THE PRECORNEAL CLEARANCE OF POLYVINYL ALCOHOL FILM IN MAN

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The incorporation of drugs into soluble ocular inserts formed from polyvinyl alcohol (PVA) or soluble collagen has been shown to markedly increase the penetration of drugs into the aqueous humour (Yakovlev & Lenkevich 1966, Bloomfield et al 1978). However, there have been few studies to quantify the rate of disintegration of the soluble insert, and most measurements have considered the rate of release of the entrapped drug. The preparation of a radiolabelled film incorporating an immobilised radioactive marker has enabled the study of the disintegration of a PVA film in man using gamma scintigraphy. The film was prepared on a Melinex substrate by spreading of a 0.25 ml thick suspension of technetium-99m sulphur colloid in 13.3% PVA solution (specific activity 700 MBq/ml) and drying in a sterile laminar flow cabinet at room temperature. Ten healthy male and female volunteers, age range 20 - 38 years, participated in the study which was approved by the Hospital Ethical Committee and the DHSS. Throughout the study, the subject was positioned at a distance of 5 cm from the collimator, with the head supported by a modified ophthalmic table. A 5 x 5 mm square piece of film was removed from the substrate and placed under the lower eyelid with forceps. A series of images of 15 second duration were then acquired over a period of thirty minutes and the data stored on the computer for analysis. The residence time of the film was then estimated from the scintigraphic images, with correction for background and decay rate. The plot of activity remaining versus time indicated that precorneal residence followed an exponential relationship (Figure 1) with a mean half life of 8 minutes.

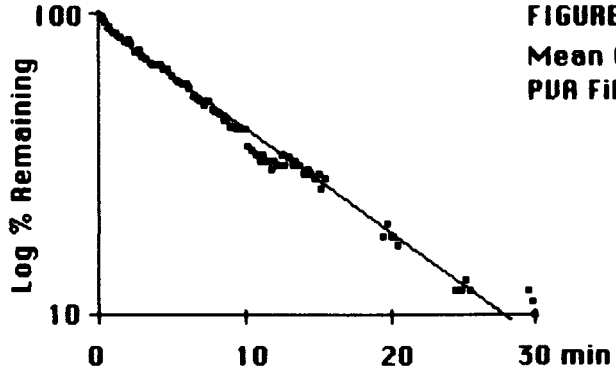

FIGURE 1.
Mean Clearance of Radiolabelled PVA Film from the Eye.

It is generally accepted that the release rate of the drug from a hydrophilic matrix is a function of the square root of time. The present data demonstrate that the release rate of an immobilised drug, released on disintegration of the matrix, approximates to a simple exponential relationship.

Bloomfield, S.E. et al (1978) Arch. Ophthalmol. 96: 210.
Yakovlev, A.A. & Lenkevich, M.M. (1966) Vestn. Oftalmol. 79: 40