

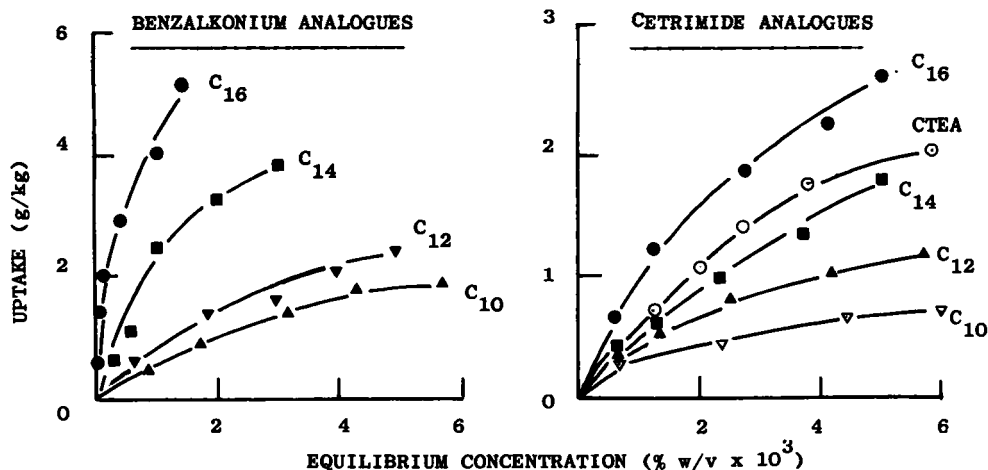
## THE UPTAKE OF CATIONIC PRESERVATIVES INTO SOFT CONTACT LENS MATERIAL (polyHEMA)

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The use of chemical disinfectants for the sterilisation of soft contact lenses based on PolyHEMA has been discussed recently (Richardson et al 1978). One major drawback of such a procedure is the uptake and concentration of materials such as chlorhexidine and benzalkonium chloride into the lens material. Quaternary ammonium compounds comprise a mixture of chain lengths and a study has been undertaken to determine whether the adsorption of cetrimide and benzalkonium analogues onto lens material is chain length dependent. A hydroxylated compound, cetyltriethoxyammonium chloride (CTEA) was also examined. The purity of the various compounds was checked by GLC and critical micelle concentration determinations. Uptake into powdered polyHEMA (Smith and Nephew Limited) and commercial lenses (Wesley Jesson, Durasoft - water content 27%) was measured using the Orange II complexation and chloroform extraction method (Few and Ottewill 1956).

The derived Langmuirian adsorption isotherms (Figure) show clearly the difference between the two series of analogues and the importance of alkyl chain length. The benzalkonium analogues are adsorbed more strongly than the cetrimide analogues and in both series adsorption increases with alkyl chain length. Adsorption is of the high affinity type (Giles et al 1960); the first layer of the cationic quaternary ammonium compound interacting with anionic groups (methacrylic acid) in the lens material. Subsequent layers of quaternary compound are taken up through hydrophobic interactions between alkyl chains. Hydroxylation of the three methyl groups of cetrimide leads to a decreased uptake and CTEA has similar adsorption to the C<sub>14</sub> cetrimide analogue. The results suggest that lens uptake can be reduced considerably if short chain length cetrimide analogues are employed. The concomitant reduction in anti-microbial activity in descending the homologous series can be offset by using a higher concentration of the poorly adsorbed preservative.

**Figure** Adsorption of quaternary ammonium compounds by PolyHEMA lens material.



Few, A.V. & Ottewill, R.H. (1956). *J. Colloid Interface Sci.* 11:34.

Giles, C.H., MacEwan, T.H. et al (1960). *J. Chem. Soc.* 3973.

Richardson, N.E., Davies, D.J.G. et al (1978). *J. Pharm. Pharmacol.* 30:469.