

DEVELOPMENT AND VALIDATION OF A DUAL FILTRATION TECHNIQUE TO CONTROL THE SIZE DISTRIBUTION OF GIANT LIPID VESICLES

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Abstract

A new purification technique is developed for obtaining distribution of giant unilamellar vesicles (GUVs) within a specific range of sizes using dual filtration. The GUVs were prepared using well known natural swelling method. For filtration, different combinations of polycarbonate membranes were implemented in filter holders. In our experiment, the combinations of membranes were selected with corresponding pore sizes—(i) 12 and 10 μm , (ii) 12 and 8 μm , and (iii) 10 and 8 μm . By these filtration arrangements, obtained GUVs size distribution were in the ranges of 6–26 μm , 5–38 μm and 5–30 μm , respectively. In comparison, the size distribution range was much higher for single filtration technique, for example, 6–59 μm GUVs found for a membrane with 12 μm pores and 5–49 μm GUVs found for 10 μm pores polycarbonate membrane. Using this technique, the water-soluble fluorescent probe, calcein, can be removed from the suspension of GUVs successfully. The size distributions were analyzed with lognormal distribution. The skewness became smaller (narrow size distribution) when a dual filtration was used instead of single filtration. The mode of the size distribution obtained in dual filtration was also smaller to that of single filtration. By continuing this process of purification for a second time, the GUVs size distribution became even narrower. After using an extra filtration with dual filtration, two different size distributions of GUVs were obtained at a time. This experimental observation suggests that different specific size distributions of GUVs can be obtained easily, even if GUVs are prepared by different other methods.