Encapsulation of Hydrophobic Pharmaceutical Agents In Hydrophilic Polymer Fibers

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Technology description

Biocompatible polymeric materials are often used in the human body to restore and improve physiologic function and enhance survival and quality of life with minimal cytotoxic effects. Non-woven, electrospun porous scaffolds can mimic the extracellular matrix. Therefore, such structures are an ideal candidate for drug delivery and cell seeding. The scaffolds can be optimized based on the polymers used and the final desired properties of the fibrous mesh. This technology applies polymeric scaffold structures to controlled release of drugs to the human eye, and can be adapted for other uses. Given the naturally hydrophilic nature of most human tissues, delivery of hydrophobic drugs remains a challenge. The primary application of these materials is to incorporate and release hydrophobic drugs, such as dexamethasone, from hydrophilic polymeric matrices produced by electrospinning. Naturally-derived polymers, such as gelatin and collagen, generate different fiber morphologies while synthetic hydrophilic polymers, such as polyvinyl alcohol have also been also electrospun. Collagen scaffolds remain highly attractive for biomedical devices given the high concentration of collagen present within tissues. Gelatin, a denatured form of collagen, is a low-cost alternative that is frequently utilized for parameter optimization studies. Techniques such as fluorescent microscopy, SEM, and UV/Visible spectrometry are used to characterize the electrospun fiber diameter, structure, drug incorporation and kinetic release profile.

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