Benzoporphyrin: In Vivo Study of Canine Malignant Melanomas with Photodynamic Therapy

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Human malignant melanomas are a kind of commonly occurring neoplasm with a clinical course of recurrence after surgical removal. This preliminary animal study seeks to evaluate the effect of benzoporphyrin derivative (BPD) in photodynamic therapy (PDT) for spontaneously arising melanoma in canines. Ten dogs with spontaneously occurring melanomas were treated with PDT using BPD as the photosensitizer. BPD was injected intravenously at a dose of 1 mg/kg. Six hours later the treatment of PDT with 690 nm light was taken. Some larger tumors (>1.5 cm deep) were surgically debulked prior to PDT. No significant systemic toxicity or skin photosensitization was observed. PDT with BPD led to a complete response in 70% (7 of 10) of these cases. 20% (2 of 10) had a partial response, and 10% (1 of 10) no response (<50% reduction of tumor size). BPD-PDT appears to have advantages in the treatment of canine melanomas, and systemic toxicity is almost nonexistent. Further studies of the long term results are necessary before BPD-PDT can be used in humans.

Key words: melanoma, photosensitizer, photodynamic therapy

Photodynamic therapy (PDT) is becoming an accepted form of treatment for spontaneously arising human and animal tumors[1-5]. This therapy consists of a "tumor-localizing" photosensitizer and its activation with light after an appropriate interval. Since visible light with a longer wavelength propagates further through tissue[6], the laser is tuned to emit light at the longest visible wavelength absorbed by the photosensitizer. Absorption of the appropriate wavelength results in the photochemical generation of cytotoxic oxygen species, such as singlet oxygen or superoxide anion[7,8]. Except for in the reticule-endothelial organs, there is a greater concentration of photosensitizer in the tumor than in the surrounding normal tissue[9]. Generally, the photosensitizer is photo-activated 24 to 72 hours after intravenous administration, corresponding to the highest tumor-to-normal tissue concentration of the drug. This preferential tumor retention in combination with the light mediated cytotoxicty results in a relatively specific therapeutic modality for the eradication of solid tumor.

Pigmented melanoma, however, does not normally respond to PDT when porphyrines are employed, due to the low extinction coefficient of these photosensitizers (630 nm), at which melanin still shows a large amount of absorption. Recently, benzoporphyrim derivate (BPD) (Quadra Logic Technologies, Inc.), which is a better alternative than traditional porphyrines, has been is in phase I / II trials. An advantage of BPD is a major visible absorption, peaking at 690 nm, which responds to pigmented melanoma[10,11]. Peak tissue levels are reached in

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