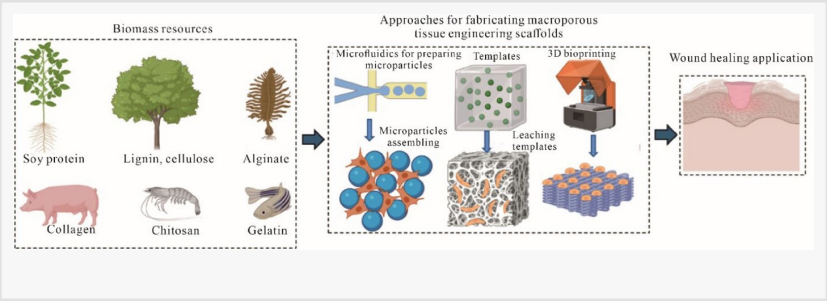
Biomass-Based Macroporous Scaffolds: A Promising Frontier in Wound Healing

Research Breakthrough in Sustainable Biomaterials for Tissue Engineering



NANJING, CHINA, March 17, 2025 /EINPresswire.com/ -- The global reliance on petroleum-based plastics has long been a concern for environmental sustainability. According to the World Bank, over 200 million tons of plastic waste were generated worldwide in 2016, contributing to pollution and greenhouse gas emissions. In response, researchers have turned to biomass materials—derived from plants, animals, and agricultural byproducts—as a renewable alternative. These materials, such as cellulose, lignin, and starch, are not only abundant but also biodegradable and environmentally friendly.

The review, titled "Macroporous scaffolds based on biomass polymers and their applications in wound healing," provides an in-depth analysis of recent developments in this field. The authors highlight techniques like microparticle assembly, leaching templates, and 3D bioprinting, which create interconnected macropores within scaffolds. These pores enhance cell infiltration, nutrient transport, and waste removal, making them ideal for tissue engineering and wound healing.

One notable finding is the potential of biomass materials like lignin and cellulose, which are often undervalued or treated as waste. The study also explores the use of agricultural byproducts, such as soy protein and starch, in developing macroporous wound dressings. These materials can be modified to enhance their mechanical properties and bioactivity, making them suitable for chronic wound treatment.

The review emphasizes the importance of pore size and porosity in influencing cell behavior. For instance, macropores ranging from 50 to 500 micrometers have been shown to support cell proliferation and tissue formation. The authors also discuss the challenges in scaling up manufacturing and clinical translation, noting the need for regulatory frameworks to support these innovations.

The study concludes that while biomass-based macroporous scaffolds hold great promise, several challenges remain. These include improving the mechanical properties of these materials and ensuring their biocompatibility. Future research should focus on optimizing pore size and porosity to better mimic native tissues and enhance wound healing outcomes.

This review underscores the potential of biomass-based materials in addressing the global

challenge of plastic waste while providing sustainable solutions for biomedical applications. As research progresses, these innovations could pave the way for more effective and environmentally friendly wound healing strategies.

See the article:
DOI
https://doi.org/10.1016/j.jobab.2024.12.001

Original Source URL
https://www.sciencedirect.com/science/article/pii/S236996982400080X

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