Chapter 4

Phospholipid Exchange between Membranes

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1. INTRODUCTION

Exchange of phospholipids between serum lipoproteins was described more than 20 years ago by Eder et al. (1954) and by Kunkel and Bearn (1954). A few years later, Florsheim and Morton (1957) showed that phospholipid exchange between serum lipoprotein fractions is rapid compared to the disappearance of these lipids from plasma. Exchange of phospholipids between chylomicrons and higher density serum lipoprotein was demonstrated by McCandless and Zilversmit (1958). These studies were extended by Minari and Zilversmit (1963), who showed that the loss of labeled phospholipids from chylomicrons incubated with dog serum was increased greatly when the proportion of serum phospholipid to chylomicron phospholipid was increased approximately tenfold (Fig. 1). In the same study, it was demonstrated that phospholipids exchanged between chylomicrons and serum lipoproteins but that the movement from chylomicrons to serum was greater than that in the reverse direction, thus leading to a net loss of phospholipid from the chylomicron fraction. The relation of this transfer to the removal of chylomicrons from the circulation has been discussed by Zilversmit (1969).

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Exchange of mitochondrial phospholipids with phospholipids in serum was reported by Tarlov (1968). A similar exchange was observed between mitochondria and the ultracentrifugally isolated lipoproteins from rat serum (Wirtz and Zilversmit, 1969). In the latter study, the exchange of phospholipids was markedly accelerated by a soluble protein factor in rat liver cytosol. A similar stimulation of phospholipid exchange was observed between high- and low-density serum lipoproteins (Illingworth and Portman, 1972) and between lipoproteins and plasma membranes from squirrel monkey liver (Illingworth et al., 1973).