Trehalose Protective Effect on an In Vitro Model of Dry Eye

INTRODUCTION

Dry Eye Syndrome (DES) or Dry Eye Disease is a multifaceted disease of the tears and ocular surface that results in symptoms of discomfort and tear film composition modification and instability and cause undertear film on the ocular surface. The corneal epithelium, a non keratinized multilayered squamous epithelium of about 50 µm, has a crucial role in the barrier function and can be considered the first line of defence against many types of injury, trauma or infection: the corneal epithelium is directly involved in the establishment of DES with discomfort and pain associated to inflammation, mucus gelation, expression of specific markers and modification of meibomian network at molecular level.

An experimentally induced in vitro DRY EYE model on HCE mimicking dry eye ocular surface damage has been applied to assess the efficacy of a Trehalose based formulation. The in vitro model has the characteristic features of a dry eye epithelium and could be satisfactorily used for a pre-clinical assessment of the protective activity of ophthalmic formulations. Trehalose is a naturally occurring disaccharide comprised of two molecules of glucose. The sugar is widespread in many species of plants and animals, where its function appears to be to protect cells against desiccation, but it is not found in mammals. Some physical chemistry properties of Trehalose in more concentrated solution are particularly beneficial during desiccation. Trehalose protects cells against desiccation, but it is not found in mammals. Some physical chemistry properties of Trehalose in more concentrated solution are particularly beneficial during desiccation.

Trehalose treatment reduced at 24h (PROTOCOL A) the MMP-9 gene expression at values comparable to that in HCE in normal condition (Fig 1 A). The treatment also induced overexpression of MUC-4, a gene encoding a transmembrane mucin, in HCE in normal condition (Fig 1 B).

The in Vitro model has the characteristic features of a dry eye epithelium and could be satisfactorily used for a pre-clinical assessment of the protective activity of ophthalmic formulations. The in vitro model has the characteristic features of a dry eye epithelium and could be satisfactorily used for a pre-clinical assessment of the protective activity of ophthalmic formulations. The in vitro model has the characteristic features of a dry eye epithelium and could be satisfactorily used for a pre-clinical assessment of the protective activity of ophthalmic formulations.

RESULTS

**HISTOLOGICAL ANALYSIS**

- **DRY HCE**: Epithelial thickness was reduced in DRY-HCE compared to NEGATIVE CONTROL-HCE 24h post dry eye induction.
- **THEALOZ**: After 24 h treatment as established DRY-HCE, THEALOZ removed the initial morphology of the HCE, which resembled the physiological conditions.
- **THEALOZ CRITICAL**: Cellular structures appear severely modified both at cellular and subcellular level; there is a clear cell junction in the overall thickness. THEALOZ CRITICAL: cellular structures appear severely modified both at cellular and subcellular level; there is a clear cell junction in the overall thickness.
- **MMP-3**: No band signal in the whole tissue. MMP-3 is not detectable in the whole tissue. MMP-3 is not detectable in the whole tissue.

**REFERENCES**

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