Novel Antibacterial Peptide Modified Contact Lenses

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Soft contact lenses are hydrogel materials recently receiving increasing attention due to their high potential for ophthalmic medical applications [1]. In this work, we present a new method to modify commercial soft contact lenses for the incorporation of antibacterial molecules. It is well known that one of the most common problems related to contact lenses is associated with the risk of eye microbial infection. This is a significant health issue given the large population of contact lenses wearers worldwide [2]. Previous studies demonstrated that many bacteria and fungi may cause corneal infections, and identified Pseudomonas aeruginosa and Klebsiella pneumoniae as the most common pathogen agents [3]. Two short antimicrobial peptides (AMPs) specifically effective against the aforementioned bacteria were anchored on the hydrogel contact lens materials, with the objective of imparting bactericidal activity on those materials. The hydrogel chemical modification was performed under mild conditions (room temperature, pH=7.4) following two approaches: physisorption and covalent binding (Figure 1A). Physisorption was carried out by simply immersing the samples in a PBS solution containing the peptide, whereas covalent bonding was achieved through a linker capable of binding the hydrogel surface at one end and the approaching peptide at the other end. Both methods proved to be effective for incorporating the selected peptides at various concentrations. However, stability studies, with a fluorescently tagged peptide, demonstrated that covalently bound peptides show a higher stability in PBS solution (Figure 1B). The modified contact lenses were characterised through several analytical techniques including wettability, Raman confocal microscopy, and fluorescence studies. These systems offer the potential to minimise corneal bacterial infection and represent a suitable platform for future ophthalmic devices. All these aspects will be herein discussed within the frame of product development.

![Figure 1](image.png)

**Figure 1.** A) Schematic representation of AMP modified soft contact lenses. B) Fluorescence stability studies on the AMP modified commercial contact lenses.

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