How Number of Extrusions and Cholesterol Effect Production of Liposome Nanoparticles

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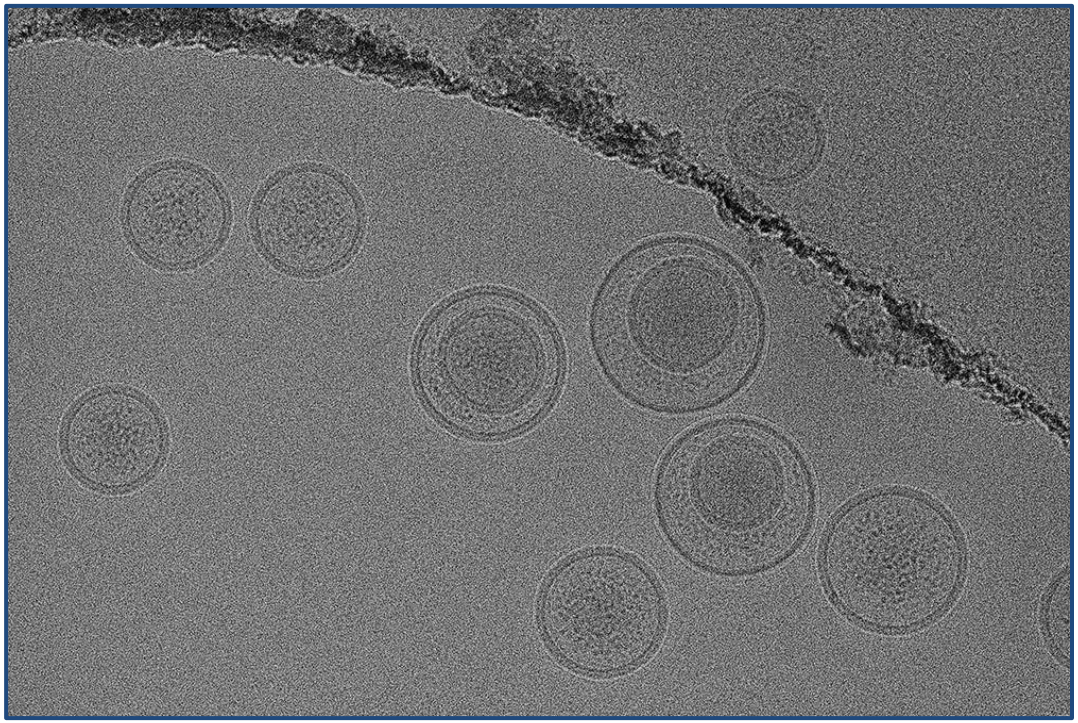
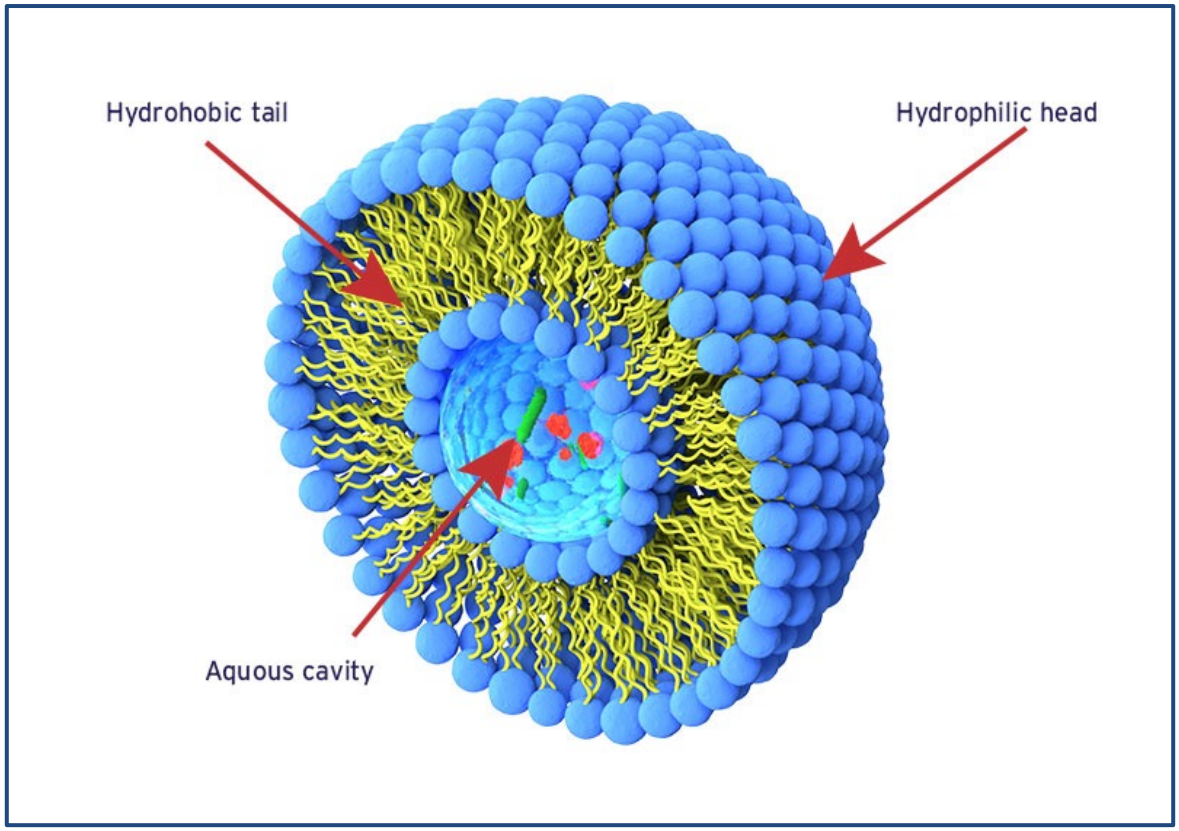
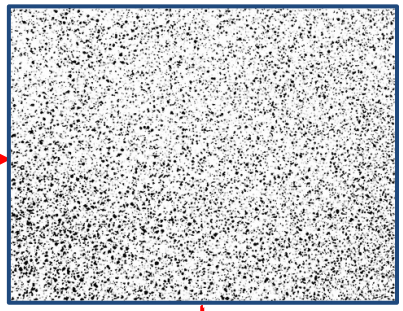


Liposomes are used as drug-carriers and development of high-performance nanoparticles have begun

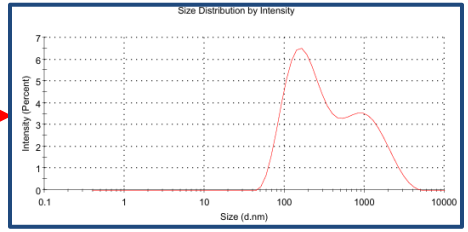


Our lab focuses on creating liposome nanoparticles using specific instruments and comparing the size distribution

Procedure



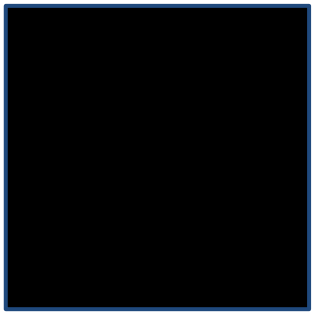
Theory and Data Collection



Data and Analysis

Liposome nanoparticle solution was created by following given procedure

Pipette and Mix Phospholipid, Cholesterol, and Chloroform



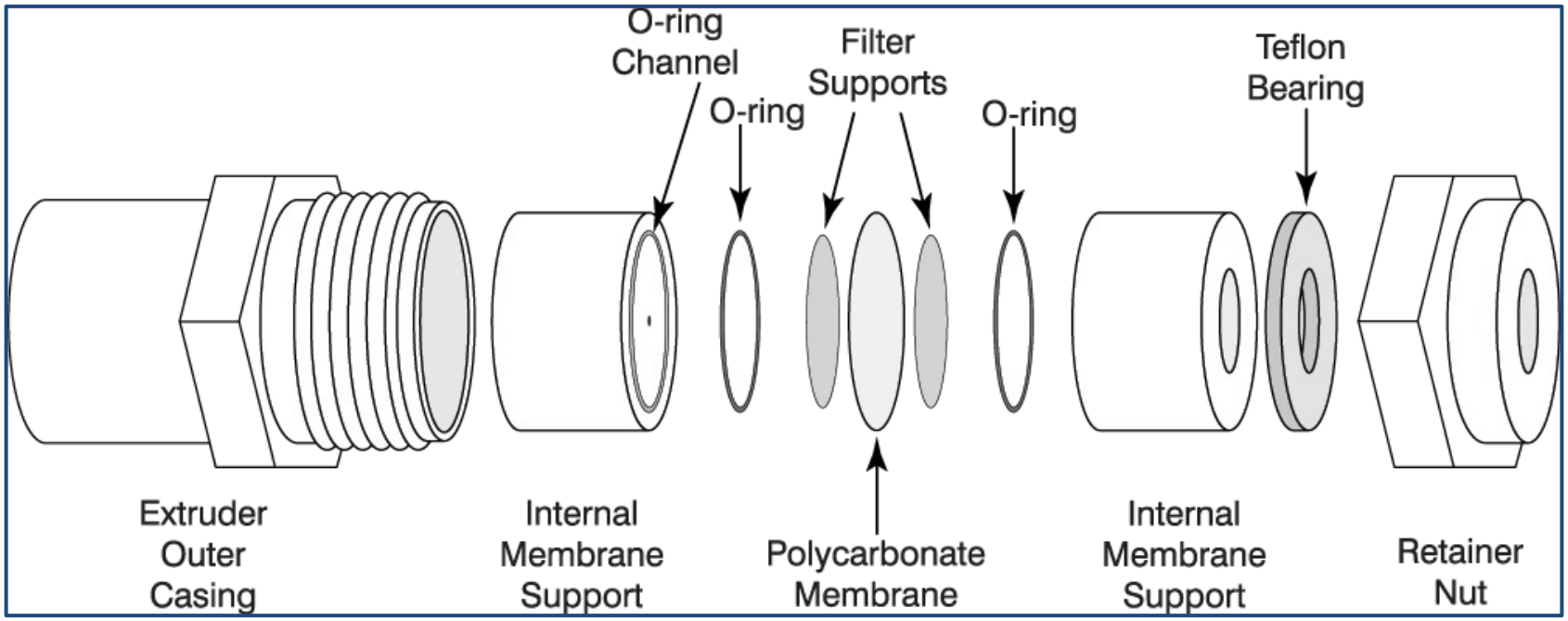
Evaporate Chloroform with Air Stream

Hydrate with DI water

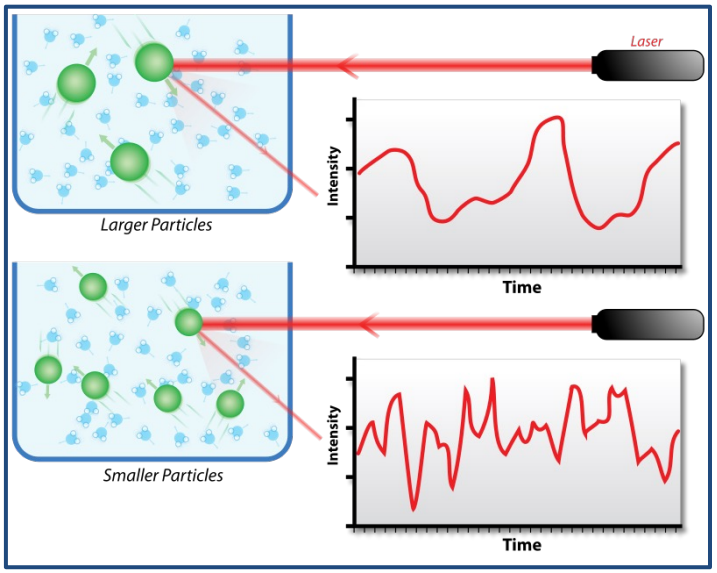
Agitate with Vortex Mixer

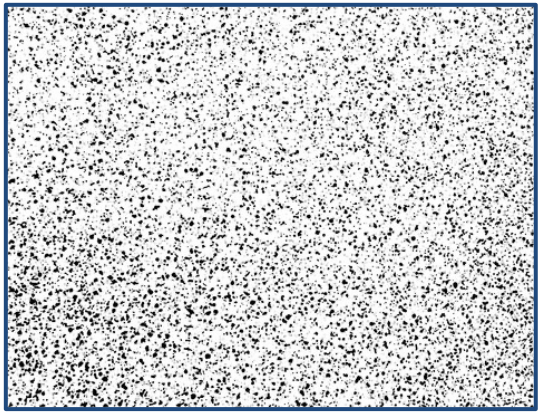
Break down multilamellar liposomes with Sonicator

Final Step of the Procedure is to Extrude the Sample



Using Dynamic Light Scattering to determine particle sizes

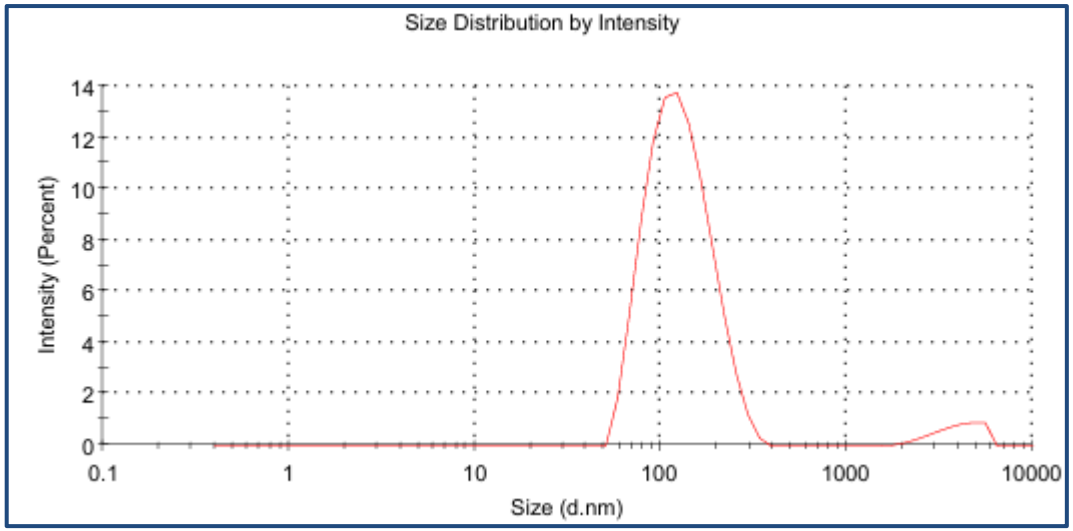




Stokes-Einstein equation

$$D = \frac{k_B T}{6\pi\mu R_0}$$

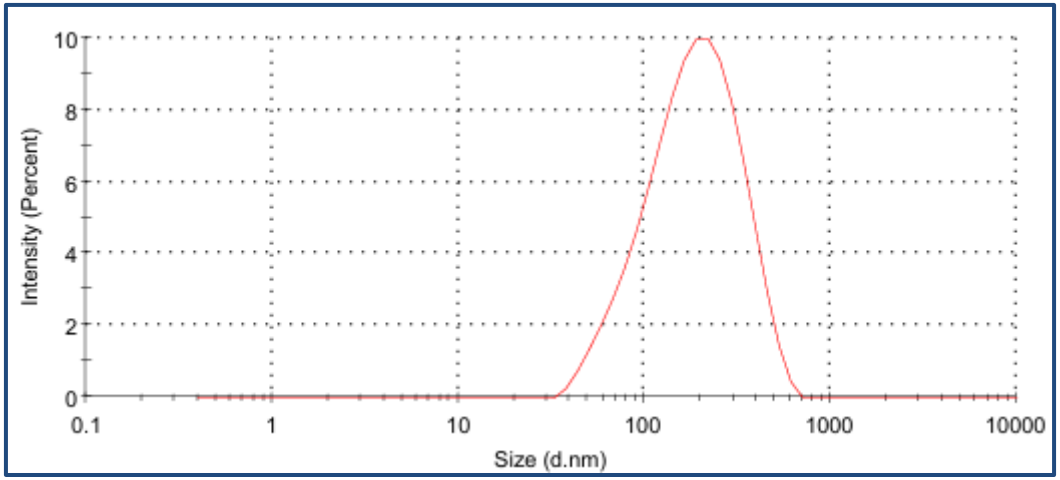
D – diffusion coefficient
μ - solvent viscosity
R_0 – solute radius
k_B – Boltzmann's constant
T – temperature (K)



Experimental Data

Number of Extrusions	5	7	9	11	13	15
Peak 1 wavelength (d.nm)	219.4	208.2	132.7	142.6	148.7	140.0
St Dev (d.nm)	125.2	111.6	51.65	56.45	58.20	49.18
% Intensity	66.2	100	95.2	98.5	100.0	100.0
PdI	0.446	0.227	0.201	0.171	0.140	0.104

7 Extrusions



Experimental Data

Standard Concentration

Number of Extrusions	5	15
Peak 1 wavelength (d.nm)	219.4	140.0
St Dev (d.nm)	125.2	49.18
% Intensity	66.2	100.0
PdI	0.446	0.104

Vs.

Half Cholesterol

Number of Extrusions	5	15
Peak 1 wavelength (d.nm)	2923	113.0
St Dev (d.nm)	668.2	40.30
% Intensity	100.0	100
PdI	0.059	0.133

Double Cholesterol

Number of Extrusions	5	15
Peak 1 wavelength (d.nm)	2175	124.9
St Dev (d.nm)	422.3	43.85
% Intensity	100	98.9
PdI	0.100	0.147

Conclusion

Following the given procedure revealed the number of extrusions increasing the percentage of nanoparticles

However

With the limited data, we found no correlation in the amount of cholesterol relating to the size of the particles

Questions?