

The Role of Long-Chain Ionic Surfactants on Extending Drug Delivery from Contact Lenses

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Abstract : Eye drops are the most commonly used treatment for short-term and long-term ophthalmic diseases. However, eye drops could deliver only about 5% of the functional ingredients contained in a burst dosage. To address the limitations of eye drops, the use of therapeutic contact lenses has been introduced. Drug-loaded contact lenses provide drugs a longer residence time in the tear film and hence, decrease the potential risk of side effects. Nevertheless, a major limitation of contact lenses as drug delivery devices is that most of the drug absorbed is released within the first few hours. This fact limits their use for extended release. The present study demonstrates the application of long-alkyl chain ionic surfactants on extending drug release kinetics from commercially available silicone hydrogel contact lenses. In vitro release experiments were carried by immersing drug-containing contact lenses in phosphate buffer saline at physiological pH. The drug concentration as a function of time was monitored using ultraviolet-visible spectroscopy. The results of the study demonstrate that release kinetics is dependent on the ionic surfactant weight percent in the contact lenses, and on the length of the hydrophobic alkyl chain of the ionic surfactants. The use of ionic surfactants in contact lenses can extend the delivery of drugs from a few hours to a few weeks, depending on the physicochemical properties of the drugs. Contact lenses embedded with ionic surfactants could be potential biomaterials to be used for extended drug delivery and in the treatment of ophthalmic diseases. However, ocular irritation and toxicity studies would be needed to evaluate the safety of the approach.

Keywords : contact lenses, drug delivery, controlled release, ionic surfactant

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