

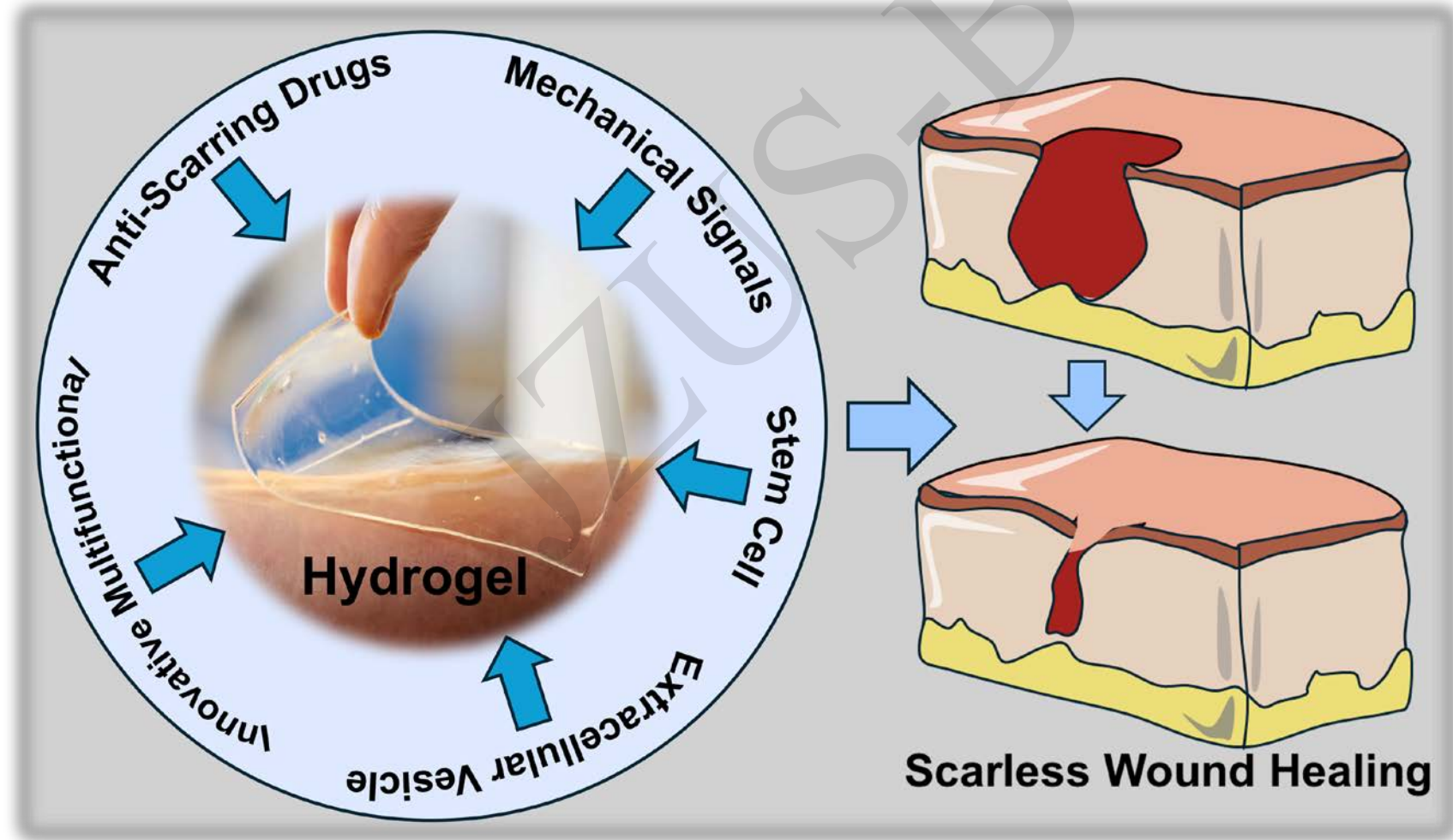
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Promoting skin regeneration: research progress on hydrogel wound dressings related to scarless healing

Key words: Hydrogel; Wound dressings; Scarless healing; Tissue regeneration; Scars

Research Summary

This review details the concept and mechanisms of scarless healing and explores the application of hydrogel dressings loaded with anti-scarring drugs, stem cells, and extracellular vesicles in scarless wound healing.



Innovation points

- 1. Photoreactive Hydrogels:** Hydrogels like HAMA/Lap that rapidly form in situ, adapt to wound shapes, and release bioactive molecules to promote scarless healing.
- 2. Mechanical Signal Modulation:** Hydrogels with YAP inhibitors (e.g., Verteporfin) that reduce scar formation by inhibiting the Hippo/YAP signaling pathway.
- 3. Tension-Reducing Hydrogels:** Dressings that contract at body temperature to reduce skin tension and minimize scarring.
- 4. Stem Cell-Loaded Hydrogels:** Incorporating stem cells into hydrogels to enhance tissue regeneration and scarless healing.
- 5. Extracellular Vesicle-Loaded Hydrogels:** Using EVs to promote wound healing and reduce scarring through controlled release.
- 6. Multifunctional Hydrogels:** Combining antibacterial, anti-inflammatory, and regenerative properties in a single hydrogel system.
- 7. Advanced Drug Delivery:** Hydrogels with liposomes or photo-responsive elements for precise and controlled drug release.
- 8. Regeneration-Directed Artificial Skin:** DNA-based hydrogels that simulate natural skin and promote scarless healing and appendage regeneration.