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Antimicrobial properties of non-ionic surafactant vesicles containing ciprofloxacin

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Background and Aims: The size and composition of a vesicular drug carrier are important factors that can influence the delivery device's biological effectiveness. In this study we investigated the impact of different cholesterol content and vesicular size on antibacterial activity of nisomal ciprofloxacin.
Methods: Ciprofloxacin-loaded formulations, using different ratios of Span 40 and Tween 40 in combination with cholesterol were prepared by the remote loading method then size of niosomes was reduced by sonication. Size analysis and zeta potentials of niosomes were evaluated. The minimum inhibitory concentration (MIC) of niosomal ciprofloxacin and free drug for Staphylococcus aureus (ATCC 29213) and Escherichia coli (PTCC 1330) were determined using an agar plate dilution method.
Results: MICs of niosomal ciprofloxacin were 2-4 fold higher (against S. aureus) and 2-8-fold higher (against E. coli) than those of free drug. The size reduced noisomes (200 nm) exhibited lower MIC values in comparison with larger ones. The most antibacterial activity was observed in the formulations with highest cholesterol content. The increment of cholesterol content may improve the fusogenic properties of niosomes.
Conclusions: The strong antibacterial activity of the encapsulated ciprofloxacin compared with free drug may be explained as a result of direct interaction of niosomes and bacteria, probably by a fusion process. The niosomal ciprofloxacin appears a promising approach in the management of bacterial infections and should be further evaluated by *in vivo* experiments.

Keywords: Niosome; Ciprofloxacin; Antibacterial