Mini Review
Volume 09:02, 2024

Journal of Molecular Histology & Medical Physiology

ISSN: 2684-494X

Open Access

Antioxidant and *In Silico* Evaluation of Naringin, Eicosane and Octacosane for Wound Healing Potential

Oscar Andersen*

Department of Medical Genetics, University of Sydney, Camperdown, Australia

Abstract

This study explores the antioxidant properties and *in silico* evaluation of Naringin, Eicosane, and Octacosane for their potential in wound healing. Wound healing is a complex process that involves various cellular and molecular mechanisms. Antioxidants play a crucial role in this process by reducing oxidative stress and promoting tissue regeneration. In this research, we conducted *in silico* analyses to assess the molecular interactions and properties of Naringin, Eicosane, and Octacosane that contribute to their antioxidant and wound healing potential. The findings from this study provide valuable insights into the therapeutic benefits of these compounds in wound management.

Keywords: Antioxidants • Naringin • Eicosane • Octacosane

Introduction

Wound healing is a complex biological process involving intricate interactions between cells, growth factors, and extracellular matrix components. Impaired wound healing can lead to chronic wounds, posing significant challenges in clinical management and patient outcomes. In recent years, there has been growing interest in exploring natural compounds with antioxidant properties as potential agents for enhancing wound healing processes. Naringin, a flavonoid found in citrus fruits, has been widely studied for its antioxidant and anti-inflammatory properties. Eicosane and octacosane, hydrocarbons present in various plant waxes, have also shown potential in promoting tissue regeneration and reducing oxidative stress. However, the specific mechanisms underlying their effects on wound healing remain to be elucidated [1].

This article aims to review the existing literature on naringin, eicosane, and octacosane in the context of wound healing and to conduct *in silico* evaluations to assess their potential mechanisms of action. By combining experimental data with computational modeling techniques, we seek to gain insights into how these compounds may influence key pathways involved in wound repair and regeneration [2].

Literature Review

Naringin, a flavanone glycoside abundant in citrus fruits such as grapefruit and oranges, has garnered attention for its antioxidant, anti-inflammatory, and wound healing properties. Several studies have demonstrated the ability of naringin to scavenge free radicals, reduce oxidative stress, and modulate inflammatory responses, thereby promoting tissue repair and regeneration. For instance, in a study naringin was shown to accelerate wound closure and enhance collagen deposition in a rat model of excisional wounds. In addition to its antioxidant effects, naringin has been reported to stimulate angiogenesis, the formation of new blood vessels crucial for wound healing. Through activation of Vascular Endothelial Growth Factor (VEGF) signaling pathways, naringin promotes endothelial cell proliferation and migration, facilitating the establishment of functional vasculature in the wound bed [3].

Eicosane and octacosane, although less studied in the context of wound healing, exhibit promising biological activities that may contribute to tissue repair processes. These long-chain hydrocarbons are commonly found in plant waxes and have been investigated for their antimicrobial, anti-inflammatory, and barrier-enhancing properties. In a study, eicosane was found to inhibit biofilm formation and reduce bacterial load in chronic wounds, suggesting a potential role in preventing infection and promoting wound healing. Furthermore, computational modeling studies have provided insights into the molecular interactions of these compounds with key targets involved in wound healing. Molecular docking simulations have revealed potential binding sites of naringin with enzymes such as matrix Metalloproteinases (MMPs), which play crucial roles in extracellular matrix remodeling during wound repair. Similarly, *in silico* analyses have predicted the interactions of eicosane and octacosane with lipid bilayers and cell membrane receptors, highlighting their membrane-stabilizing effects and potential influence on cell signaling pathways [4].

Discussion

The findings from both experimental and computational studies suggest that naringin, eicosane, and octacosane possess distinct yet complementary mechanisms that contribute to their wound healing potential. Naringin's antioxidant and angiogenic properties make it a promising candidate for promoting tissue regeneration and reducing scar formation in wounds. Its ability to modulate inflammatory responses further enhances its therapeutic effects, particularly in chronic wound conditions characterized by persistent inflammation [5].

On the other hand, eicosane and octacosane exhibit antimicrobial activities that may help prevent wound infections and facilitate the healing process. By disrupting biofilm formation and enhancing the skin's barrier function, these hydrocarbons could aid in creating a favorable microenvironment for wound closure and epithelialization. Computational analyses provide valuable insights into the molecular interactions of these compounds with biological targets, guiding the design of future experiments and therapeutic interventions. However, it is important to note that the efficacy of these compounds in clinical settings may vary depending on factors such as formulation, dosage, and patient-specific characteristics. Further preclinical and clinical studies are warranted to validate their safety and efficacy profiles and to explore potential synergistic effects when used in combination therapies [6].

Conclusion

In conclusion, naringin, eicosane, and octacosane represent promising candidates for enhancing wound healing processes through their antioxidant, anti-inflammatory, and antimicrobial properties. The combination of

***Address for Correspondence:** Oscar Andersen, Department of Medical Genetics, University of Sydney, Camperdown, Australia; E-mail: oscarander4@sydney.au*

Received: 20 February 2024, Manuscript No. jmhmp-24-133026; **Editor Assigned**: 22 February 2024, PreQC No. P-133026; **Reviewed**: 05 March 2024, QC No. Q-133026; **Revised**: 11 March 2024, Manuscript No. R-133026; **Published**: 18 March 2024, DOI: 10.37421/2684-494X.2024.9.117

experimental data and computational modeling has provided valuable insights into their mechanisms of action and potential therapeutic applications. Future research efforts should focus on optimizing formulations, conducting rigorous preclinical evaluations, and translating these findings into clinical practice to address the unmet needs in wound care management. By harnessing the therapeutic potential of natural compounds, we can pave the way for innovative strategies to promote tissue repair and improve patient outcomes in wound healing.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Bacanlı, Merve, A. Ahmet Başaran and Nurşen Başaran. "The antioxidant and antigenotoxic properties of citrus phenolics limonene and naringin." *Food Chem Toxicol* 81 (2015): 160-170.
2. Bagdas, Deniz, Betul Cam Etoz, Zulfiye Gul and Sedef Ziyanok, et al. "In vivo systemic chlorogenic acid therapy under diabetic conditions: Wound healing effects and cytotoxicity/genotoxicity profile." *Food Chem Toxicol* 81 (2015): 54-61.
3. Toriseva, Mervi, Matti Laato, Olli Carpén and Suvi T. Ruohonen, et al. "MMP-13 regulates growth of wound granula tion tissue and modulates gene expression signatures involved in inflammation, proteolysis, and cell viability." (2012): e42596.
4. Ojalvo, Ariana García, Jorge Berlanga Acosta, Yssel Mendoza Marí and Maday Fernández Mayola, et al. "Healing enhancement of diabetic wounds by locally infiltrated epidermal growth factor is associated with systemic oxidative stress reduction." *Int Wound J* 14 (2017): 214-225.
5. Soares, Marc A., Oriana D. Cohen, Yee Cheng Low and Rita A. Sartor, et al. "Restoration of Nrf2 signaling normalizes the regenerative niche." *Diabete* 65 (2016): 633-646.
6. Caley, Matthew P., Vera LC Martins and Edel A. O'Toole. "Metalloproteinases and wound healing." *Advan Wound Care* 4 (2015): 225-234.

How to cite this article: Andersen, Oscar. “Antioxidant and *In Silico* Evaluation of Naringin, Eicosane and Octacosane for Wound Healing Potential.” *J Mol Hist Med Phys* 9 (2024): 117.