Docket #: S16-388

Improved Wound Healing based on Bioconjugation Methods and Click Chemistry

Researchers at Stanford have developed methods using click chemistry to immobilize and concentrate therapeutic factors on a tissue to improve wound healing. Tissue regeneration is a complex process involving the temporal and spatial interplay between cells and their extracellular milieu. Often therapeutic approaches to tissue regeneration do not reconstitute this interaction and thus wound healing is limited or impaired. Previous attempts to improve wound healing by topically applying therapeutic factors and biomolecules are limited as these factors are easily removed or washed away. Thus, there is a need for better methods to stimulate the regenerative process and foster wound healing. To help meet this need the inventors have developed this method which uses copper-free click chemistry to enable topical agents and biomolecules to be immobilized and concentrated on the surface of the damaged tissue. This increases the residence time of therapeutic factors and enables synergistic combinations of multiple proteins to work together. This method promotes faster, more effective wound healing especially in challenging situations.

Stage of research
New in-situ data demonstrating promising regenerative effects after 60 days (see publication below)

Applications

- Topical wound healing for:
  - Injuries to the eye
  - Diabetic ulcers
  - Skin injuries

    - Nerve injury

Advantages

- Method provides spatial-temporal control over the regenerative process
- Increases therapeutic residence time, bioavailability and bioactivity
- Click chemistry:
    - Rapid yet highly specific
    - Does not require external trigger such as UV light or metal-ion catalyst
    - Does not require frequent re-administration of active ingredients
- Enables synergistic combination of therapeutic agents and biomolecules to work together

Publications

- Logan, C. M., Fernandes-Cunha, G. M., Chen, F., Le, P., Mundy, D., Na, K. S., & Myung, D. (2023). In Situ-forming Collagen Hydrogels Crosslinked by Multifunctional Polyethylene Glycol as a Matrix Therapy for Corneal Defects: 2-Month Follow-up In Vivo. Cornea, 42(1), 97-104.
- Lee et al. Tethering Growth Factors to Collagen Surfaces Using Copper-Free Click Chemistry: Surface Characterization and in Vitro Biological Response *ACS Appl. Mater. Interfaces* 2017, 9, 23389-233-99,

Patents

- Published Application: 20200038484

Innovators

- David Myung
- Gabriella Fernandes-Cunha Rogers
- Hyun Jong Lee

Licensing Contact

Irit Gal

Senior Licensing Manager

Email