Photobiomodulation Therapy

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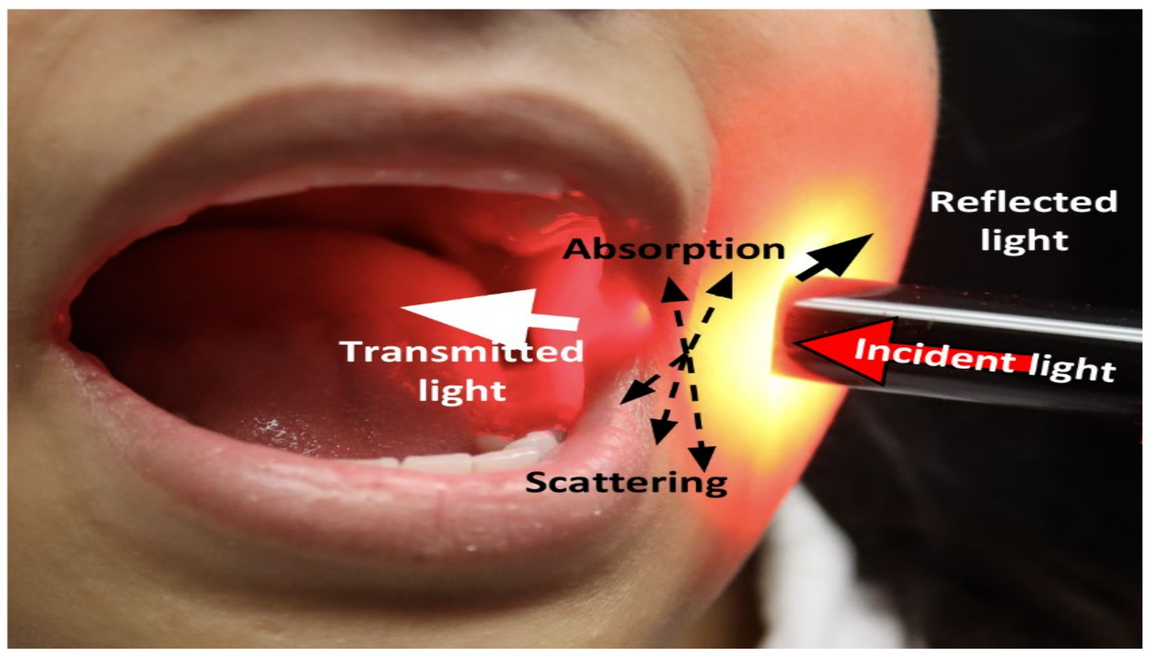
INTRODUCTION

Photobiomodualtion therapy is therapeutic use of low dose of light treatment including lasers, light emitting diodes (LED's) and broad band light at discrete wavelengths ranging from visible to near infrared, in a non-thermal manner to alleviate pain or inflammation, modulate the immune responses and promote wound healing and tissue regeneration.



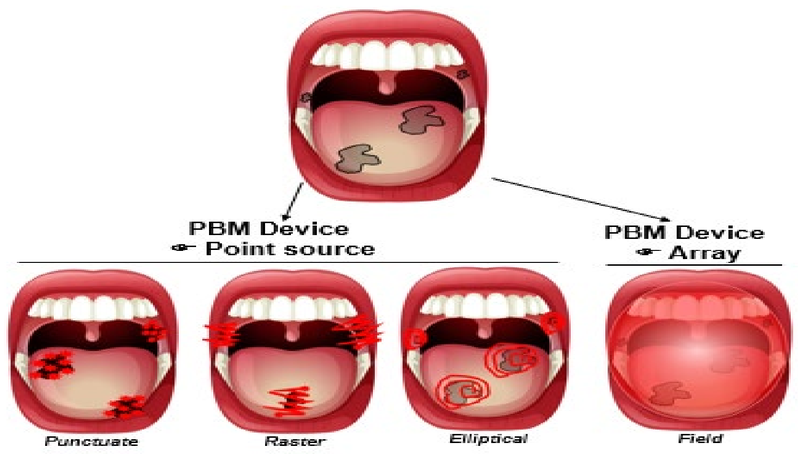
MECHANISM OF ACTION

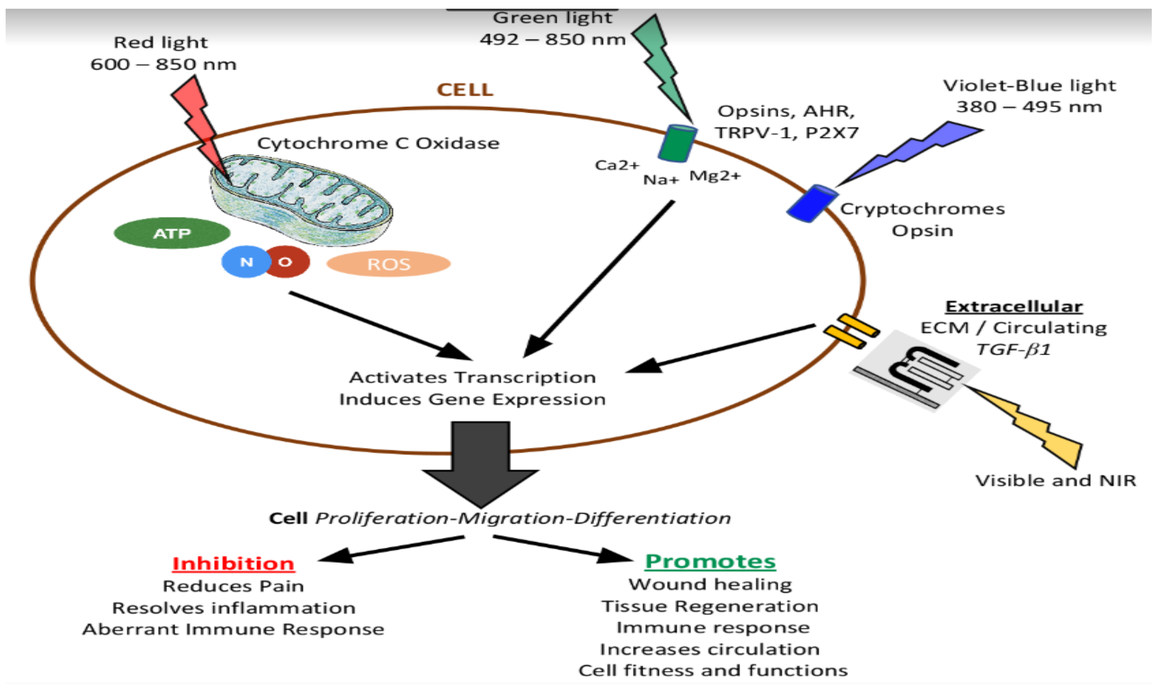
1**. Role of Mitochondrial Cytochrome-C Oxidase**
The Cytochrome C oxidase (CCO), which is situated in the inner mitochondrial membrane(IMM), is the major target for photobiomodulation therapy. Cytochrome-C is an essential component of the electron transport chain, which is responsible for cellular metabolism. PBM response is mediated by CCO at 660 (red) and 810 nm (near-infrared) wavelengths.

2. Increase Production of ATP
When light is absorbed by Cytochrome C oxidase (COX), it stimulates the electron transport chain, causing the mitochondria to produce more adenosine triphosphate (ATP). When tissue is damaged, the synthesis of ATP in the cell is inhibited, slowing the cell's metabolism as a protective strategy. PBM aids in the restoration of the oxidative process, which aids in the restoration of normal cellular activity.

3. Increased activity of Nitrous oxide and Reactive oxygen species
Laser stimulation also releases free nitric oxide (NO) and reactive oxygen species (ROS) in addition to ATP. NO is a potent vasodilator as well as a major cellular signaling molecule involved in a variety of physiological functions. Many essential physiological signaling pathways, including the inflammatory response, have been proved to be affected by ROS. Increased NO and enhanced ROS levels work together to provide an environment for quicker signaling, which leads to lower inflammation.

4. Restore the Balance of Cellular Energy
PBM aids in the restoration of normal cellular function, hence preventing apoptosis (cell death). This reduces inflammation and edema in addition to accelerating tissue healing.





INDICATIONS

Oral Mucositis, Recurrent Aphthous Stomatitis, Post- extraction healing, Temporomandibular joint disorders, Burning mouth syndrome, Oral lichen planus, Pemphigus vulgaris, Pemphigoid, Epidermolysis bullosa

CONTRAINDICATIONS

Pregnancy, Presence of known malignancy (PBM stimulates cell growth), Thyroid condition (may cause hyperthyroidism with a low dose)

CONCLUSION

PBM therapy is a non-invasive, non-pharmacological treatment that has the potential to provide significant clinical advantages as a long-term, cost-efficient, safe, and successful clinical method. More research and clinical trials will help to define more specific clinical protocols that will assure strong, consistent outcomes.

REFERENCES

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