Lipid Rearrangement Promoted by Cytochrome c in Mitochondrial Mimetic Giant Vesicles Containing Oxidized Phosphatidylcholine

Cintia Kawai,1 Helena Junqueira,3 Rosângela Itri,3 Iseli L. Nantes,1 Maurício da Silva Baptista2

1 Universidade Federal do ABC, UFABC, Santo André, SP, Brazil
2 Instituto de Química, Universidade de São Paulo, SP, Brazil
3 Instituto de Física, Universidade de São Paulo, SP, Brazil

The interaction of cytochrome c (cytc) with the inner mitochondrial membrane (IMM) is related to events responsible for cell life and death. Several studies have demonstrated that two sites of cytc structure, A and L, are responsible for the electrostatic interaction of the protein with cardiolipin present in IMM. In this study the association of cytc with Giant Unilamellar Vesicles GUVs (diameter > 20 μm) with a composition mimicking the IMM, i.e., containing POPC/DOPE/CL (1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine/1,2-dioleoyl-sn-glycero-3-phosphoethanolamine/heart cardiolipin) was analyzed by optical microscopy images. The interaction was studied at pH 7.4, a condition in which the binding of cytc occurs preferentially by site A. The association of cytc with mitochondrial mimetic GUVs promoted phospholipid rearrangement resulting in lipid domains (probably CL domains) as evidenced by small dark spots on the vesicles surface. The presence of 25 mol % POPCox (POPC-derived hydroperoxide) in the lipid composition resulted in images of GUVs consistent with an increase of membrane fluidity (Riske, K. A. et al, Biophys. J., 2009; Wong-ekkabut et al, Biophys J., 2007). In this condition, the addition of cytc resulted in slightly larger dark spots on the GUVs surface. The larger cytc-promoted lipid domains might be a consequence of the higher fluidity promoted by POPCox. The formation of lipid domains in the presence of cytc is consistent with previous results showing a cooperative binding of the protein on the mitochondrial mimetic membranes (Nantes et al, J. Biol. Chem,2001, Suraniti et al, Langmuir, 2007).

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