

Nanofibres in assisting wound healing mechanism

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Nanofibres are lightweight fabricated fibres having diameters in the nanometre scale. They are synthesised using various polymeric substances, such as chitosan. The fabrication process can be done either by using a biofilm or through the laser method. Apart from drug delivery, biosensors and skin engineering, the usage of nanofibres has increased manifolds in the wound healing process. The high surface area-to-volume ratio of the nanofibres aids in enhancing certain physical, chemical and physicochemical properties. The advantages of nanofibres include enhanced solubility for drugs, high porosity, superior mechanical strength and increased similarity with the extracellular matrix. The similarity of the nanofibres to the extracellular matrix plays a vital role in wound dressing applications. The advancement and exploitation of versatile properties of nanofibres make them suitable for the treatment of burns. Using the electric field, the fibres of biodegradable polymers are directly sprayed upon the injury. This aids in the formation of a fibrous mat dressing, which helps in the formation of normal skin at the location of the injury. It also eliminates scars, hence enhancing the wound healing process. These nanofibre membrane mats have a pore size in the range of 500 nm to 1 nm. These membrane mats are small in size and exhibit aerosol particle capturing mechanisms to protect the wounds from microbial penetrations. Their high surface area aids in fluid sorption and dermal delivery processes. Hence, functionalised nanofibers can improve the wound repair process by influencing behaviours of cells, such as attachment, proliferation and differentiation. It is a non-toxic, biocompatible and cost-effective tool for wound dressings in the field of biomedical engineering.

Keywords: Nanofibres, Extracellular matrix, Porosity, Dermal, Differentiation, Proliferation, Biocompatibility

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