Electrospun Plasma-assisted Functionalized Ocular Inserts for Triamcinolone Acetonide Delivery

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Topically administered ocular Drug Delivery Systems are the most desirable formulations for the treatment of ocular chronic diseases, being the most simple, convenient and patient-friendly ocular route of administration, despite it requires prolonged and continuous treatment over time. At this regard, ocular insert represent an innovative and effective strategy. Ocular inserts are solid/semisolid sterile preparations characterized by dimensions and shape specifically designed for topical ocular administration. They are able to rapidly adhere on the ocular surface and remain in situ for prolonged period while assuring a controlled drug release and potentially increasing drug transcorneal absorption. Based on these assumptions, the aim of this work was to opportunely design and characterize novel useful polymeric inserts based on a 3D scaffold. Poly-butylene succinate (PBS) scaffolds were prepared by electrospinning, functionalized with biopolymers (inulin, poly(hydroxyethyl)aspartamide [PHEA], heparin) by plasma-assisted reaction and loaded with triamcinolone acetonide (TA). The obtained products were evaluated in terms of physico-chemical, technological-applicative and biological properties. Ocular inserts resulted non-bioerodible, with a very low swelling degree and a high drug loading ability, cytocompatible and extremely mucoadhesive. Moreover, inserts are also able to slowly release TA after firmly adhering on the corneal tissue. This translates into a significant increase of transcorneal permeation and penetration (enhancement of both Kp and Ka values up to an order magnitude). In conclusion, inserts can be an effective strategy to increase patient compliance by reducing the frequency of administration and avoiding pulsatile drug entry into the eye.