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RETENTION OF PERFLUOROCHEMICALS IN RAT TISSUES

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Injection of perfluorochemical (PFC) emulsion-based oxygen transport fluids into rodents can produce marked alterations in lymphoid tissue weights, depending on dose administered and its composition (Lowe 1988). Because the spleen and liver appear to be the most responsive tissues, we have assessed their uptake and retention of PFCs following injection of different emulsions in rats.

Male Wistar rats (150-300g; n = 48) were injected intraperitoneally under light ether anaesthesia with 30 ml/kg b.w. of either (i) Fluosol-DA 20% (F-DA; Green Cross, Japan), (ii) a novel 20% (w/v) perfluorodecalin (FDC) emulsion containing 1% (w/v) of a stabilizing C-16 oil additive, perfluoroperhydrofluoranthrene (Rhone-Poulenc Chemicals, ISC Division, Avonmouth), and 4% (w/v) Pluronic F-68 (Sharma et al., 1987), or (iii) sterile saline (0.9% w/v NaCl). At 24 hr, 72 hr, 1, 2, 3 or 4 weeks after injection, animals were killed by cervical dislocation and their livers and spleens removed, weighed and frozen in liquid N_2. Tissue PFC concentrations were determined using a modification of the gas chromatographic method of Yamanouchi et al (1975), following extraction with either carbon tetrachloride (BDH, Poole) or tetrachloroethylene (BDH). Samples (1 µl) were analysed using a Pye Unichem 4500 gas chromatograph.

Uptake of PFCs, as determined by measurement of total tissue PFC concentrations, was greater in spleen than liver, irrespective of emulsion injected. Maximal mean (± s.e.m.) tissue PFCs occurred 72 hr after injection of F-DA (spleen: 86.3 ± 1.3 mg/g; liver: 30.5 ± 1.4 mg/g), but were more variable in rats injected with the novel emulsion. At 4 weeks post-injection, spleen PFC concentrations had fallen to < 5% of maximum values and were undetectable in the liver. Marked differences in the time course of retention of individual PFCs occurred in liver and spleen. For example, in animals receiving the novel emulsion, mean spleen FDC and C-16 oil concentrations were maximal 24 hr after injection (FDC: 21.0 ± 1.5 mg/g; C-16: 0.6 ± 0.03 mg/g), whereas maximum liver concentrations (FDC: 4.2 ± 1.1 mg/g; C-16: 0.2 ± 0.06 mg/g) occurred 72 hr post-injection in both cases.

These results show both quantitative and qualitative differences between rat spleen and liver in their uptake and retention of PFCs. The present finding that PFC uptake into spleen was greater than in liver was in agreement with previous observations in male rats injected with comparable doses of F-DA (Lutz and Metzenauer 1980). One explanation for these results is the variation in molecular weight of individual compounds which is known to influence their tissue retention time (Yamanouchi et al 1975).

Lowe, K.C. (1988) In Mochizuki, M. et al (eds) Oxygen Transport to Tissue, Vol. X. Plenum, New York, pp 655-663
Lutz, J., Metzenauer, P. (1980) Pflugers Archiv. 387: 175-181
Sharma, S.K. et al (1987) In Silver, I.A., Silver, A. (eds) Oxygen Transport to Tissue, Vol. IX. Plenum, London, pp 97-108
Yamanouchi, K. et al (1975) Chem. Pharm. Bull. 33: 1221-1231