

Electrospun plant protein-based dressings functionalized with hirudin for chronic wound healing

Chronic wounds, like venous leg ulcers and pressure ulcers, are a growing medical concern. These wounds are difficult to heal because they often involve ongoing inflammation, tiny blood clots called microthrombi, and poor circulation at the wound site. This combination of problems slows down healing and greatly reduces patients' quality of life. Despite the existence of various treatment options, achieving effective tissue regeneration in chronic wounds remains difficult.

Therefore, this project aims to create a new type of wound dressing that not only protects the wound from dirt, contamination, and further injury but also actively promotes healing. The dressing will be made from micro fibers composed of soy plant protein and a biocompatible copolymer called PLCL, produced by electrospinning. This combination improves the dressing's strength and stability, especially in the moist environment typical of chronic wounds. What makes this approach particularly innovative is the addition of hirudin, a natural compound originally derived from leech saliva. Hirudin helps reduce the formation of microthrombi, prevents excessive blood clotting, and also has anti-inflammatory and pain-relieving properties.

After manufacturing, the structure and properties of the dressing will be carefully analyzed. Cell culture studies will also be conducted to evaluate the material's effectiveness in promoting tissue regeneration and wound healing.

This research topic was chosen in response to the increasing prevalence of chronic wounds, especially among aging populations. Current therapies often fail to promote long-term healing, highlighting the urgent need for innovative solutions. One key innovation of this project is the use of hirudin, a natural antithrombotic agent. Hirudin prevents the formation of microthrombi, which are common in chronic wounds and hinder healing. The project's expected outcome is a multifunctional wound dressing that protects wounds from external factors while actively supporting tissue regeneration.

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