Optimization of drug delivery system using liposomes targeting CD4+ T lymphocytes for treatment of immune-mediated diseases

Suthasinee Meeroekvai1, Panchika Prangkio2*

1Interdisciplinary Program in Biotechnology, Graduate School, Chiang Mai University, Chiang Mai 50200, Thailand
2Division of Biochemistry and Biochemical Technology, Department of Chemistry, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand
*E-mail: panchikap@cmu.ac.th

Abstract: CD4+ T lymphocytes are immune-mediated cells that play a role in regulating immune response to pathogens. Impaired functions of CD4+ T lymphocytes can lead to immune disorders. A liposome is a closed bilayer spherical particle of lipid which is designed for improving therapeutic properties of conventional drugs. Drug-loaded liposomes can be delivered to their targeted sites effectively via functionalization with ligands or antibodies. In this study, immunoliposomes or liposomes functionalized with CD4-antibody were labelled with a fluorescent dye. Liposome compositions and physiochemical properties of liposomes were characterized using dynamic light scattering (DLS) and zeta potential determination. J-Lat Clone 10.6 cell line, which is the CD4+ T lymphocyte used in studies of HIV latency and reactivation, was chosen as a study model. Cellular uptake of liposomes with different compositions was investigated by flow cytometry technique. Our results showed that immunoliposomes with 0.1-1% CD4-antibody could be uptaken by the J-Lat 10.6 cells from 1-48 h with different capabilities. Furthermore, the zeta-potential of non-functionalized liposomes and immunoliposomes were -13.3 and -40.0 mV, respectively, suggesting that immunoliposomes were more stable than non-functionalized liposomes. The enhancement of liposomal drug delivery efficacy to CD4+ T lymphocytes may open up the new therapeutic approaches for targeting latently HIV-infected cells.

Keywords: CD4+ T lymphocytes; Drug delivery; HIV latency; Immunoliposomes; Liposomes