ABSTRACT

In the past decade, extensive research has been conducted on developing a new method of delivering ophthalmic drugs using contact lenses. This method of drug application could potentially overcome the limitations associated with currently used methods (eye drops and ointments) by decreasing pre-corneal drug loss. It can also eliminate the need for multiple dosing by serving as a reservoir and providing sustained drug release over extended period of time. Testing contact lens performance can be challenging. Currently all tests are conducted by using in vitro methods. Conventionaly, the drug release tests are performed in a static vial-based system containing 2 – 5 mL of saline buffer. This method, however, has certain limitations and do not reflect the ocular environment correctly. Consequently, the results of such measurements may differ significantly from reality. It has been concluded that sophisticated in vitro models are necessary to adequately model on-eye drug release from contact lenses.

The purpose of this thesis was to evaluate and compare the release of two fluoroquinolones, ciprofloxacin and moxifloxacin, from conventional and silicone hydrogel daily disposable contact lenses under various conditions. A series of in vitro tests were carried out using a fixed-volume vial and an *in vitro* eye model that mimics physiological tear flow. Additionaly, an attempt was made to improve release of moxifloxacin from silicon-hydrogel contact lenses by addition of poloxamer 407 to the incubation drug solution.

This thesis provided new insight into the field of therapeutic contact lenses and deepened knowledge about the influence of various factors on the release kinetics. Obtained results have shown that commercial contact lenses release drugs on a continuous basis, and this process takes from several to several hours, which allows assuming that potentials may be used as drug carriers in the future. It has also been shown that the release of drugs from contact lenses is dependent on many variables. The parameters of the release system, in particular the volume of the release medium and flow rate, have a significant influence on measured release profiles. Under physiological flow conditions, release profiles are significantly slower and constant when compared with release in a static volume vial model. The release is also affected by the composition of the contact lens material, water solubility of the drug and the components of the tear film.