Perspective
Volume 9:2, 2023

Journal of Cosmetology & Trichology

ISSN: 2471-9323

Open Access

Checking Dermal Infiltration and Penetration Energy of Effective Items: The Role of Raman Microspectroscopy

Zhengzheng Jiang*

Department of Chemical and Physical Health Risks, University of Medical Cosmetology, Zhejiang, China

Introduction

When it comes to topical items, such as skincare products or pharmaceutical preparations, their effectiveness relies on their ability to infiltrate and penetrate the skin barrier. Dermal infiltration refers to the process of the active ingredients entering the dermis, while penetration energy relates to the force required for these ingredients to reach deeper skin layers. This article aims to shed light on the significance of assessing dermal infiltration and penetration energy and how it contributes to determining the effectiveness of topical items. The skin is a complex organ with multiple layers, including the epidermis and the dermis. The outermost layer, the stratum corneum, acts as a protective barrier, preventing the penetration of external substances. For topical items to exert their desired effects, their active ingredients must successfully traverse this barrier and reach the deeper layers of the skin [1].

Discussion

Dermal infiltration refers to the movement of active ingredients from the outermost layer of the skin into the dermis, where they can interact with their target sites. Penetration energy, on the other hand, is the force or energy required for these ingredients to overcome the resistance posed by the stratum corneum and penetrate into the deeper layers of the skin. Raman microspectroscopy is a powerful analytical technique that utilizes laser-induced scattering of light to provide detailed molecular information about a sample. In the context of topical items and skin samples, Raman microspectroscopy plays a crucial role in analyzing their chemical composition, characterizing active ingredients and understanding their interaction with the skin. This article explores the significance of Raman microspectroscopy in the field of dermatology and skincare research. Raman spectroscopy is based on the Raman scattering phenomenon, where a sample's molecules scatter incident light, resulting in a unique spectral fingerprint that reflects its chemical composition. Raman microspectroscopy combines this technique with microscopy, enabling the analysis of specific regions within a sample with high spatial resolution. Raman microspectroscopy allows for non-invasive analysis of skin samples to assess the penetration of active ingredients. By analyzing the Raman spectra obtained from different skin layers, researchers can understand the depth and distribution of these ingredients, aiding in the development of optimized formulations [2,3].

Raman microspectroscopy provides insights into the structure and composition of the skin barrier. It can assess lipid organization, hydration levels and protein conformation, helping researchers understand the impact of topical items on skin barrier function and identify potential mechanisms of action. Raman microspectroscopy has shown promise in diagnosing and monitoring skin diseases. By analyzing Raman spectra of skin lesions or affected areas, researchers can identify biochemical changes associated with specific conditions, aiding in early detection, accurate diagnosis and treatment monitoring. Several techniques are employed to evaluate the dermal infiltration and penetration energy of topical items. These techniques aim to provide insights into the effectiveness of these products and guide formulation improvements. Here are some commonly used methods: In vitro permeation studies involve using artificial skin models or excised human or animal skin samples to assess the permeation and penetration of active ingredients. These studies measure the quantity of the active ingredient that passes through different skin layers over a specific period. They provide valuable information about the kinetics and depth of penetration of the ingredients. Skin absorption studies involve applying the topical item to the skin surface and monitoring the absorption of its active ingredients. Techniques such as tape stripping or skin biopsy can be used to sample and analyze the amount of the active ingredient present in different skin layers. These studies provide insights into the distribution and concentration of the active ingredient within the skin. Advanced imaging techniques like confocal microscopy or optical coherence tomography (OCT) can be utilized to visualize the penetration of active ingredients into the skin layers. These techniques allow for real-time visualization of the movement and distribution of the active ingredients, providing a qualitative assessment of dermal infiltration. Computational modeling techniques, such as molecular dynamics simulations, can be employed to predict the behavior and penetration of active ingredients based on their physicochemical properties. These models simulate the interactions between the active ingredients and the skin, providing valuable insights into their dermal infiltration capabilities [4,5].

Conclusion

Raman microspectroscopy plays a pivotal role in the analysis of topical items and skin samples in dermatology and skincare research. Its ability to provide chemical composition information, ingredient distribution mapping and penetration analysis contributes to a better understanding of product efficacy, formulation optimization and skin interactions. Determining the dermal infiltration and penetration energy of active ingredients helps assess the efficacy of topical items. If the active ingredients cannot effectively penetrate the skin barrier, their therapeutic or cosmetic effects may be limited or nonexistent. Understanding the dermal infiltration and penetration energy of active ingredients guides formulation optimization. It allows for the development of delivery systems or modifications that enhance the penetration capabilities, ensuring optimal efficacy of topical items. Assessing dermal infiltration and penetration energy also helps evaluate the safety of topical items. If active ingredients penetrate too deeply or in excessive amounts, they may reach systemic circulation, potentially leading to systemic side effects or interactions.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

***Address for Correspondence:** Zhengzheng Jiang, Department of Chemical and Physical Health Risks, University of Medical Cosmetology, Zhejiang, China; E-mail: jiang121@gmail.com*

Received: 10 February, 2023, Manuscript No. JCTT-23-101720; **Editor assigned:** 13 February, 2023, PreQC No. P-101720; **Reviewed:** 04 March, 2023, QC No. Q-101720; **Revised:** 10 March, 2023, Manuscript No. R-101720; **Published:** 17 March, 2023, DOI: 10.37421/2471-9323.2023.9.213

References

1. Brenner, Michaela and Vincent J. Hearing. "The protective role of melanin against UV damage in human skin." *J Photochem Photobio* 84 (2008): 539-549.

2. Hsu, Kai-Di, Hong-Jhang Chen, Chi-Shin Wang and Chi-Chin Lum, et al. "Extract of Ganoderma formosanum mycelium as a highly potent tyrosinase inhibitor." *Sci Rep* 6 (2016): 1-9.

3. Cao, Wei, Xuhao Zhou, Naneki C. McCallum and Ziying Hu, et al. "Unraveling the structure and function of melanin through synthesis." *J Am Chem Soc* 143 (2021): 2622-2637.

4. Kuo, Hsing-Chun, Yen-Wenn Liu, Chi-Chin Lum and Kai-Di Hsu, et al. "Ganoderma formosanum exopolysaccharides inhibit tumor growth via immunomodulation." *Int J Mol Sci* 22 (2021): 11251.

5. Chou, Chun-Hsu, Ming-Shiun Tsai, Hsin-Yu Lu and Chao-Kai Chang, et al. "Enzymatic hydrolysates obtained from Trametes versicolor polysaccharopeptides protect human skin keratinocyte against AAPH-induced oxidative stress and inflammatory." *J Cosmet Dermatol* 18 (2019): 2011-2018.

How to cite this article: Jiang, Zhengzheng. “Checking Dermal Infiltration and Penetration Energy of Effective Items: The Role of Raman Microspectroscopy.” *J Cosmo Tricho* 9 (2023): 213.