PHOTOBIOMODULATION INDUCES ANALGESIC, ANTI-INFLAMMATORY AND REGENERATIVE EFFECTS IN A DENTINAL HYPERSENSITIVITY EXPERIMENTAL MODEL

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INTRODUCTION AND OBJECTIVES

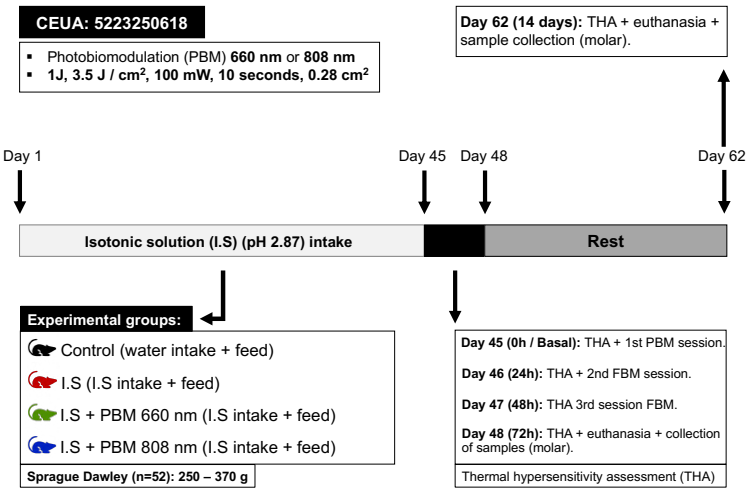
DENTINAL HYPERSENSITIVITY (DH)

PROBLEM!

Affects over **43%** of the world's population

Objective: To elucidate the anti-inflammatory and regenerative molecular mechanisms of PBM through substance P (SP) and osteopontin (OPN) respectively in an experimental model of DH in rat teeth.

MATERIALS AND METHODS



RESULTS

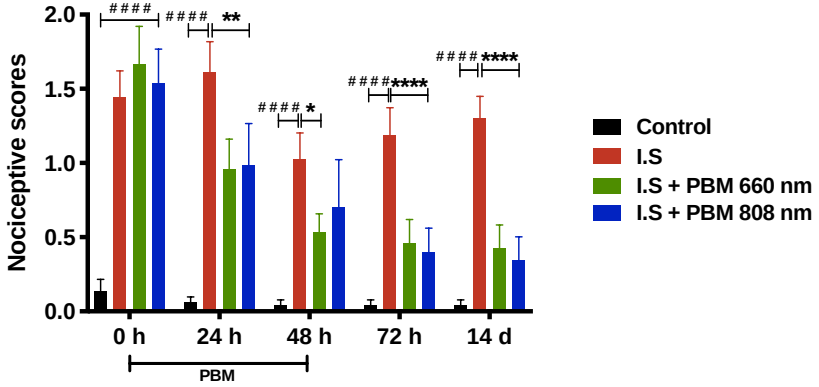


Figure 1. Evaluation of the antinociceptive effect of PBM against the cold thermal sensitivity test. The animals ingested I.S (pH 2.87) for 45 days. Thermal sensitivity tests for cold (4ºC) were performed on a 0h (basal), 24h and 48h measurement with interleaved PBM (660 nm and 808 nm) treatments (always after each measurement), totaling a number of three sessions with an interval of 24h between each of them. The 72h measurement was based on the evaluation of the short-term response of the animals to treatment and 14 days after the long-term response. PBM (660 nm and 808 nm) induced antinociception when evaluated 24h, 48h, 72h (time equivalent to 24h after conclusion of the irradiation protocol) and 14 days after the protocol of 3 consecutive sessions. Results presented as mean ± e.p.m. Two-way ANOVA followed by Bonferroni post-test: **#### p <0.0001** I.S and I.S + FBM (660 nm and 808 nm) vs. CT; **#### p <0.0001** I.S vs. CT; ****** p <0.0001** I.S vs. I.S + FBM (660 nm and 808 nm); **** p = 0.0025** I.S vs. I.S + FBM (660 nm and 808 nm) and *** p = 0.0353** I.S vs. I.S + FBM 660 nm.

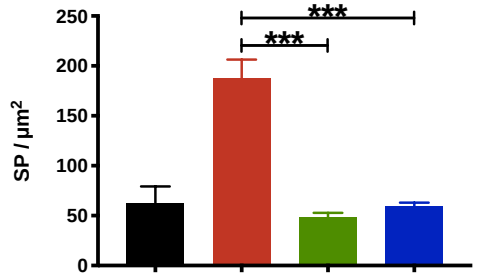


Figure 2. Immunohistochemical analysis of anti-inflammatory SP effect in the molars within 72 hours. The vertical axis refers to the amount of SP analyzed per µm² and in the horizontal axis the experimental groups are distributed. PBM (660 nm and 808 nm) induced a decrease in SP immunostaining by 72 hours (24 hours after the 3 consecutive sessions protocol) observed in the image. Results presented as mean ± e.p.m. One-way ANOVA followed by Bonferroni post-test: ***** p = 0.0004 I.S** vs. I.S + FBM 660 nm and ***** p = 0.0006** I.S vs. I.S + PBM 808 nm.

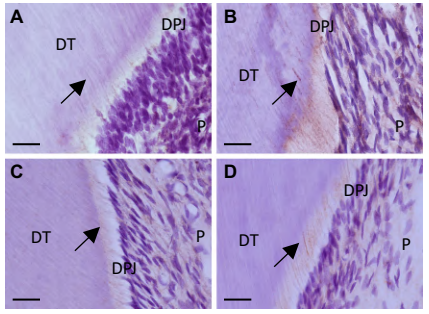


Figure 3. Representative photomicrograph of hematoxylin counterstained dentin (DT), dentin-pulp junction (DPJ) and pulp (P) immunohistochemistry. Samples (40,000 X, Bar: 20 µm) of animal molars from the groups: Control **(A)**, I.S **(B)**, I.S + PBM 660 nm **(C)** and I.S + PBM 808 nm **(D)**. Qualitative analysis demonstrated that PBM (660 nm and 808 nm) induced a decrease in SP immunostaining **(arrow)** when evaluated at 72 hours (24 hours after the 3 consecutive sessions protoco) observed in the image.

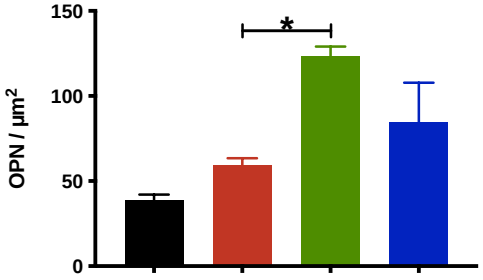


Figure 4. Immunohistochemical analysis of regenerative OPN effect in molars at 14 days. The vertical axis refers to the amount of OPN analyzed per µm² and on the horizontal axis the experimental groups are distributed. PBM (660 nm) induced increased OPN immunostaining 14 days after the 3 consecutive session protocol. Results presented as mean ± e.p.m. One-way ANOVA followed by Bonferroni post-test: *** p = 0.0433** I.S vs. I.S + PBM 660 nm.

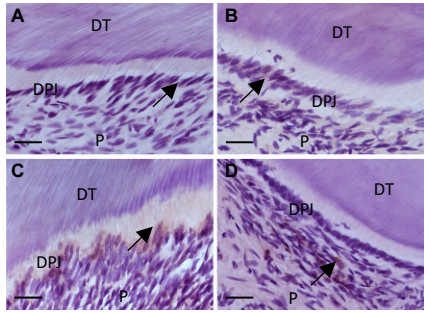


Figure 5. Representative photomicrograph of hematoxylin counterstained dentin (DT), dentin-pulp junction (DPJ) and pulp (P) immunohistochemistry. Samples (40,000 X, Bar: 20 µm) of animal molars from the groups: Control **(A)**, I.S **(B)**, I.S + PBM 660 nm **(C)** and I.S + PBM 808 nm **(D)**. Qualitative analysis showed that PBM (660 nm) induced an increase in OPN immunostaining **(arrow)** when evaluated 14 days after the 3 consecutive sessions protocol observed in the image.

CONCLUSIONS

Both **660 nm** and **808 nm** PBM induces antinociception in rats by mechanisms involving increased OPN and decreased SP immunostaning in the experimental DH model without generating adverse effects. Our data guarantees, prove and credit the efficiency of this therapeutic modality in promoting biostimulatory action accompanied by analgesic, anti-inflammatory, and regenerative effects. These indispensable effects promote a better quality of life in patients with DH.

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CAPES