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INFUENCE OF SELECTED ABIOTIC FACTORS ON ACANTHAMOEBA ADHESION TO CONTACT LENSES

Summary

Amoebae of the *Acanthamoeba* genus, belonging to Free-Living Amoebae (FLA), pose a serious threat to human health and life. Particularly worrying is the fact of amoebae detection on the surface of contact lenses or in contact lens storage containers. As facultative human parasites, the amoebae of the *Acanthamoeba* genus, may cause *Acanthamoeba* keratitis (AK). Due to the lack of a specific treatment protocol, preventive measures are the main factor reducing the risk of AK. Over 90 % of AK cases are related to contact lenses using. The amoebae adhesion to the contact lenses surface facilitates the transmission of amoebae from the contact lens to the cornea. Common in the market contact lens care solutions, based on antibacterial and antifungal compounds, are not fully effective against amoebae. Therefore, there is an urgent need to enhance the anti-amoebic properties of contact lens care solutions.

In the recent years, nanotechnology has developed rapidly. Metal nanoparticles (NPs), such as silver, gold, and platinum, are proposed as new anti-bacterial, anti-fungal and anti-viral agents. Their anti-parasitic activity has also been proven. Due to their specific physicochemical properties and mechanism of action, NPs are promising in case of use in the treatment and prevention of AK.

The *Acanthamoeba* NEFF strain and 3 clinical strains were used to conduct experiments determining the anti-amoebic and anti-adhesive activity of the tested NPs and contact lens care solutions against amoebae. Macrophage and fibroblast cell lines were used during cytotoxicity tests. During the research, spectrophotometric readings of absorbance and fluorescence as well as microscopic observation were used.

The obtained results confirm the lack or slight anti-amoebic and anti-adhesive activity of the multipurpose contact lens care solutions. An increase in this activity was observed after the addition of NPs. The anti-amoebic and anti-adhesive activity of NPs was significant and directly proportional to the used NPs concentration. The increase of the contact lens care solutions activity was observed in favourable relation to the cytotoxicity.

The research shows that the anti-amoebic and anti-adhesive activity of multipurpose contact lens care solutions is limited. The addition of tested NPs to contact lens care solutions enhances their activity. In conclusion, NPs may be considered as a contact lens solution component that may reduce the risk of *Acanthamoeba* keratitis cases among contact lens users.