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Ex-Vivo model for the evaluation of drugs and micellar systems permeation across cornea

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Nowadays, diseases affecting posterior eye segment are increasing at an alarming rate. These include age-related macular degeneration, diabetic macular edema and diabetic retinopathy. Currently, the intravitreal administration is widely used, even if frequent injections can lead to retinal detachment, endophthalmitis and increased intraocular pressure. To overcome these problems, the topical administration of nanotechnology-based drug delivery systems is a strategy presently used. In particular, polymeric micelles are proposed as an

effective carrier to transport efficiently therapeutics to the posterior eye segment, minimizing drug loss and side effects. However, being the cornea the most important anatomical barrier that limits the delivery of drugs into the eye, the evaluation of permeation through this barrier is necessary. The aim of this preliminary study is to evaluate an ex vivo model useful to study the permeation of drugs and above all nanotechnology-based drug delivery systems across the cornea. This model implies the use of bovine corneas, as one of the most useful model to simulate human corneas, and Franz type diffusion cells. This should be used to evaluate the capacity of nanotechnology-based drug delivery systems to enhance and promote the entrance of drug into the eye. In particular, the use of polymeric micelles based on polysaccharide polymers is proposed. New inulin (INU) and hyaluronic acid (HA) amphiphilic derivatives (INU-EDA-RA and HA-C16) were synthetized. In addition, dexamethasone was chosen as an effective drug useful for retinal diseases. Consequently, dexamethasone loaded INU-EDA-RA and HA-C16 micelles were prepared and characterized.