THE INTERACTION OF THIOMERSAL AND CHLORHEXIDINE GLUCONATE WITH PLASTICS AND GLASS

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The concentrations of antimicrobial agents in commercially available solutions for the disinfection of soft contact lenses have been shown to decrease on storage (Richardson et al, 1977). Such solutions are frequently packed in polypropylene or polyethylene containers although interactions between plastics and preservatives, which may result in a reduction of the antimicrobial concentration below effective levels, are well documented. Glass is generally considered to be inert but little has been reported on its suitability for containers of contact lens solutions.

The influence of the nature of the container on the loss of chlorhexidine gluconate and thiomersal from a solution suitable for the disinfection of soft contact lenses was investigated.

The solution, containing chlorhexidine gluconate (0.005% w/v) and thiomersal (0.002% w/v), was stored in polypropylene, polyethylene, amber glass and clear glass containers under various conditions. The thiomersal and chlorhexidine gluconate contents were measured at intervals for up to two years by methods based on those of Neurath (1961) and Holbrook (1958) respectively.

The decrease in concentration of chlorhexidine and thiomersal varied depending upon the container in which the solution was stored and can be illustrated by the data for storage at room temperature in the dark for six months. The thiomersal concentrations of solutions stored in glass containers were unchanged but fell by 4% and 10% of the initial value after storage in polypropylene and polyethylene respectively. The loss of chlorhexidine was similar to that of thiomersal from solutions stored in polypropylene and polyethylene. However, when stored in amber glass and clear glass containers the chlorhexidine concentration was reduced by 16% and 25% respectively. The latter finding was unexpected since glass in this respect is usually considered to be inert.

Chlorhexidine and thiomersal both exhibited light-accelerated degradation against which amber glass offered good protection. Although amber glass would be the container of choice for a solution containing thiomersal alone, polypropylene is more suitable for long term storage of the solution containing both chlorhexidine and thiomersal due to the greater loss of chlorhexidine from glass containers.

The results of on-going storage tests should help to elucidate the mechanism of interaction of chlorhexidine and thiomersal with plastic and glass. A preservative which interacts by surface adsorption only will be lost from solution until the surface of the container, whether it is glass or plastic, is saturated. However, if the preservative is able to absorb into plastic it will be lost to a greater extent and if volatile, its concentration in solution will continue to fall as it evaporates from the external surface, (Richardson et al, 1977).

These results illustrate that container material and its opacity must be considered in the selection of a suitable container for the storage of soft contact lens solutions and indicate prohibition of the use of plastics in favour of glass, as has been demanded by some authorities, may be inadvisable.

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