

**PREPARATION CHARACTERIZATION AND STABILITY EVALUATION OF
VANCOMYCIN INCORPORATED
POLY(LACTIDE-CO-GLYCOLIDE)(75:25) MICROSPHERES
FOR IMPLANTATION IN ORTHOPAEDIC APPLICATIONS**

Burcu Sayın¹, Sema Çalıř¹, Meral Özalp², Melike Ekizođlu², A.Atilla Hıncal¹

¹University of Hacettepe, Faculty of Pharmacy, Dept. Pharmaceutical Technology, 06100, Ankara, Turkey

²University of Hacettepe, Faculty of Pharmacy, Dept. Pharmaceutical Microbiology, 06100, Ankara, Turkey

Introduction

Vancomycin HCl, is a glycopeptide antibiotic often used to treat gram-positive pathogens and is the agent of choice for infections with meticillin-resistant *Staphylococcus aureus* (MRSA). In the last decades; antibiotic loaded microparticulate systems which are prepared with biodegradable poly(lactide-co-glycolide) (PLGA) polymers used for implantation purpose in bone for the localized treatment of bone infections (1).

Methods

Vancomycin loaded PLGA microspheres were prepared by emulsion/solvent evaporation process. For the formation of o/w type emulsion, 30 mg vancomycin which was dissolved in dimethyl sulfoxide added to the polymer solution (300 mg PLGA 75:25) in methylene chloride. Then, this dispersion was emulsified into the aqueous continuous phase containing sodium oleate (SO): polyvinyl alcohol (PVA). This medium was stirred continuously (750 rpm) at room temperature for 2 hours until the evaporation of methylene chloride was completed. Finally, the resulting microspheres were collected by centrifugation, washed with water and dried at room temperature. For release studies, weighed PLGA microspheres in phosphate buffer solution (pH 7,4) were placed in a thermostated bath shaken continuously at 50 cpm at 37°C. At scheduled time intervals, samples were taken and the amount of vancomycin was measured spectrophotometrically at 280 nm. Minimum Inhibitory Concentration (MIC) of the antibiotic was determined in every removed sample. The stability of vancomycin loaded microspheres was determined under accelerated conditions (40±2°C and 75%±5 % relative humidity) in the 3 months period (2).

Results and Discussion

Total drug content in microspheres were determined as 3,99 % which were prepared by 60% yield. The mean particle size of microspheres was 77±1.7 µm. Vancomycin release from PLGA microspheres were investigated for 2 months and determined that its bioactivity stayed unchanged during this period. Almost 90% of release was completed on 60th day. SEM photographs before and after in vitro release studies revealed that microspheres were homogenous and had a spherical surface. At the end of 3rd month of the stability study, almost 10% amount of vancomycin was determined to be lost, the particle size of the microspheres was found to be increased, the surface morphology and spherical shape of the microspheres was completely deformed.

Conclusion

In conclusion, vancomycin loaded PLGA microspheres seemed to be suitable and good candidates for the local treatment of bone infections. During the 3 month period stability evaluation, surface morphology, particle size distribution and drug content of the microspheres were determined to be changed.

References

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