CHLORHEXIDINE-RELEASING HOLLOW FIBRES AS A POTENTIAL MEANS OF MINIMISING DEVICE-RELATED INFECTIONS

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It has been proposed that on insertion, an intrauterine contraceptive device (IUCD) becomes coated in a mucus biofilm which offers protection to those bacteria which have been introduced into the uterus from the vagina (Malhi *et al*, 1989). The incidence of uterine infection is highest in the first few months after fitting the IUCD and in attempt to combat this,antibiotic cover is recommended at the time of insertion. Despite this, pelvic infections have been shown to occur in IUCD users twice as frequently as in women not using contraception (Population Report,1988). The value of antibiotic prophylaxis, however, could be questioned since penetration of systemically administered antibiotics into mucus is poor (Kearney & Marriott, 1987). We have therefore investigated ways in which antimicrobial agents can be delivered directly to the required site.

6cm lengths of hollow fibres of either nylon (N) or polyethylene (PE) were loaded with chlorhexidine acetate (CA) either suspended in sesame oil or in solution in alcohol. The ends were sealed and the release of CA across the polymer wall, into 30ml volumes of distilled water, monitored with time.The CA was assayed by UV spectroscopy at 259nm. Control tubes containing vehicle alone were treated similarly.

The results for CA release from nylon fibres (internal diameter (i.d.) 0.5mm; external diameter (e.d.) 0.63mm) are presented in the figures. CA release was concentration dependent and was 4 times faster when dissolved in ethanol than when suspended in sesame oil. Nylon fibres of i.d. 0.25mm, e.d. 0.75mm, showed a release rate approximately 5% of the previous fibre, with a lag time of 10 days. CA release from PE fibres of comparable dimensions was negligible.

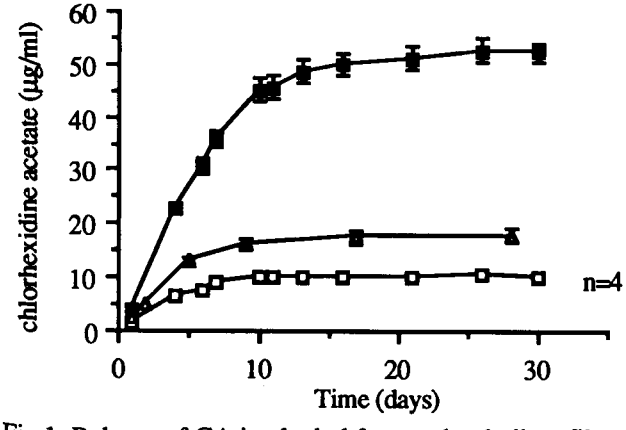

Fig.1. Release of CA in alcohol from nylon hollow fibres

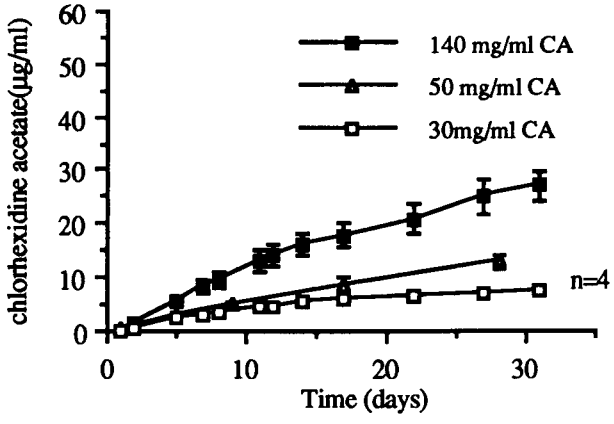

Fig.2. Release of CA in sesame oil from nylon hollow fibres

The results suggest that the rate of release of CA from hollow fibres may be controlled within wide limits. The use of such fibres attached to IUCDs would allow the antimicrobial agent to be delivered directly to the required site of action. The rapid release of a high concentration of CA would eliminate bacteria adhered to the fibre and the exhaustion of the drug reservoir within a few days should prevent any adverse effects on the normal microflora. This drug delivery principle could also be applied to sutures and catheters which similarly have been shown to cause such device related infections.

Kearney, P. and Marriott, C. (1987). Int. J. Pharm. 32: 211-217
Population Report Series B(5), March 1988.
Malhi, J.S. *et al.* (1989) J. Pharm. Pharmacol. 41: 110P