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Stability and *in vitro* evaluation of captopril-loaded mucoadhesive buccal films

Hala Rayya[1], Krisztián Pamlényi[1], Raghad Alsheikh[2], Dániel Nemes[2], Ildikó Bácskay[2], Géza Regdon jr.[1], Katalin Kristó[1]

[1]Institute of Pharmaceutical Technology and Regulatory Affairs, University of Szeged, Szeged, Hungary
[2]Department of Pharmaceutical Technology, University of Debrecen, Debrecen, Hungary

Buccal films offer an effective alternative to traditional oral dosage forms by improving drug bioavailability and patient adherence. Chitosan is a key polymer for such films due to its biodegradability, mucoadhesion, and permeation-enhancing properties, which can be further improved by salification with ascorbic acid. Captopril, an ACE inhibitor used for hypertension and heart failure, is administered orally. It undergoes hepatic first-pass metabolism, resulting in a bioavailability of 60–75%. Thus, buccal delivery of captopril can enhance bioavailability and overcome the limitations associated with the oral route. In our previous work, captopril-loaded chitosan ascorbate buccal films were successfully formulated and optimized. In this work further investigations were carried out with regard to the biocompatibility, permeability, and stability. Stability test of drug-free and drug-loaded films was conducted under controlled temperature and humidity. Cytotoxicity and permeation were also evaluated using an *in vitro* buccal cell line model. Stability evaluation revealed changes in mechanical properties of the prepared films during storage. Spectroscopic analyses suggested that the observed variations were predominantly associated with physical changes within the film matrix due to moisture uptake rather than chemical degradation. Cytotoxicity testing demonstrated acceptable cellular compatibility of the polymeric system, supporting its suitability for buccal application. Furthermore, *in vitro* permeability test indicated that the films were capable of enhancing buccal captopril transport. Overall, our findings provide supportive evidence for the potential of chitosan-ascorbate buccal films application as a captopril delivery system, while underscoring the need for suitable packaging during storage.