Synopsis of Original Research Paper

Distinct Plasma Apolipoprotein-Interactions with Emulsion Monolayers and Vesicle Bilayers

Tetsurou Handa

Graduate School of Pharmaceutical Sciences, Kyoto University

Triacylglyceride (TG)/phosphatidylcholine (PC) -emulsions and PC-vesicles are protein-free models for TG-rich plasma lipoproteins and biological membranes, respectively. Both have been utilized for drug delivery systems. We have found that PC monolayers of emulsion particles and PC bilayers of vesicles have different interfacial properties and metabolic fates in animal plasma. In this study, plasma apolipoprotein binding to emulsion and vesicle particles are studied in terms of interaction between amphiphilic helices of apolipoproteins and surface PC layers of the lipid particles, and the physiological relevance of the results is discussed. Binding amounts of apoC-2 and apoE to PC/TG-emulsions were about 10 times larger than those to PC-vesicles in plasma. Accordingly, the plasma-clearance of emulsions through apoE receptors was more rapid than vesicles in rat. The maximum binding amount of the isolated apoA-1 was 4 times larger for emulsions than vesicles. Apolipoproteins are thought to interact surface PC layers of lipid particles ,with the amphiphilic helices nestled between the PC head groups. The different binding capacities between emulsions and vesicles are explained by the interaction of surface (PC) and core (TG) lipids. Although binding of apolipoproteins to surface PC layers may produce the packing defects, the penetration of TG into the surface monolayers of emulsions could fill the packing defects, resulting the increased binding capacity.