

THE INFLUENCE OF EMULSIFYING AGENTS ON THE PHAGOCYTOSIS OF FAT EMULSIONS

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Fat emulsions (usually made from soybean oil) have been used for several years as a source of calories in parenteral nutrition. It is believed that their clearance by the reticulo-endothelial system and their subsequent fate in the body is dependent on the surface characteristics of the droplets, in particular the nature of the emulsifying agent (Jeppsson and Rossner 1975). The present investigations have compared the uptake of various soybean oil emulsions by polymorphonuclear macrophages (mouse peritoneal) (PMN) and the phagocytic system Acanthamoeba castellanii Neff. This latter system has been used previously to study the phagocytosis of latex beads and phospholipid vesicles (Batzri and Kom 1975). 10% v/v soybean oil in water emulsions were prepared using different emulsifiers. PMN were prepared using the method of Stossel et al (1972). Acanthamoeba castellanii was maintained in a balanced growth media and uptake of emulsion droplets was examined by turbidometric analysis using a Sofica 4200 light scattering photometer. Addition of lysophosphatidylcholine (LPC) to an emulsion stabilised by a mixture of phosphatidylcholine and phosphatidylethanolamine (PC/PE) increased the charge on the droplets as well as the uptake by the phagocytosis systems. This uptake can be quantified by means of first order rate constant (K) (Table 1). The results show clearly the importance of the nature of the surface layer. It is not yet clear whether the observed effects are due solely to surface charge, for example there are satisfactory correlations between the K value and microelectrophoretic mobility, or is a composite of surface layer properties and charge effects. However, it is concluded that the manner in which the emulsion droplets are handled by both phagocytic systems can be altered readily by small formulation changes.

Table 1. Phagocytosis of Soybean Oil Emulsions (10% v/v).

Emulsifier (% v/v)	1st order rate constant (sec ⁻¹)		Zeta Potential (mv)
	PMN	Acanthamoeba	
1.2% PC:PE (4:1)	1.56	0.14	- 28.5
1.2% PC:PE (4:1) + 0.1% LPC	7.80	0.33	- 57.0
1% Pluronic F68	0.10	0.06	- 12.2

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