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LASER THERAPY AS SUPPORTIVE TREATMENT FOR ORAL MUCOSITIS IS A SAFE PROCEDURE IN ONCOLOGICAL PATIENTS

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Introduction

Laser therapy is emerging as a promising supportive treatment for oral mucositis induced by oncological therapies. However, its mechanisms of action and, more importantly, its safety in cancer patients, have poorly carefully investigated so far.

Objectives

The main purpose of the presented study is to analyze the behavior of cancer cells in vitro and in vivo after laser exposure.

Methods

Cell metabolism was assessed in vitro on mouse B16F10 melanoma cells, on human skin fibroblasts, commercial human umbilical vein endothelial cells and primary bone marrow-dendritic cells by ATPlite Luminescence Assay at 24 and 48 hours after different laser protocols exposure. Both xenograft melanoma and ortotopic oral carcinogenesis mouse models were used to analyze tumor growth and invasiveness through a histological (hematoxylin and eosin stain) and immunohistochemistry characterization (CD4, CD8, DCIR2 and Melan-A). The analysis of the tumor infiltration was performed using FACS technology.

DIODE LASER TREATMENTS

L1: λ 660 nm, laser power 100 mW, irradiance 50 mW/cm², fluence 3 J/cm², time 60 s, CW
L2: λ 800 nm, laser power 1 W, irradiance 200 mW/cm², fluence 6 J/cm², time 30 s, CW
L3: λ 970 nm, laser power 2.5 W, irradiance 200 mW/cm², fluence 6 J/cm², time 30 s, CW

Class IV, K-Laser Cube series, Eltech K-Laser, Via Castagnole 20/H, Treviso, (Italy)

Results

In vitro cell metabolism and proliferation increased after laser treatment. Interestingly, in vivo laser therapy reduced tumor growth and invasiveness, indicating a beneficial influence on tumor microenvironment. Laser-treated tumors were delimited and infiltrated by immune cells, in particular by lymphocytes and dendritic cells. A paralleled effect was the enhanced secretion of type I interferons. In contrast, the number of pro-angiogenic macrophages was reduced in response to laser therapy, with consequent normalization of the tumor vasculature.

Laser therapy increases the proliferation of cultured cells

Laser therapy improves lymphocytes recruitment

Laser therapy improves the vasculature function and vessels' perfusion and maturation

Laser therapy improves the vasculature function and vessels' perfusion and maturation

Conclusion

Our results encourage to perform laser therapy safely also in potentially dysplastic or neoplastic areas in oncological patients, affected by mucosal or cutaneous lesions.