

Probiotics in conjunction with photobiomodulation: A Novel Approach to Enhance Tissue Repair and Wound Healing

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Summary:

The purpose of this research proposal is to examine the potential benefits of probiotics and photobiomodulation (PBM) for wound healing and tissue restoration. Significant healthcare issues are posed by chronic wounds, which frequently result in complications and higher expenses. Probiotics alter the microbiome and immunological response, while PBM uses low-level light to improve cellular functions. We hypothesise that wound healing can be enhanced and expedited by combining these therapies. To investigate safety and efficacy, the project will include animal models, in vitro testing, and a pilot clinical trial. Positive results could result in novel, potent wound care solutions, improving patient care.

Area of Research & Domain of Research

Area of Research: Wound Healing

Domain of Research: Photobiomodulation and Microbiome Therapy

Objective of the Proposal:

The purpose of this proposal is to look into how probiotics and photobiomodulation (PBM) affect tissue repair and wound healing together. The best probiotic strains and PBM parameters will be assessed in this study in order to improve the healing process for different kinds of wounds. Determining the synergistic effects of probiotics and PBM, optimizing treatment procedures, and evaluating their efficacy in clinical settings are the main research difficulties.

Context/Short Synopsis

1. Which issue are you attempting to resolve?

Pressure sores and diabetic ulcers are examples of chronic wounds that present serious health risks and raise healthcare expenses and morbidity. Long healing times and antibiotic resistance are two common drawbacks of current therapy. Novel, safe, and efficient treatments that improve wound healing are required.

2. Is the answer now accessible?

Probiotics and PBM have both demonstrated potential in improving wound healing, but their combined effects have not been fully studied. Although there is a dearth of thorough research examining their synergistic advantages in clinical applications, existing studies demonstrate their promise. By methodically investigating the combined use of PBM and probiotics in wound care, this proposal seeks to close this knowledge gap.

Goals Anticipated:

A number of results are anticipated from this effort, including the identification of the best PBM parameters (wavelength, intensity, and duration) and probiotic strains that promote wound healing.

In preclinical and clinical contexts, there is evidence of better tissue repair and wound healing rates.

a deeper comprehension of the processes by which probiotics and PBM aid in healing, including how they affect microbial balance, inflammation, and collagen production.

creation of a clinical procedure that can be used in healthcare settings to integrate the use of probiotics with PBM in wound care.

Reference articles link.

1. Nanomedicine and advanced technologies for burns: Preventing infection and facilitating wound healing

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5742034/>

2. Mechanisms and applications of the anti-inflammatory effects of photobiomodulation

<https://www.aimspress.com/article/10.3934/biophy.2017.3.337/Related.html>

3. Photothermal/Photoacoustic Therapy Combined with Metal-Based Nanomaterials for the Treatment of Microbial Infections

<https://www.mdpi.com/2076-2607/11/8/2084>

4. Photophysical Mechanisms of Photobiomodulation Therapy as Precision Medicine

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9953702/>

5. Biophotonic Therapy Induced Photobiomodulation

https://link.springer.com/chapter/10.1007/978-3-030-45351-0_37

6. Knackstedt R, Gatherwright J. The role of topical probiotics on wound healing: A review of animal and human studies. **Int Wound J**. 2020;17(6):1687-1694. doi:10.1111/iwj.13451.

7. Houreld NN. Healing Effects of Photobiomodulation on Diabetic Wounds.

Appl Sci. 2019;9(23):5114.

doi:10.3390/app9235114.

8. Photobiomodulation (PBM) is the metabolic and cytological response of living cells to photons of “light energy”.

<https://www.appliedbiophotonics.com/photobiomodulation>

9. Biophotonic Therapy Induced Photobiomodulation

https://link.springer.com/chapter/10.1007/978-3-030-45351-0_37

10. How Biophotonics Is Harnessing Light for Health And Science

<https://www.photonicsonline.com/doc/how-biophotonics-is-harnessing-light-for-health-and-science-0001>

11. Probiotics in Wound Healing

[Probiotics in Wound Healing](#)

This article discusses the role of probiotics in promoting wound healing through various mechanisms.

12. Photobiomodulation Therapy for Wound Care

[Photobiomodulation Therapy for Wound Care](#)

This review examines the therapeutic applications of PBM in wound healing and its effectiveness.

13. Probiotics and Their Effect on Surgical Wound Healing

[Probiotics and Their Effect on Surgical Wound Healing](#)

This systematic review explores the impact of probiotics on surgical wound healing and their potential as therapeutic agents.

14. Probiotics, Photobiomodulation, and Disease Management

[Probiotics, Photobiomodulation, and Disease Management](#)

This article discusses the interplay between probiotics and PBM in managing diseases and enhancing healing.

15. Role of Beneficial Bacteria in Tissue Repair

[Probiotics or Pro-healers: The Role of Beneficial Bacteria in Tissue Repair](#)

This review highlights the pro-healing properties of probiotics and their mechanisms in tissue repair.

16. The Role of Topical Probiotics on Wound Healing

[The Role of Topical Probiotics on Wound Healing](#)

This article reviews animal and human studies on the effectiveness of topical probiotics in wound healing.

17. Low-intensity LASER and LED (photobiomodulation therapy) for pain control of the most common musculoskeletal conditions

<https://pubmed.ncbi.nlm.nih.gov/34913330/>

18. Photobiomodulation with simultaneous use of red and infrared light emitting diodes in the treatment of temporomandibular disorder: study protocol for a randomized, controlled and double-blind clinical trial

https://journals.lww.com/md-journal/fulltext/2019/02080/photobiomodulation_with_simultaneous_use_of_red.62.aspx

19. Pain management using photobiomodulation: Mechanisms, location, and repeatability quantified by pain threshold and neural biomarkers in mice

<https://onlinelibrary.wiley.com/doi/10.1002/jbio.201700370>

20. Effects of Low-Level Laser Therapy on Skeletal Muscle Repair

https://journals.lww.com/ajpmr/abstract/2014/12000/effects_of_low_level_laser_therapy_on_skeletal.7.aspx