doi:10.20396/revpibic.v0i0.id

XXVI Congresso de Iniciação Científica Unicamp
17 a 19 de outubro Campinas | Brasil

EFFECT OF TWO PHOTOBIOMODULATION DEVICES ON THE TISSUE REPAIR OF MICE

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Abstract
Cronic wounds are one of the most serioous complications in individuals with diabetes. Wound repair is a complex and dynamic biologic process with three phases: inflammation, proliferation and maturation. Photobiomodulation (PBM) can be used as an alternative therapy to treat this lesion. In this study, we evaluated the effect of two PBM devices (DUAL pen and Polarized light) to treat skin wounds in diabetic mice. Mice were treated for 1 or 3 days. After treatment, all animals were sacrificed and a biopsy of the lesion was taken. Clinically, the groups treated with the two devices presented an improved healing process than control groups.

Key words:
Wound repair, diabetes, photobiomodulation

Introduction

Wound repair is a complex process associated with multiple cellular and chemical interactions, resulting in angiogenesis, neocollagenesis and scar formation. Thus, cells involved in this process, such as inflammatory, endothelial and mesenchymal cells, produce several chemical mediators for regulating these molecular and cellular events.

These mediators may influence positively, negatively, or both, the healing process. Since the healing process is compromised in patients with vascular deficiency, such as in diabetic subjects, several treatment proposals were developed over time.

Hence, the aim of this study was to evaluate the effect of two PBM devices (DUAL pen and Polarized light) to treat skin wounds in diabetic mice.

Results and Discussion

This research was approved by the Ethics commission on animal use of the University of Campinas (CEUA/UNICAMP), under the protocol 4530-1/2017.

A total of 60 male C57BL/6 mice were used in this study and treated as showed below:

Chart 1. Distribution of the animals according to diabetes status and treatment given:

	Groups	Animals	Sessions
Normoglycemic	**G1:** Control 1 day	5	-
	G2: DUAL 1 day	5	1
	G3: PL 1 day	5	1
	G4: Control 3 days	5	-
	G5: DUAL 3 days	5	2
	G6: PL 3 days	5	2
Diabetic	**G7:** Control 1 day	5	-
	G8: DUAL 1 day	5	1
	G9: PL 1 day	5	1
	G10: Control 3 days	5	-
	G11: DUAL 3 days	5	2
	G12: PL 3 days	5	2

DUAL: red laser + infrared light; PL: polarized light

The diabetes was induced using a single dose of 100mg/kg of Streptozotocin (STZ) and diabetes confirmed by measuring the glycemic levels with a digital glycosometer. The wounds were performed with a 8mm dermatologic punch after general anesthesia. The two PBM devices are describes below:

DUAL pen (red laser + infrared laser): application time: 40-50 seconds; Dose: 4J/cm^2; Potency: 100 and 120mW; Wavelength: 660nm e 808nm.

Polarized light: application time: 2 minutes; Dose: 2.4J/cm^2; Potency: 40mW; Wavelength: 480nm.

After treatment, the animals were sacrificed and the lesion was biopsied for histological analysis. The clinical aspect of the wounds is shown in Figure 1:

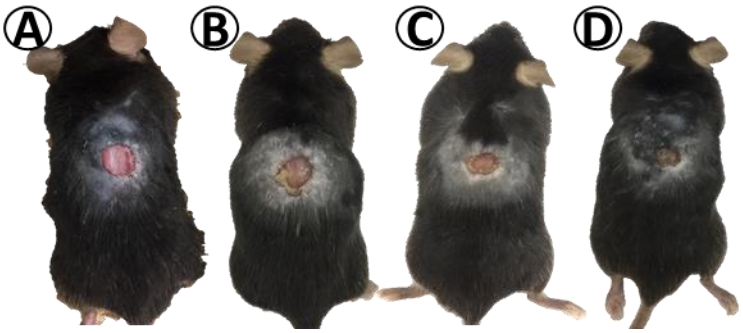

Figure 1: Diabetic animals after the wound was performed (A). After 3 days without treatment (B); treated with DUAL pen (C) and Polarized light (D).

Conclusions

Diabetic mice treated with these two PBM devices present improved healing when compared to control groups.

Acknowledgement

We would like to thank PIBIC-EM, CAPES and CNPq for the financial support.

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