

# Hyaluronic acid based adipose tissue derived extracellular matrix scaffold in wound healing: Histological and immunohistochemical study

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## Introduction

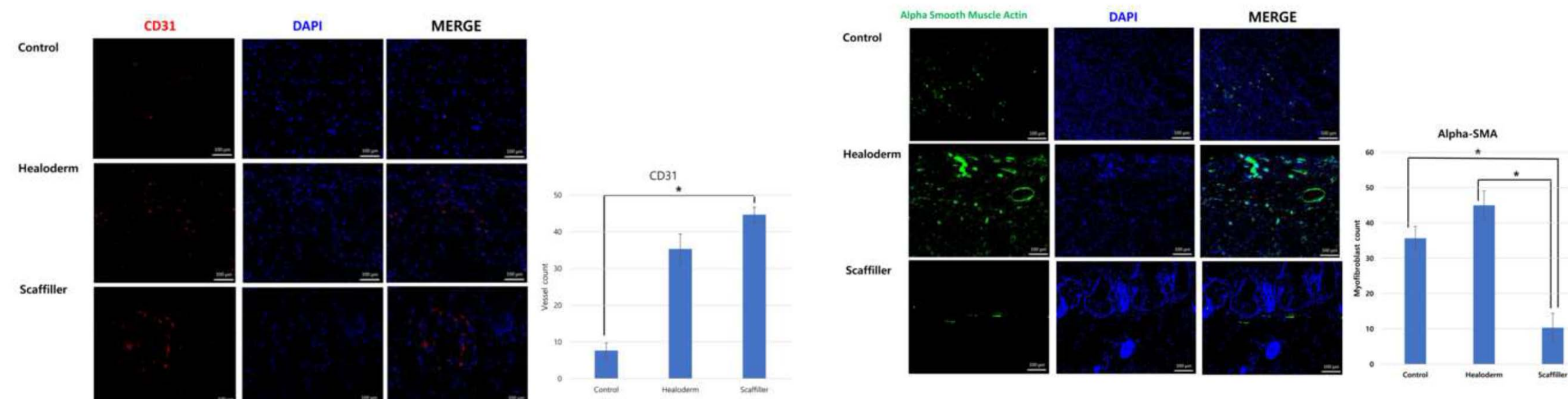
Adipose tissue is considered the most accessible and optimal source of extracellular matrix (ECM) products in clinical settings. We evaluated the effectiveness of human adipose tissue-derived ECM (adECM) sheets as a wound dressing material. To enhance healing potential and cost-effectiveness, we modified adECM sheets by adjusting ECM concentration and incorporating crosslinked hyaluronic acid (HA). Adipose tissue was obtained from healthy donors, processed, and casted into ECM sheets.

## Materials and Methods

Crosslinked HA was added to create ECM-HA sheets (Scaffiller, Medikan, Korea). In vitro analysis involved seeding adipose-derived stem cells (ASCs) onto porous ECM-HA sheets and evaluating cell survival rate and cytokine array after 3 days. In vivo efficacy, applying ECM-HA sheets to full-thickness wounds in a rat model, with HA-based dressing and adECM sheets as control groups. Re-epithelialization and collagen deposition were examined through histopathological examinations, while immunohistochemistry was used to wound healing.

## Conclusion

Our study successfully fabricated ECM-HA sheets incorporating adECM and HA, hold promise as scaffolds for adipose-derived stem cells, showcasing significant therapeutic potential for wound healing applications.

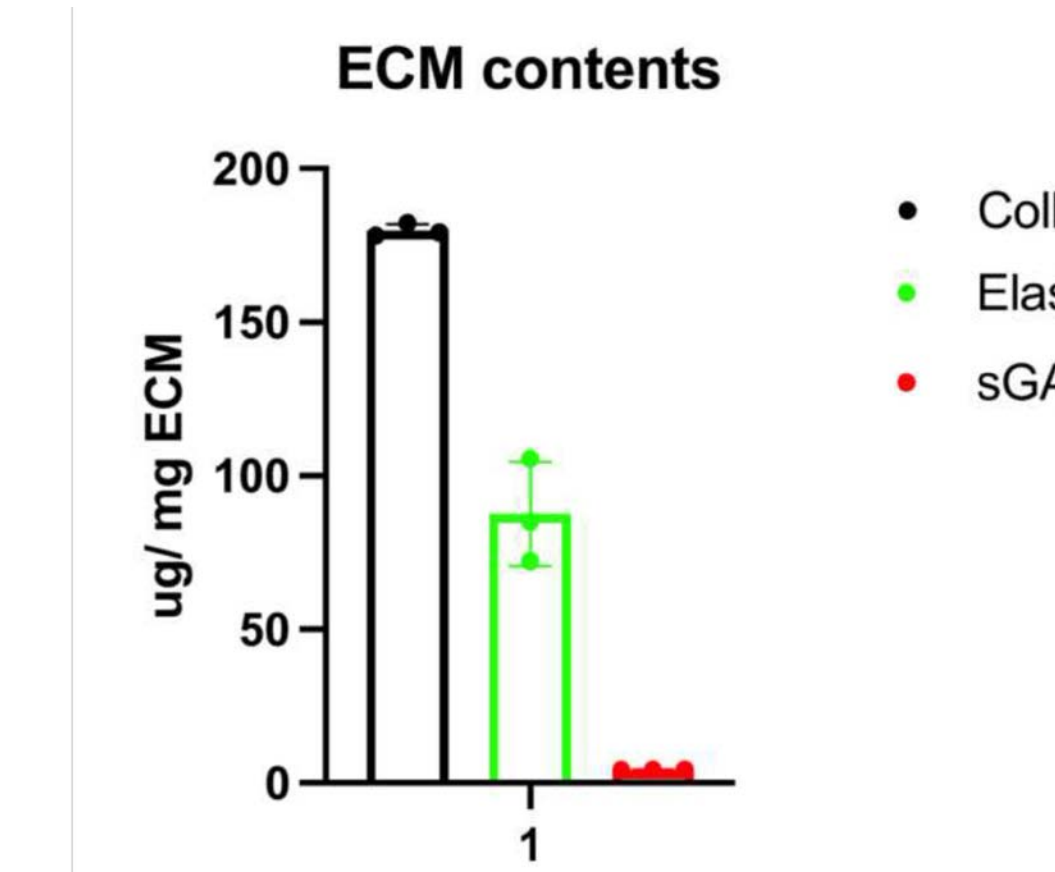


## Results

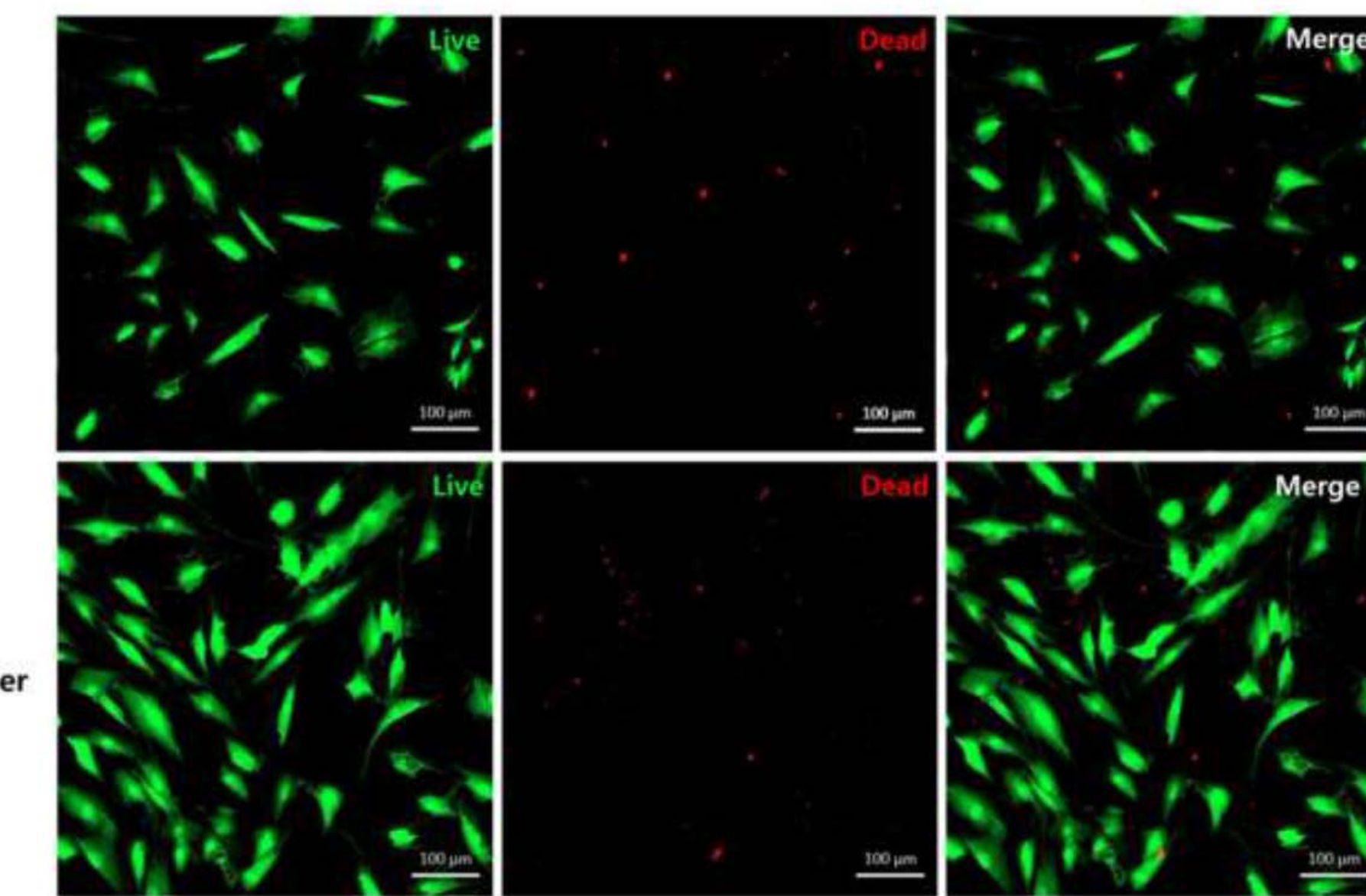
The extracted ECM components accounted for approximately 5% of the original tissue volume, with ECM-HA sheet production efficiency being six times higher than adECM sheet. In vitro analysis revealed favorable ASC survival rates and increased angiogenic and bioactive cytokine levels in ECM-HA sheet. Macroscopic evaluation showed enhanced healing rates, while histological analysis demonstrated improved epithelialization, thicker dermis, increased collagen deposition, and enhanced vascularity in the ECM-HA group.



Macroscopic view of ECM-HA sheet derived from human adECM and crosslinked HA. (Diameter of 20mm)



The protein components of Scaffiller.



Fluorescence microscopy images of Live/Dead assay. ASCs cultured in Scaffiller after 3 days. Red denotes dead cells, whereas green denotes live cells. The combined photos show both living and dead cells. Scale bar = 100 μm.

