# CHAPTER 5
# SUMMARY AND CONCLUSION

1. In summary, these results need to be viewed within the wider context of this work, which is to examine the potential use of these chitosan solutions as vehicles for ocular drug delivery. Bearing in mind the unavoidable effect of autoclaving, the main considerations are (a) whether or not the residual solution viscosity after autoclaving is still sufficient for ocular retention, and (b) how stable the solutions are on storage. In answer to these questions, the results of this work have shown that, (a) if the initial molecular weight and solution concentration of the chitosan are high enough, the residual solution viscosity after autoclaving is both sufficient and adjustable for practical use, and (b) the autoclaved chitosan solutions can be stored safely for extended periods of up to 360 days at 30 °C; storage at 2-8 °C improves storage stability still further, as would be expected, but only marginally so. On the basis of these results, it is concluded that chitosan solutions in diluted aqueous L-lactic acid have considerable potential for use as ocular drug delivery vehicles. Further work is continuing in order to develop this potential.
2. The compatibility and stability studies show that the 0.1% and 0.3%w/v chitosan solutions may be of value for the delivery of vancomycin, since vancomycin eye drops at 50 mg/ml in the chitosan solutions have a stability comparable with or even better than Tears Naturale II™.
3. The pharmacokinetics of topically applied vancomycin in rabbit eyes shows that the viscosity and mucoadhesive nature of chitosan are more important than the sol-gel transition, because vancomycin eye drops at 50 mg/ml in 0.3% w/v chitosan solution is equivalent in terms of bioavailability to Tears Naturale II™. Vancomycin eye drops at 50 mg/ml in 0.3% chitosan solution offers several advantages as a vehicle for the ophthalmic delivery of vancomycin in areas under the curve, which reflect that the 0.3% chitosan

vehicle retains active ingredient (vancomycin) in the eye when compared to Tears Naturale II™.

The main conclusion drawn from this study is that the 0.3% chitosan solution appears to be a promising candidate as a vehicle for vancomycin drug delivery. It has biocompatibility and storage stability, and is more cost effective than any other vehicle. The physical properties of the formulation (50 mg/ml of vancomycin in 0.3% chitosan solution) do not change when prepared extemporaneously in eye drops. Its use in topical ocular administration provides an attractive option in extemporaneous solutions of vancomycin by allowing a reduced frequency of topical eye drop application. It is, therefore, more convenient for health care teams.

Furthermore, chitosan offers other potential benefits regarding its antimicrobial properties, particularly in the treatment of bacterial keratitis.