THE INFLUENCE OF NONIONIC SURFACTANTS ON THE ABSORPTION OF THIOPENTONE BY GOLDFISH

K.A.Walters & A.T. Florence*, I.C.I. Ltd. Central Toxicology Laboratory, Alderly Park, Cheshire SK10 4TJ and *Department of Pharmaceutics, University of Strathclyde, Glasgow G1 1XW

Goldfish have been widely used to study the effects of surfactants on the passive transfer of drugs across epithelial membranes (Gouda, 1974; Florence & Gillan, 1975) and attempts have been made to relate surfactant structure to the increased drug absorption observed below the surfactant critical micelle concentration (Florence & Gillan, 1975). In this work a series of (Brij) alkyl polyoxyethylene ethers have been used to study the relation between physical properties and effects on thiopentone absorption.
The mean reciprocal overturn time (1/T) was used as before as an index of rate of absorption (Levy & Gucinski, 1964) using not less than 5 goldfish immersed in thiopentone (200 ml , 0.01%, pH 7.0). Some results at two concentrations are shown in Table 1.

Table 1. Reciprocal turnover times (min^{-1}) ($\pm$Std.dev) of thiopentone in presence of surfactants

Surfactant	HLB	0.0005%	0.1%
None	-	0.09 $\pm$ 0.03	
POE(4) lauryl ether	9.7	0.11$\pm$0.02	-*
"(10) " "	12.0	0.54$\pm$0.02	-*
"(23) " "	16.9	0.25$\pm$0.09	0.18$\pm$0.02
POE(2) Stearyl ether	4.9	0.07$\pm$0.01	(0.07$\pm$0.03)+
"(10) " "	12.4	0.15$\pm$0.02	0.41$\pm$0.07
"(20) " "	15.3	0.21$\pm$0.01	0.31$\pm$0.02
POE(2) oleyl	4.9	0.11$\pm$0.02	(0.11$\pm$0.01)+
"(10) "	12.4	0.17$\pm$0.03	0.34$\pm$0.14
"(20) "	15.3	0.19$\pm$0.04	0.29$\pm$0.04

* at this concentration these surfactants were toxic + cloudy dispersion

At low concentrations the surfactants had an increasing effect with increasing HLB up to the most hydrophilic surfactant studied (POE (23) lauryl ether, HLB 16.9). Surfactants had little effect up to an HLB of 10.0, the activity of low HLB surfactants being limited by their low solubility. There was no significant difference between the effects of surfactants with saturated and unsaturated hydrocarbon chains.

Non-equilibrium dialysis indicated that thiopentone interacts with the non-ionic surfactants in micellar form. Nevertheless rates of absorption from micellar solutions were usually greater than those from pre-micellar systems suggesting that loss of membrane integrity occurs in these cases. Histological examination of epithelium in contact with these systems supports this view.

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