



Clinical-Medical Image

Enhancing Biocompatibility and Biointegration of Human Acellular Dermal Matrix *via* Vacuum Plasma Surface Treatment

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Brief Report

The human acellular dermal matrix is widely utilized in medical applications due to its structural and functional properties, providing a scaffold for tissue repair and regeneration. However, its clinical performance often depends on its biocompatibility and biointegration. Enhancing these properties is essential to improving the efficacy of HADM in diverse applications. Vacuum plasma surface treatment has emerged as a promising technique to modify biomaterials and optimize their interactions with host tissues. Vacuum plasma treatment involves the generation of ionized gas under controlled conditions to alter the surface characteristics of materials. When applied to HADM, this technique enhances its surface energy and introduces functional groups that promote cell adhesion, proliferation, and differentiation. These modifications create a more favorable environment for cellular integration, leading to improved tissue regeneration and healing outcomes.

Studies have demonstrated that vacuum plasma treatment can significantly enhance the biocompatibility of HADM by reducing immunogenicity and increasing its ability to support cellular attachment and growth. Additionally, this surface treatment improves the biointegration of HADM by facilitating the infiltration of host cells and vascularization, which are critical for successful tissue repair. The process is also highly versatile, allowing for customization of surface properties to meet specific clinical requirements. Despite its potential, the clinical translation of vacuum plasma-treated HADM requires further research to ensure long-term stability and effectiveness. Challenges such as scalability, cost, and regulatory considerations must be addressed to facilitate its widespread adoption. Nonetheless, this innovative approach represents a significant advancement in biomaterials science, offering a practical solution to enhance the therapeutic performance of HADM.

By improving the biocompatibility and biointegration of HADM, vacuum plasma surface treatment holds the potential to transform regenerative medicine and significantly enhance patient outcomes in various reconstructive and reparative procedures [1,2].

Keywords: Phrenic nerve; Respiratory dysfunction; Diaphragm electromyography

Acknowledgement

None.

Conflict of Interest

None.

References

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