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A novel and simple technique for separation of liposomes from unloaded drug molecules

Vignesh Muthuvijayan and **Naagarajan Narayanan**
Indian Institute of Technology, India

Liposomes have been used in drug delivery for decades. After drug loading, liposomes must be separated from the unloaded drug molecules. Currently, dialysis, density gradient centrifugation, ultracentrifugation and column chromatography are used for separation of liposomes. These techniques are primarily applicable for small-scale production[1]. Also, they are tedious and/or expensive. Here, we have developed a rapid and cost-effective method for separation of liposomes from unloaded drug molecules. We prepared phospholipids from egg yolk[2] and prepared the liposomes using previously described techniques3. We separated the liposomes using precipitation with ethanol, acetone and isopropanol. We optimized the separation process using a 2-factorial design with volume of precipitating agent and time as the input factors and percentage recovery and particle size ratio as the output factors. We considered the points with 100% recovery and particle size ratio of 1 as the optimum points. The studies showed that the volume of precipitating agent used plays a significant role separation of liposomes and not the time of incubation. We also identified that optimum separation was obtained using ethanol and acetone (Figure 1a and 1b). In case of isopropanol, although particle size wasn't affected, the maximum recovery obtained was less than 60% (Figure 1c). The results show that using ethanol and acetone, we can separate liposomes within 20 minutes with a recovery close to 100% without change in particle size. TEM analysis has to be performed to confirm the results observed. A model drug (Toluidine Blue) was loaded to the separated liposomes and the release was studied (Figure 2). The release profiles were modeled using Higuchi's equation, Peppas model and saturation kinetics model.

Biography

Vignesh Muthuvijayan has completed his PhD from the Department of Chemical Engineering, Oklahoma State University, USA and postdoctoral studies from Department of Biomedical Engineering, School of Medicine, Johns Hopkins University, USA. He is currently working as an Assistant Professor in the Department of Biotechnology, Indian Institute of Technology Madras. His research focuses on developing polymeric materials for biomedical applications such as implants, drug delivery and tissue engineering.

vigneshm@iitm.ac.in