

## "Evaluation of inflammatory response induced by different types of daily contact lenses."

Andrea Coelho <sup>1</sup>, Madalena Lira <sup>2</sup>, Paula Sampaio<sup>1</sup>

<sup>1</sup> Biology Department, University of Minho

<sup>2</sup> Centre of Physics, University of Minho

### Abstract

Introduction: Contact lenses (CL) are biocompatible materials however, CL can also act as a vector for microorganisms to adhere and transfer to the ocular surface. Communal microorganisms that uneventfully cohabit on lid margins and conjunctiva and potential pathogens that are found transiently on the ocular surface can adhere to CL in vivo. In the presence of reduced tissue resistance, these resident microorganisms or transient pathogens can invade and colonize the cornea or conjunctiva and produce inflammation or infection. Approximately two thirds of the isolated bacteria from CL-associated microbial keratitis are Gram-negative bacterial strains, most notably *Pseudomonas aeruginosa* but also some *Serratia* species, while one third comprises Gram-positive cocci, including *Staphylococcus aureus* and *Staphylococcus epidermidis*.

Purpose: In order to assess the inflammatory potential of daily disposable CL, the purpose of this study was to evaluate the inflammatory response induced by different types of daily CL before and also after a normal daily wear. The inflammatory response can be measured by quantifying the Tumor Necrosis Factor alpha (TNF- $\alpha$ ) produced by macrophages after contact with the CL. The microorganisms that are able to adhere to the CL are the major inducer of a possible inflammatory response, so microbiome of CL after the normal daily wear will also be evaluated.

Methods: To establish the best incubation time to evaluate the pro-inflammatory potential of the daily worn CL (8 hours of wear), they were co-incubated with a macrophage cell culture for 3h, 8h and 14h and TNF- $\alpha$  in the supernatant of co-incubation was quantified by ELISA. Macrophage cell viability after co-incubation with CL was also assessed by lactate dehydrogenase (LDH) leakage assay.

Results: The results showed that after 3h of co-incubation, only the positive control (containing LPS) showed a significant increase in TNF- $\alpha$  values. After 8h, of co-incubation the worn CL showed a significant increase of four times, while at 14h that increase was only of 2.5 times. Analysis of the LDH showed that at 14h of co-

incubation more than 50% of the macrophage cells were death, contrary to 3 and 8 hour of co-incubation that showed viability values above 85%.

Conclusion: These results indicated that the best incubation time to test the inflammatory potential of the CL wear 8 hours of co-incubation.