Mesenchymal Stem cell Loaded Thermosensitive Hydrogel Wound Dressings in Wound Healing

Wound Healing

R. Gu et al., “Research progress related to thermosensitive hydrogel dressings in wound healing: a review,” Nanoscale Advances, vol. 5, no. 22, pp. 6017–6037, Jan. 2023, doi: 10.1039/d3na00407d.

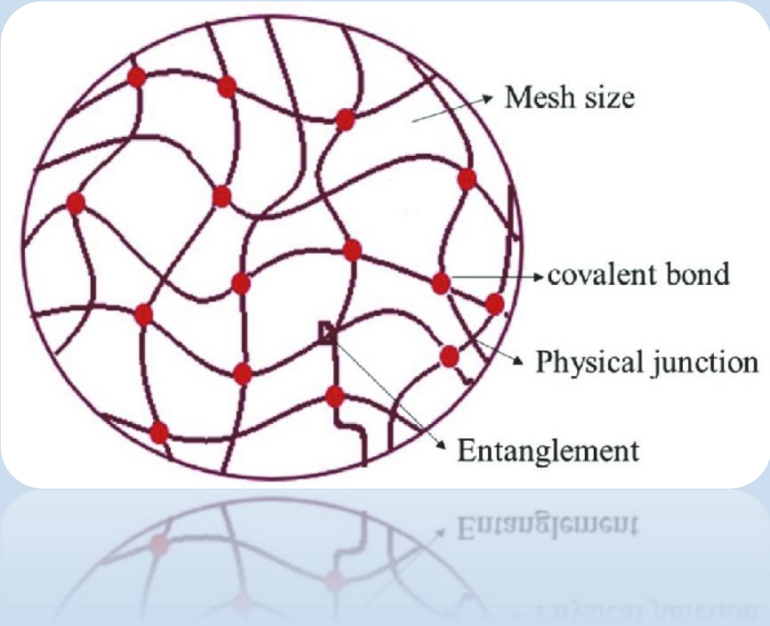
Rules of dressings in Wound Healing

- protective physical barrier
- Moisture Management
- Absorb wound exudate
- Prevent bacterial infection
- Promote tissue regeneration
- anti-inflammatory properties
- Enhance angiogenesis and collagen synthesis
- Therapeutic agents delivery
- pressure redistribution
- Pain Reduction and Comfort
- Temperature Regulation

Gefen, Amit, P. Alves, D. Beeckman, Breda Cullen, J. Lázaro-Martínez, Hadar Lev-Tov, Nick Santamaria, et al. “Fluid Handling by Foam Wound Dressings: From Engineering Theory to Advanced Laboratory Performance Evaluations.” International Wound Journal 21 (2024).

Hydrogels in Wound Care

- High water content
- Biocompatibility
- Flexibility and conformability
- thermosensitivity
- Controlled release of therapeutics



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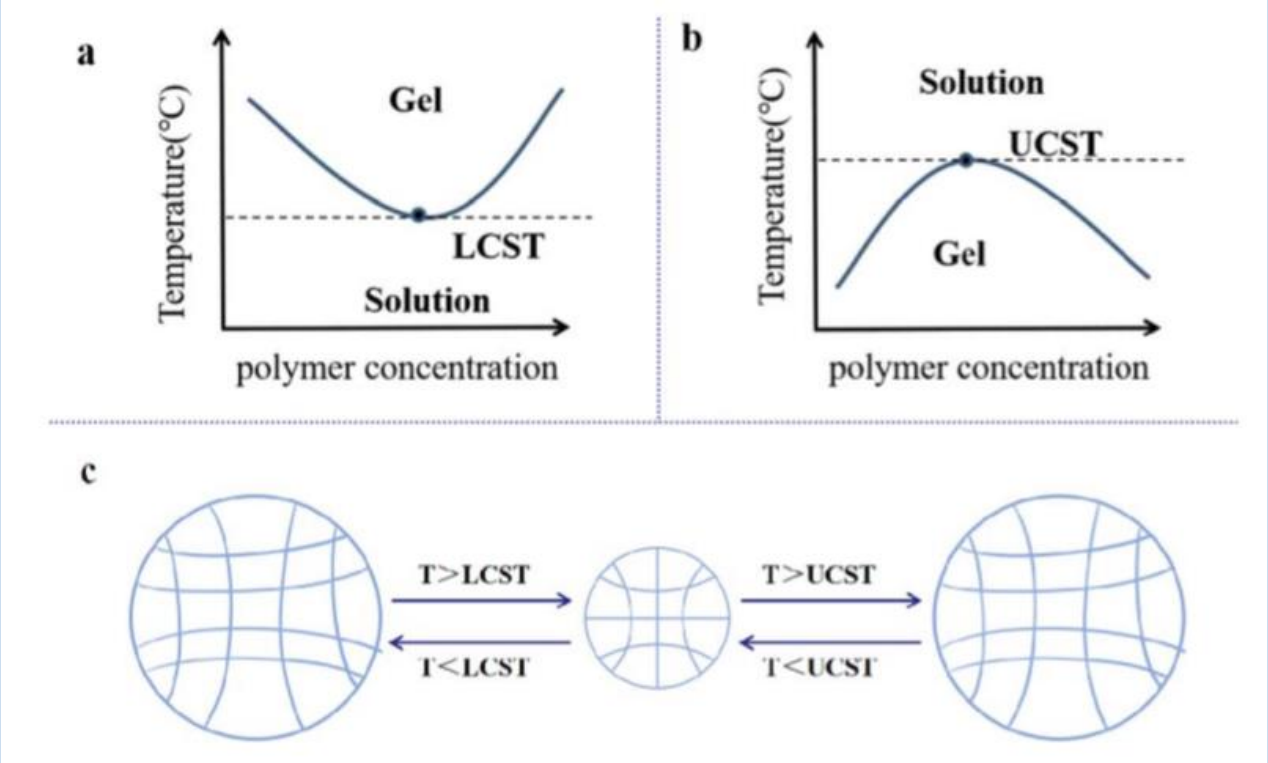
Thermosensitive Hydrogels

Thermal shrinkable



Thermal expandable

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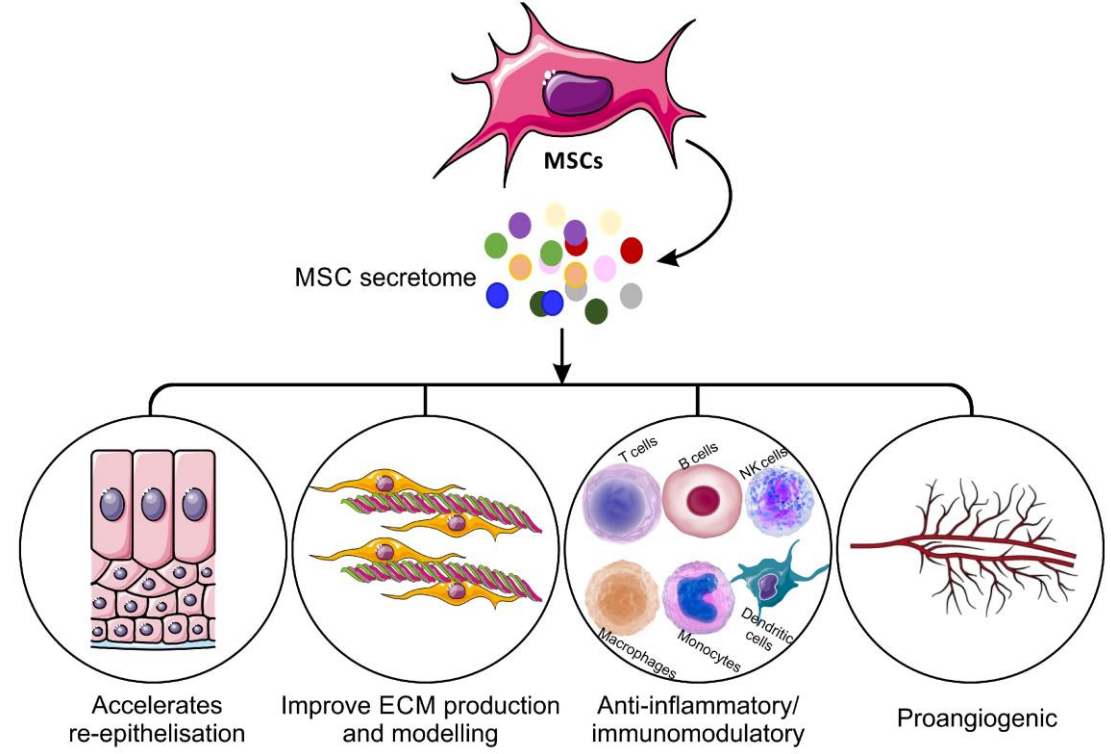
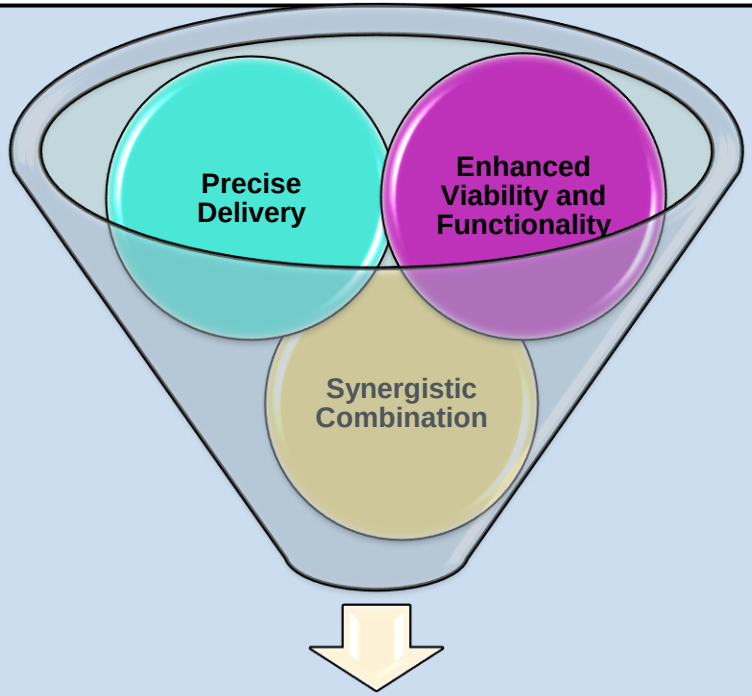
Mesenchymal Stem Cell in Wound Healing



P. Ahangar, S. J. Mills, and A. J. Cowin, “Mesenchymal stem cell secretome as an emerging Cell-Free alternative for improving wound repair,” International Journal of Molecular Sciences, vol. 21, no. 19, p. 7038, Sep. 2020, doi: 10.3390/ijms21197038.

Integration of Stem Cells with Thermosensitive Hydrogels



Improved Healing Outcomes

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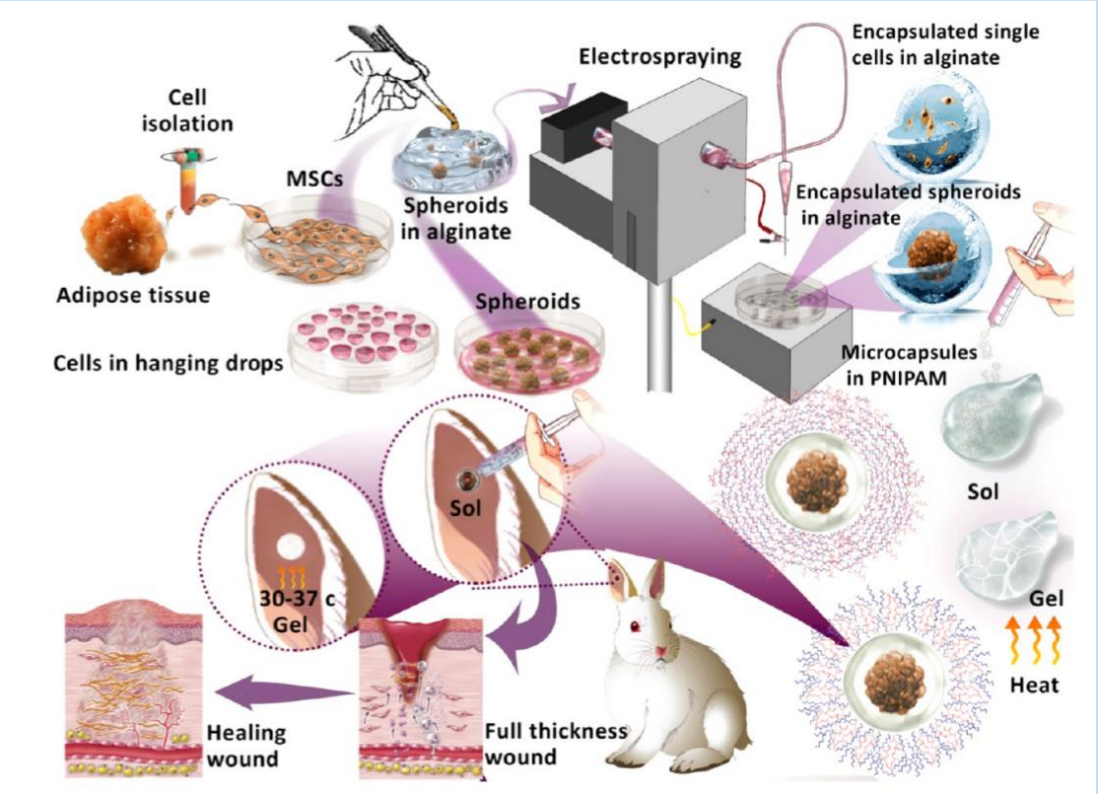
Case study No.1



"Mesenchymal stem cell spheroids embedded in an injectable thermosensitive hydrogel: an in situ drug formation platform for accelerated wound healing | ACS Biomaterials Science & Engineering." https://pubs.acs.org/doi/10.1021/acsbiomaterials.0c00988

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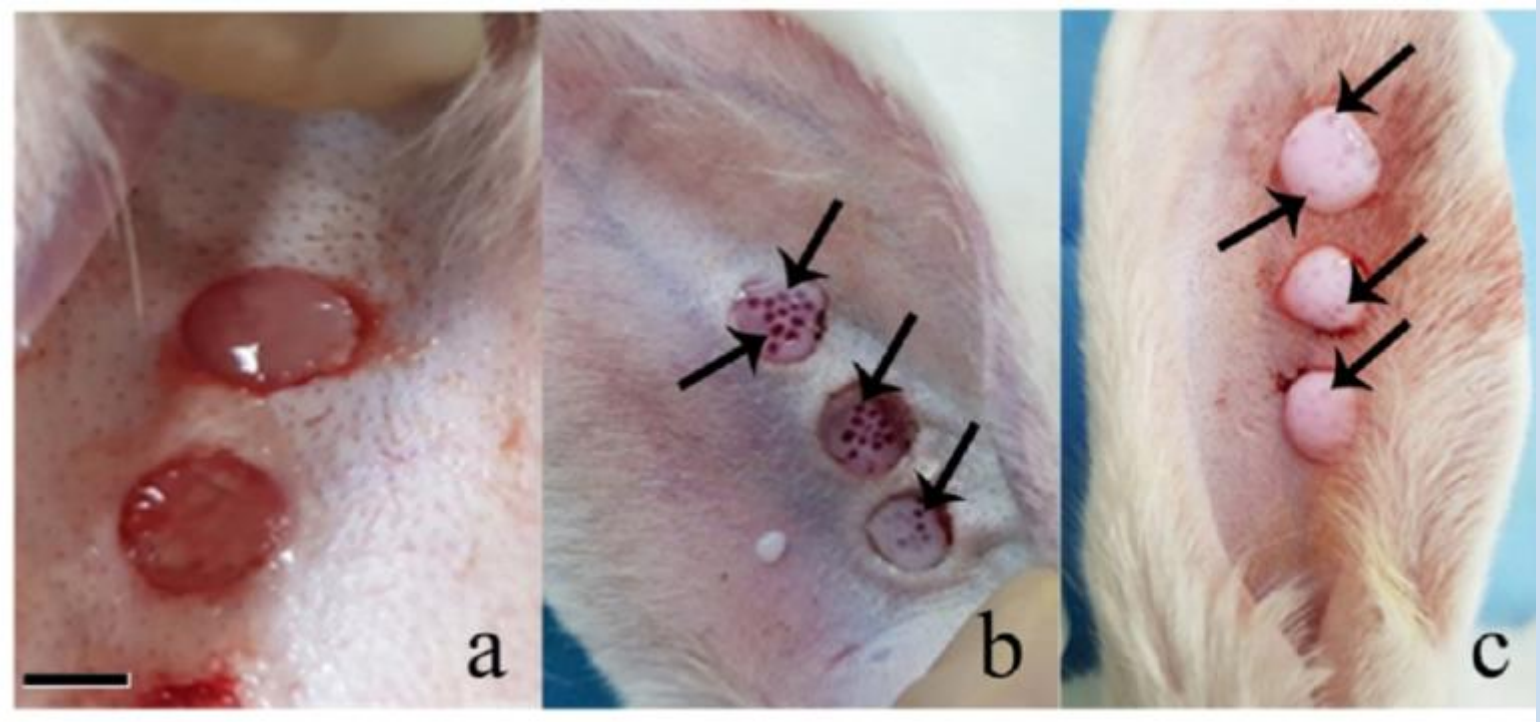

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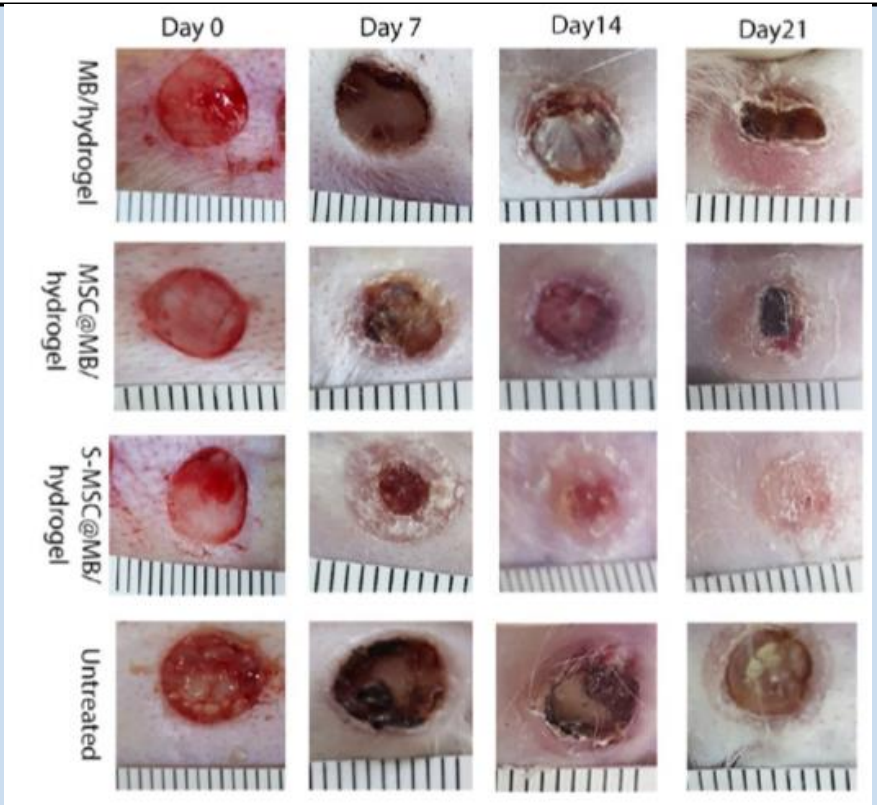

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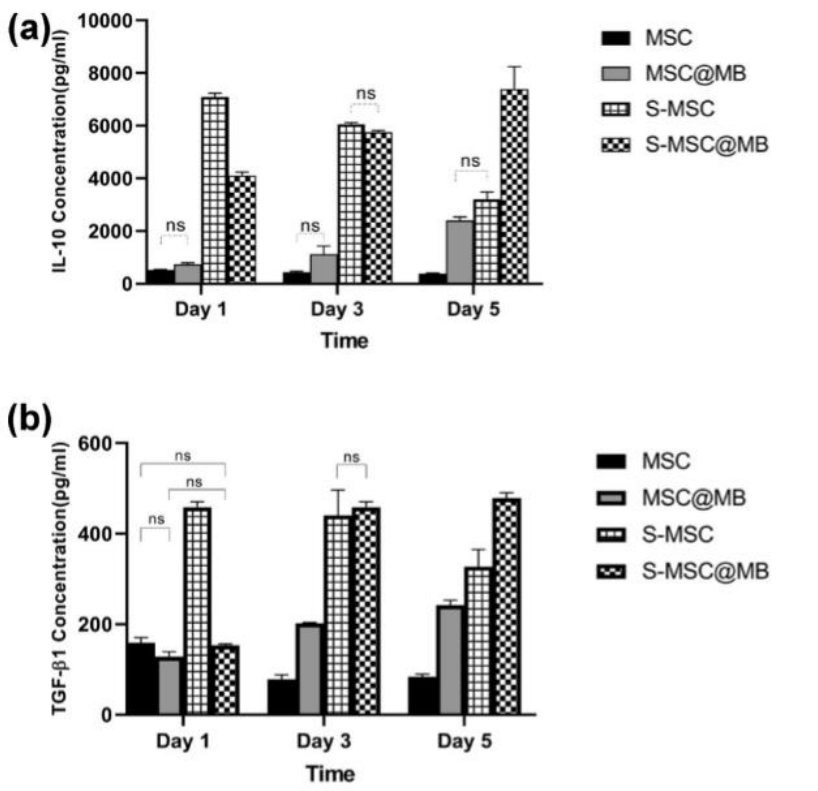

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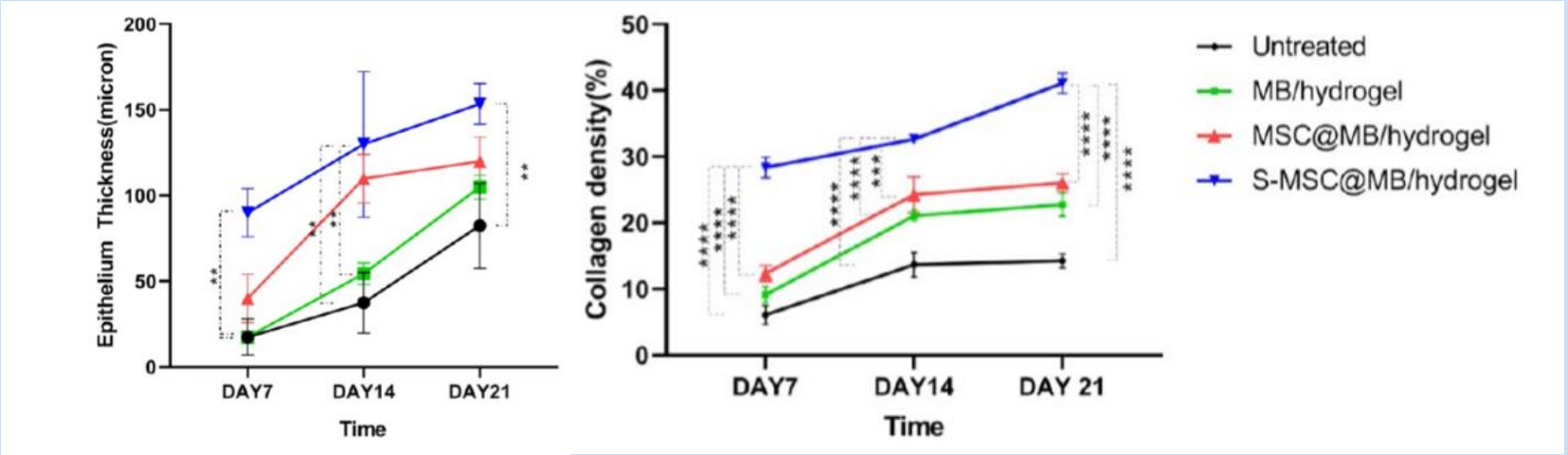

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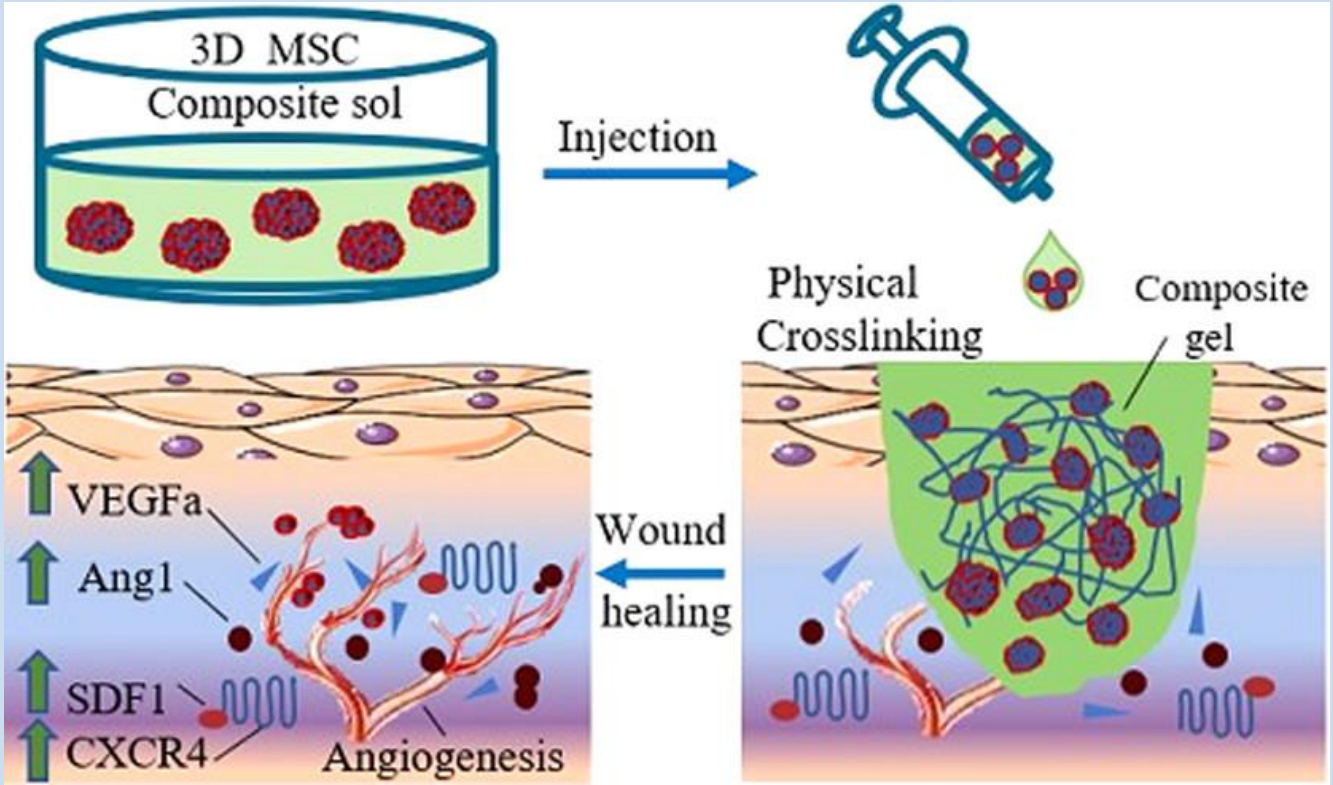
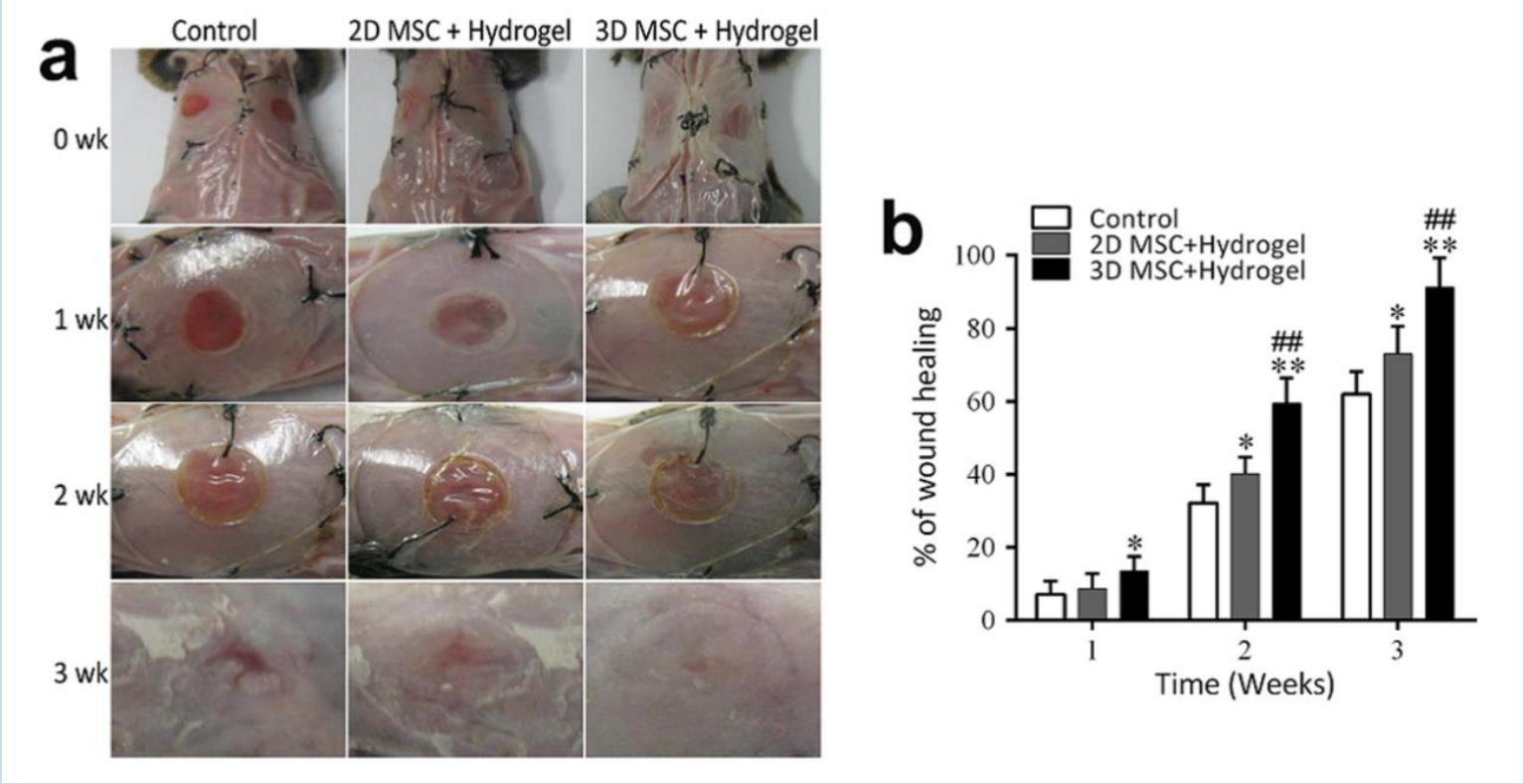
Case study No.2



M. Yang, S. He, Z. Su, Z. Yang, X. Liang, and Y. Wu, “Thermosensitive injectable Chitosan/Collagen/B-Glycerophosphate composite hydrogels for enhancing wound healing by encapsulating mesenchymal stem cell spheroids,” ACS Omega, vol. 5, no. 33, pp. 21015–21023, Aug. 2020, doi 10.1021/acsomega.0c02580.

Thermosensitive Injectable Chitosan/Collagen/β-Glycerophosphate Composite Hydrogels for Enhancing Wound Healing by Encapsulating Mesenchymal Stem Cell Spheroids



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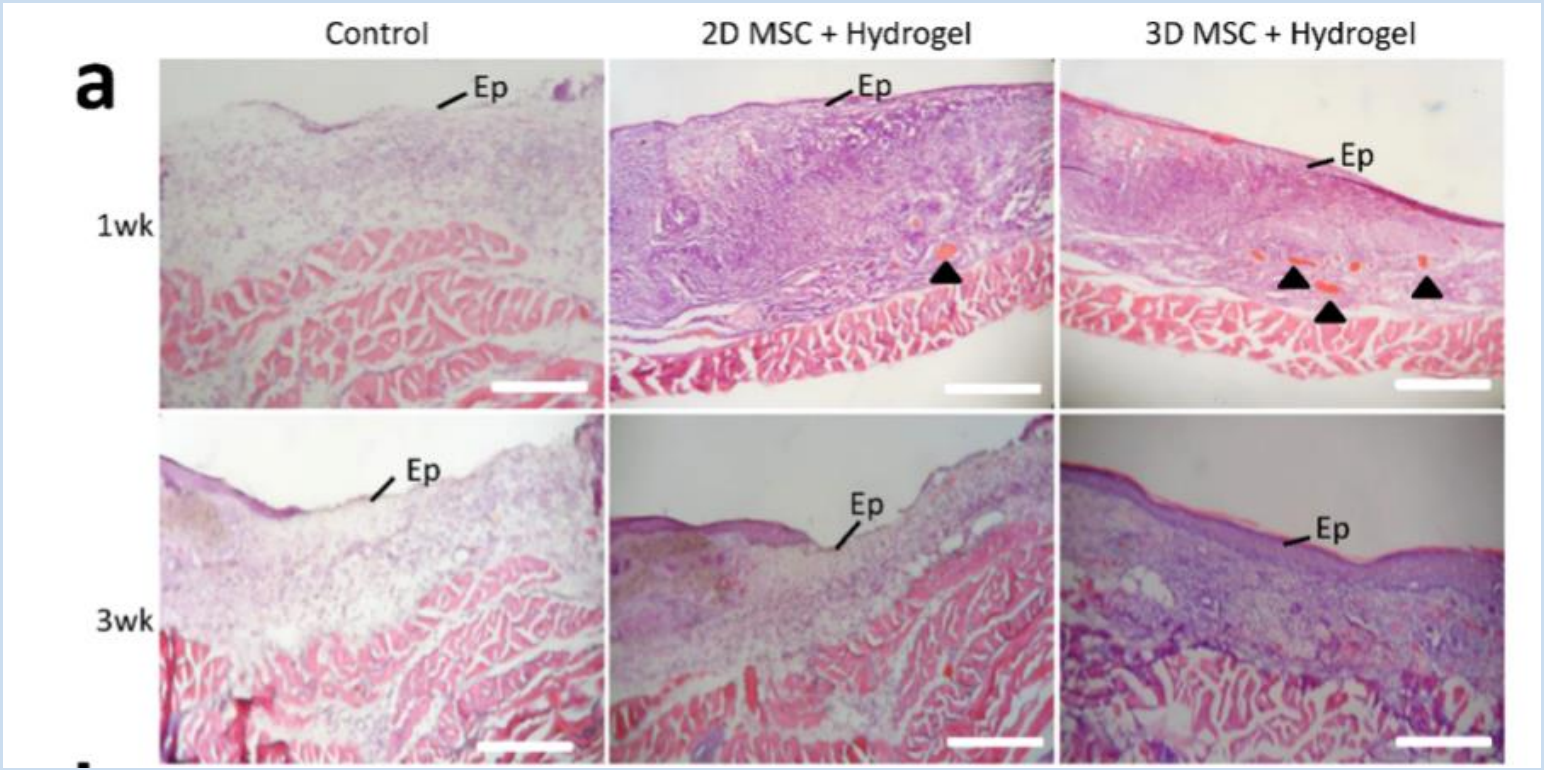

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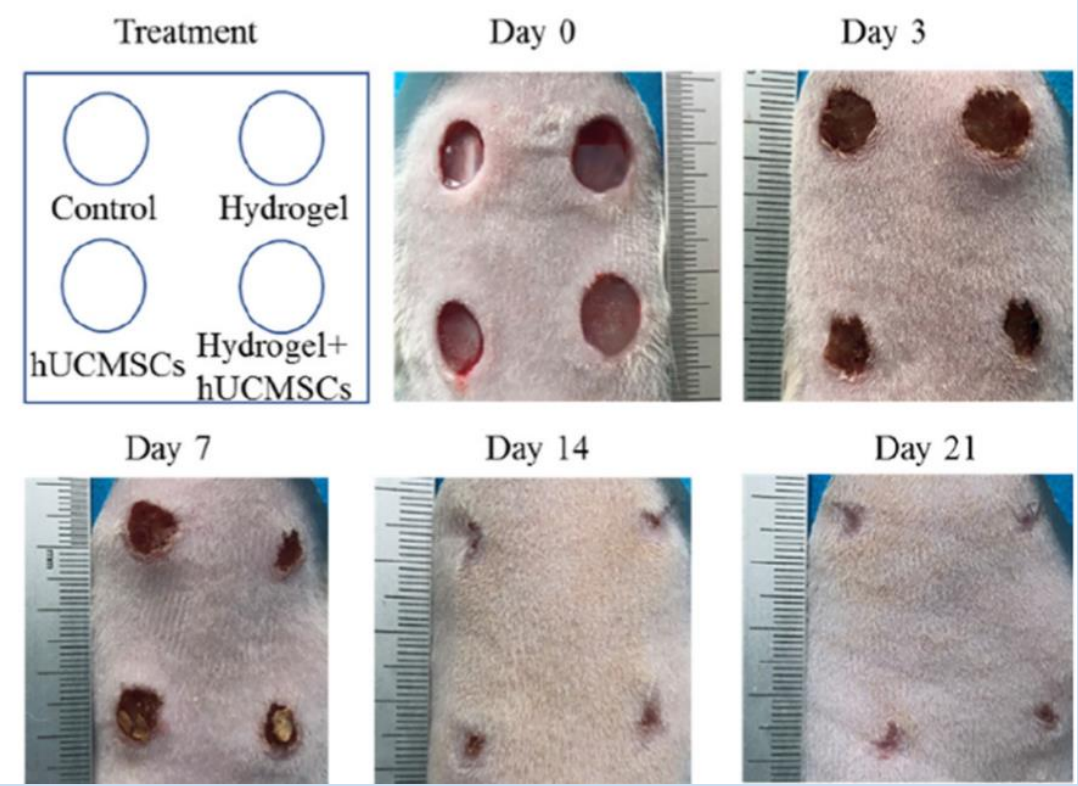

H. Xu et al., “Enhanced cutaneous wound healing by functional injectable thermo-sensitive chitosan-based hydrogel encapsulated human umbilical cord-mesenchymal stem cells,” International Journal of Biological Macromolecules, vol. 137, pp. 433–441, Sep. 2019, doi: 10.1016/j.ijbiomac.2019.06.246.

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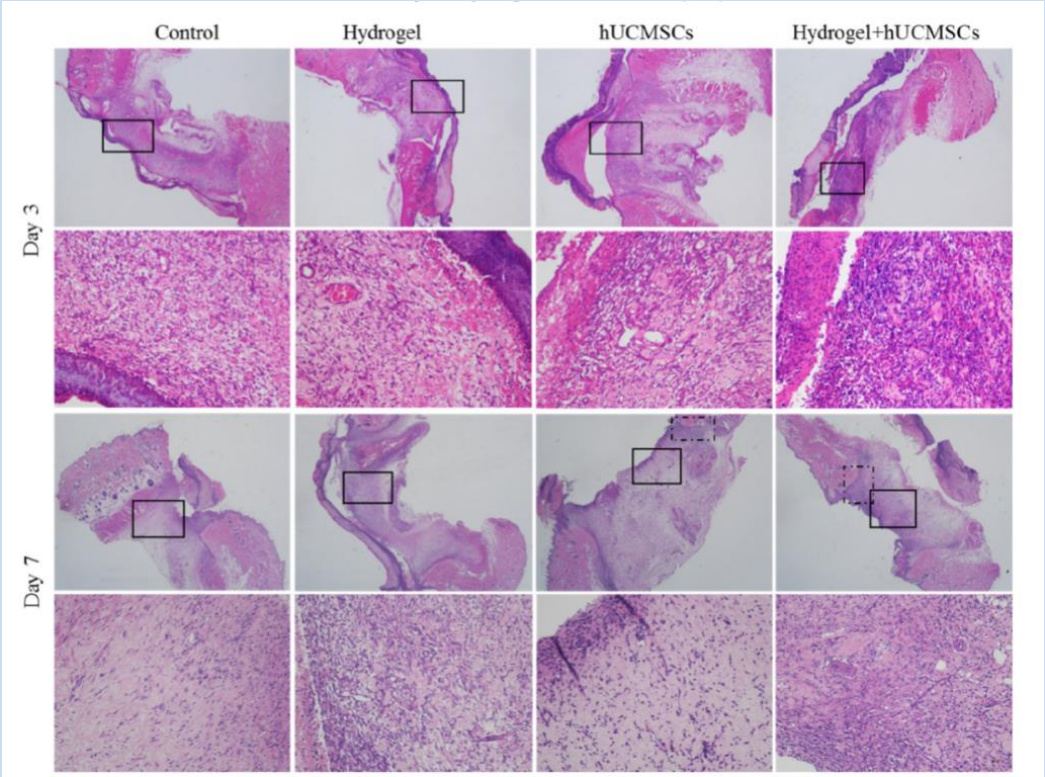

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Thanks for your attention