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Structural and Antioxidative Stabilities of Liposomal Nanocapsulsin Membrane Physicochemical Properties

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1 Introduction

Although the use of liposomal nanocapsules in biology and medicine is a promising new area of drug delivery systems, the structural and antioxidative stabilities of their membranes are important factors for storage and drug targeting. In the present study, we investigated the physicochemical properties of the liposomal bilayers incorporated with coenzyme Q_{10} (CoQ_{10}) using ^{13}C- and ^{31}P- nuclear magnetic resonances (^{13}C- and ^{31}P-NMR).

2 Materials and Methods

We prepared some types of CoQ_{10}-incorporated liposomes for improvements of their membrane stabilities. They were studied by an inversion recovery fourier transform (IRFT) ^{13}C-NMR and a lanthanide-induced shift (LIS) ^{31}P-NMR techniques.

3 Results and Discussion

The fluidity of CoQ_{10}-liposomes was studied by an inversion recovery Fourier transform (IRFT) ^{13}C-NMR technique. In contrast to the CoQ_{10}-liposome prepared from dipalmitoylphosphatidylcholine (DPPC), that prepared from 1-palmitoyl-2-oleoyl-PC remarkably enhanced the membrane fluidity (~120%). The ionic permeabilities of their liposomes were studied by a lanthanide-induced shift (LIS) ^{31}P-NMR technique. Both CoQ_{10}-liposomes prepared from 1-stearoyl-2-linoleoyl-PC or 1-palmitoyl-2-oleoyl-PC enhanced the permeability for paramagnetic Pr^{3+} infusion into the PC bilayers. However, the CoQ_{10}-liposome prepared from 1-stearoyl-2-linoleoyl-PC revealed a potent antioxidative stability in contrast to that prepared from 1-palmitoyl-2-oleoyl-PC. These results show that intercalated compounds such as CoQ_{10} are useful to control the PML carriers for suitable membrane packing and lipid peroxidation inhibitory activity. The measurements of the membrane stabilities of their liposomes *in vivo* are currently under way.

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