Docket #: S23-199

Using protein signaling to promote regenerative wound healing and reduce scarring

Stanford scientists have discovered that a specific protein signaling pathway can promote regenerative wound healing by suppressing fibrosis-related mechanosignaling. Application of this protein to wounds can reduce scarring and promote the regrowth of functional skin elements like hair follicles and sweat glands that are typically absent in scars. This approach has promising clinical applications for scar prevention in surgical procedures and may be broadly applicable to treating various fibrotic conditions.

Skin wound healing is a complex biological process that typically results in scar formation, especially when wounds penetrate through the dermis. Scars not only cause cosmetic concerns but can also lead to functional limitations including restricted movement, pain, and loss of dermal appendages such as hair follicles and sweat glands. Current therapeutic approaches for reducing scarring often involve ablating fibrogenic cell populations, which can impair the wound healing process by eliminating cells necessary for proper repair. Despite decades of research, no effective therapeutic strategies exist for successfully preventing or reversing the fibrotic process that leads to scarring, and true skin regeneration—defined by recovery of dermal appendages, normal extracellular matrix structure, and appropriate mechanical strength—has remained an elusive goal in wound management.

Application of this protein signaling pathway activator to wounds effectively suppresses fibrosis-related mechanosignaling, resulting in significantly reduced scarring. Treated wounds exhibit remarkable regenerative properties, including the regrowth of dermal appendages—hair follicles, sweat glands, and sebaceous glands—that are typically absent in conventional scars. Importantly, this approach

demonstrated particular effectiveness for surgical wounds, where planned incisions often result in substantial scarring. Consequently, this technology represents a significant advancement in wound management with potential applications in surgical procedures and various fibrotic conditions throughout the body.

Stage of Development:
Preclinical – in-vivo data

Applications

- Prevention of scarring in surgical wounds and planned incisions
- Treatment of existing scars to promote regenerative healing
- Management of burn wounds and traumatic skin injuries
- Potential treatment for various fibrotic conditions beyond the skin
- Regeneration of functional dermal appendages in damaged tissue

Advantages

- Promotes true regenerative healing rather than fibrotic scarring
- Enables regrowth of functional skin elements including hair follicles and sweat glands
- Targets specific signaling pathways without ablating cell populations necessary for healing
- Compatible with existing wound management protocols
- Potentially effective for both prevention and treatment of scars

Patents

- Published Application: WO2024248945

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