

Electrochemotherapy and photodynamic therapy as a novel treatment for squamous cell carcinoma in cats

Introduction

- Squamous cell carcinoma (SCC) is considered the most common malignant cutaneous tumor seen in feline medicine, usually affecting the head of the cat (nasal plane, ears, eyelids, and lips).
- UVB radiation from chronic exposure to sunlight has been linked as the main cause of cutaneous SCC in cats.
- Clinical presentation shows as erosive lesions, forming ulcers, or as a papillary-like growth. They are slow to metastasize, but they grow infiltrating the underlying tissues

Objectives

Realization of a descriptive study based on the cases of feline SCC attended in the Hospital Clinic Veterinari de la UAB in the last years.

Evaluation of pros and cons from each kind of therapeutical approach.

Diagnosis

Excisional/incisional biopsy from multiple areas, histopathology

FNA of draining lymph nodes, thoracic Rx

Knowing the stage of the SCC it's crucial to choose the most efficient therapeutic approach and prognosis

Tis Carcinoma in situ/ Pre-invasive carcinoma
T1 <2cm of diameter, superficial or exophytic
T2 Diameter between 2-5cm, minimal tissue invasion
T3 >5cm of diameter, tissue invasion
T4 Tumor invading deep structures (fascia,muscle,bone)

Fig 1. Staging system (Owen LM, 1980)

Treatment for cutaneous SCC in cats

Traditional treatment approaches for SCC

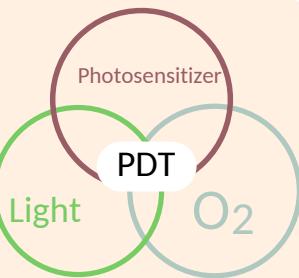
- Excisional surgery
- Chemotherapy
- Criotherapy

Novel treatment approaches

- Electrochemotherapy
- Photodynamic therapy

Photodynamic therapy

PDT combines a selective photosensitizer agent with illumination, that along with the oxygen that's found in the tissues, generates cytotoxic reactive species (ROS) in the cancerous cells, leading to their death. It also damages the surrounding microvasculature, causing a local inflammatory response that leads to an immune reaction against the tumor



Electrochemotherapy

ECT is based on the reversible electroporation phenomenon: exposition to short electric pulses creates pores in the cell membrane, thus, making it a transiently permeable pathway for lipophilic drugs like bleomycin to pass through.

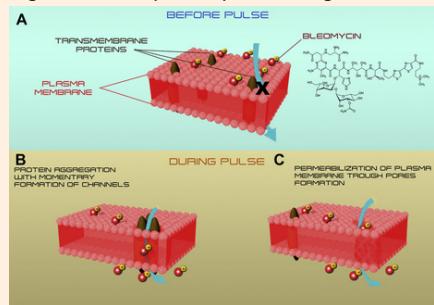


Fig. 2. Mechanism of drug perfusion during electroporation, using bleomycin as chemotherapy agent. (Spugnini & Baldi, 2019)

Retrospective study from clinical cases

Patient	Age	Breed	Treatment (ECT or PDT)	Anatomic placement of SCC	Voltage (V/cm) or light wavelength	Drug	Total number of sessions	Treatment response	Response duration / Relapse time
Spayed female cat	10	European shorthair	ECT	Right nasal planum 1 x 1,4 cm	1100V/cm	Bleomycin 15000UI/m ² IV	2	Almost complete, no evidence of disease	No relapse
Female cat	12	European shorthair	ECT	Nasal planum	1100V/cm	Bleomycin 15000UI/m ² IV	2	Almost complete, no evidence of disease	10 months
Spayed female cat	9	European shorthair	ECT	Nasal, face, periorbital	1100V/cm	Bleomycin 15000UI/m ² IV	2	Partial (70%)	No relapse
Spayed male cat	9	European shorthair	ECT	Right nasal planum 3 x 3,3mm	1100V/cm	Bleomycin 15000UI/m ² IV	1	Not available	Not available
Spayed male cat	3	European shorthair	ECT	Nasal planum 1,2 x 1,2 x 0,7 cm	1100V/cm	Bleomycin 15000UI/m ² IV	2	Almost complete	No relapse
Spayed male cat	18	European shorthair	PDT	Nasal planum	635nm	5-metil-ALA	1	Not available	Not available
Male cat	7	European shorthair	PDT	Nasal planum, temporal zone, above OD	635nm	5-metil-ALA	2	Almost complete	2 years



Fig. 3) A) Cat with infiltrative cutaneous SCC affecting nasal planum, no treatment performed. B) Same cat 15 days after first ECT session. C) 4,5 months after second ECT session, no ulcerated or tumor tissue can be macroscopically observed.

Conclusion

- ECT and PDT are highly effective, safe methods to treat cutaneous SCC in cats. They're easy to administer, minimally invasive and have low toxicity and adverse effects.
- Their efficiency is similar or greater than traditional therapies, combining both antitumoral effect and satisfactory cosmetic results
- Should be considered in the future as a treatment of choice in low-staged tumors or when other treatments are unfeasible.