

HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY IN THE ANALYSIS OF DRUGS RELEASED FROM POLYMERIC COATINGS

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Introduction

Liquid chromatography is a separation method that allows simultaneous separation and determination of a large number of compounds in many different matrixes. The possibility of using different detectors increases the range of applicability and usefulness of the method. Analytical procedures using HPLC have been applied in many fields: criminalistics, pharmacy, food industry, environmental protection, etc.

Materials and Methods

The study included drugs from the group of antibiotics: amoxicillin (AMX), cefazolin (CEF) and vancomycin (VANKO). The chromatographic system was applied in which the C18 (150x4.6, 5 μ m) (TOSOH, Bioscience) stationary phase was used. The mobile phase was a mixture of 0.05% trifluoroacetic acid solution in water with acetonitrile. The elution was carried out in both isocratic and gradient systems. Detection was carried out using spectrophotometric diode array (DAD) and fluorescence (FL) detectors. The samples for the study were solutions of drugs released from polymeric coatings (PLGA) into the model matrix (artificial saliva and artificial inflammatory saliva). The studies were carried out at different times of drug release as well as in order to determine the total amount of drug applied.

Results and Discussion

Chromatographic systems for AMX, CEF and VANKO determinations were developed. These systems allow to conduct research with both single compound coatings and mixtures of these drugs. The developed procedures were validated and simultaneously studies on the stability of analytes in various conditions were conducted. The developed analytical procedures made it possible to monitor not only the drug release from the polymer film by determining its concentration in the solution, but also to track the stability of the active compound during its release to the model solution. Stability studies were carried out in model systems in various concentrations of analytes for up to 30 hours. It was found that the analyses were stable during the release of saliva to the model solution even up to 30 hours. In the case of studies with the model solution of saliva in inflammation, it was found that AMX decomposes after only 4 hours in the solution, CEF decomposes after 24 hours in the solution, while vancomycin showed stability throughout the experiment.

Conclusions

High-performance liquid chromatography systems for identification and determination of drugs and their derivatives released from polymeric coatings were developed. The use of high-performance liquid chromatography in studies on the release of drugs from polymeric coatings allows full monitoring of the drug during the experiment. Compared to other analytical techniques (such as UV / VIS spectrophotometry), it not only determines the content of the analyte in the solution, but also whether there are any side reactions during the release affecting the chemical form of the drug.

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