

Public Abstract

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Title: Local photodynamic therapy for squamous cell carcinoma in a murine model

The proposed study was designed to evaluate the efficacy of local photodynamic therapy (PDT) for squamous cell carcinoma (SCC) in a mouse model. SCC is the most common cancer of the equine (horse) eye and structures around the eye, and often results in loss of the eye or animal. Currently, there is no satisfactory treatment for SCC in horses, and there is a strong rationale for the development of adjunctive therapy to enhance destruction of the tumor cells beyond the surgical margins. We have developed a novel approach to the treatment of equine ocular SCC by injecting a photoactive agent locally into the tumor bed and performing PDT.

Photodynamic therapy involves the use of photochemical reactions mediated through the interaction of photosensitizing agents (light sensitive agents), light, and oxygen for the treatment of malignant or benign diseases. Photosensitizers are typically given by injection into the vein. In the present study, a photosensitizer was administered into the tumors. Subsequently, these photosensitizers were activated by illumination with an appropriate wavelength light to generate active molecular species, such as free radicals and singlet oxygen that are toxic to cells and tissues. The development of oxygen free radicals damages cellular organelles, deoxyribonucleic acid (DNA), and microvasculature of the treated tissue, and the combined results lead to inflammation and tissue destruction. Because the photosensitizer was locally injected into the tumor and the light source was directly targeted on the lesion, local PDT achieves dual selectivity, minimizing damage to adjacent healthy structures.

Our results showed that local PDT with verteporfin at dose of 0.1 mg/cm^3 and light dose of 100 J/cm^2 effectively inhibited the growth of SCC in a murine model at day 13 and day 30. Choice of solvent (DMSO or 5% dextrose solution) did not affect the results. Local PDT following surgical excision of the tumor may be an effective adjunctive therapy for the treatment of equine SCC.