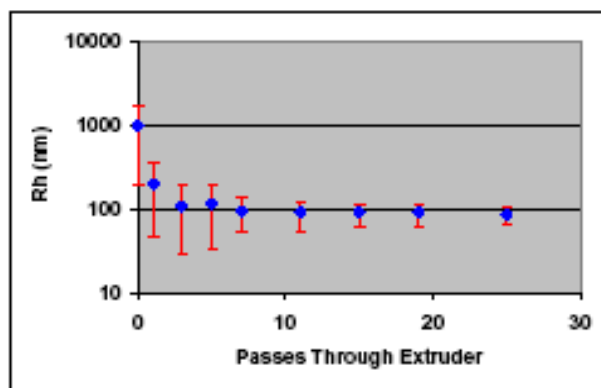


## Vesicle Size Distribution Analysis

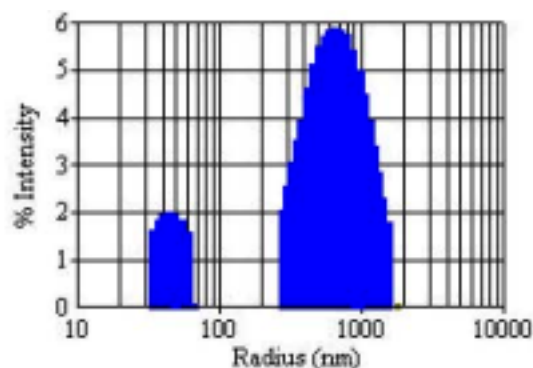
Unilamellar vesicles are liquid droplets enclosed by a single bilayer of phospholipid molecules. These vesicles are prepared from multi-lamellar vesicles by extrusion through membranes with defined pore sizes. Once formed, unilamellar vesicles are stable in suspension for extended periods of time. For many applications, e.g. targeted drug delivery, the mean vesicle size influences the intended suspension characteristics and is an important parameter for describing the efficacy of different sample preparation techniques. Because of its sensitivity to particle size and polydispersity, dynamic light scattering is a valuable tool for characterizing vesicle suspensions.

Multilamellar vesicles were prepared as a solution of 1,2-Dilauryl-sn-Glycero-3-Phosphocholine in deionized water at 25 mg/ml. The samples were extruded through an Avanti Mini-Extruder (Avanti Polar Lipids, Inc). The stock solution was passed through the extruder multiple times, diluted with water, and then characterized by dynamic light scattering with a DynaPro-LSR instrument. Figure 103-1 shows the decrease in particle radius and narrowing of the size distribution (polydispersity – indicated by error bars) as a function of the number of passes through the membrane.

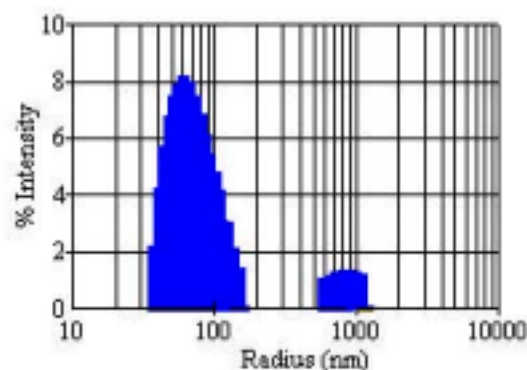


**Figure 103-1:** Size and polydispersity, by Cumulant analysis, of vesicle suspension after extrusion.

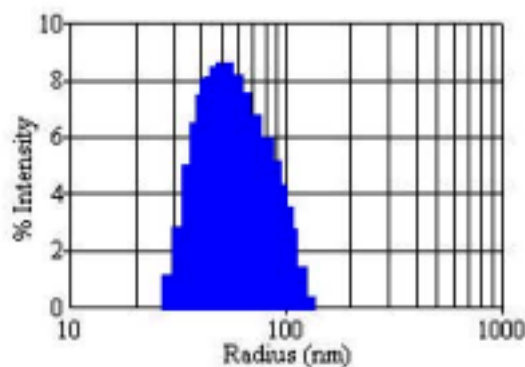
The figures in the next column show selected Regularization histograms for the vesicle suspension after multiple extrusions. These figures better illustrate how the size distribution changes from large, polydisperse, multilamellar vesicles to small, monodisperse, unilamellar vesicles during the extrusion process. The size distribution shows only one peak after 12 passes, with further passes resulting in a decrease in the polydispersity at constant size.



**Figure 103-2a:** Regularization histogram for vesicle suspension prior to extrusion.



**Figure 103-2b:** Regularization histogram for vesicle suspension after seven passes through the extruder.



**Figure 103-2c:** Regularization histogram for vesicle suspension after fifteen passes through the extruder.

