

Improved triamcinolone acetonide-eluting contact lenses based on

cyclodextrins and high hydrostatic pressure assisted complexation

BIOMEDICAL ENGINEERING (DEBiom)

CAROLINA MARTO COSTA (carolina.marto.costa@tecnico.ulisboa.pt)

Introduction

The prevalence of diabetic eye disease is continuously rising worldwide and encompasses a variety of ocular conditions that affect people with diabetes, including diabetic retinopathy (DR), cataract and glaucoma [1].

Triamcinolone acetonide (TA) is a corticosteroid drug that can be employed in the management of DR and is administered intravitreally. Despite being the most efficient route to deliver the drug to the posterior part of the eye, it may induce severe ocular complications [2].

Contact lenses (CLs) are non-invasive devices that offer an advantageous platform for the topical release of ophthalmic drugs. However, the lack of interaction between CLs and lipophilic steroids hampers its ability to load therapeutic concentrations [3].

Herein, we incorporate cyclodextrins (CD), cyclic oligosaccharides with lipophilic cavities, to improve drug loading and release from CLs [4]. The effect of sterilization by high hydrostatic pressure (HHP) on the hydrogel properties (water content, transmittance, and stiffness) was evaluated.

Results



Methods



References

[1] U. Schmidt-Erfurth, J. Garcia-Arumi, F. Bandello; Ophtalmologica 2017, 237, 185-222. DOI: 10.1159/000458539

[2] V. Sarao, P. Lanzetta; European Endocrinology 2012, 8, 42-27. DOI: 10.17925/EE.2012.08.01.42 [3] A. F. Pereira-da-Mota, C-M. Phan, A. Concheiro, L. Jones, C. Alvarez-Lorenzo; Journal of Controlled Release 2022, 343, 672-702. DOI: 10.1016/j.jconrel.2022.02.014

[4] T. Loftsson, M. Brewster; Journal of Pharmacy and Pharmacology 2011, 63, 1119-1135. DOI: 10.1111/j.2042-7158.2011.01279.x

Conclusions

The hydrogels revealed physical properties suitable for CLs. Functionalization with CDs endowed the hydrogels with a stronger affinity for TA and sustained release for 1 day. TA-loaded CLs decreased the secretion of inflammatory cytokines. Overall, the CLs revealed to be suitable candidates for the topical ocular application of TA.

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