Evaluation of thymol loaded phytosome and niosome formulations for lung cancer

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Introduction

Lung cancer is a major global health threat, with non-small-cell lung cancer comprising of 85% of cancer cases. [1,2] Conventional chemotherapy is often limited by systemic toxicity. [3] Thymol which is natural monoterpenoid and crucial phenolic compound, exhibits potent anticancer activity. [4] Vesicular systems enable the delivery of therapeutic agents to specific target sites, by enhancing treatment efficacy. [5]

Methods

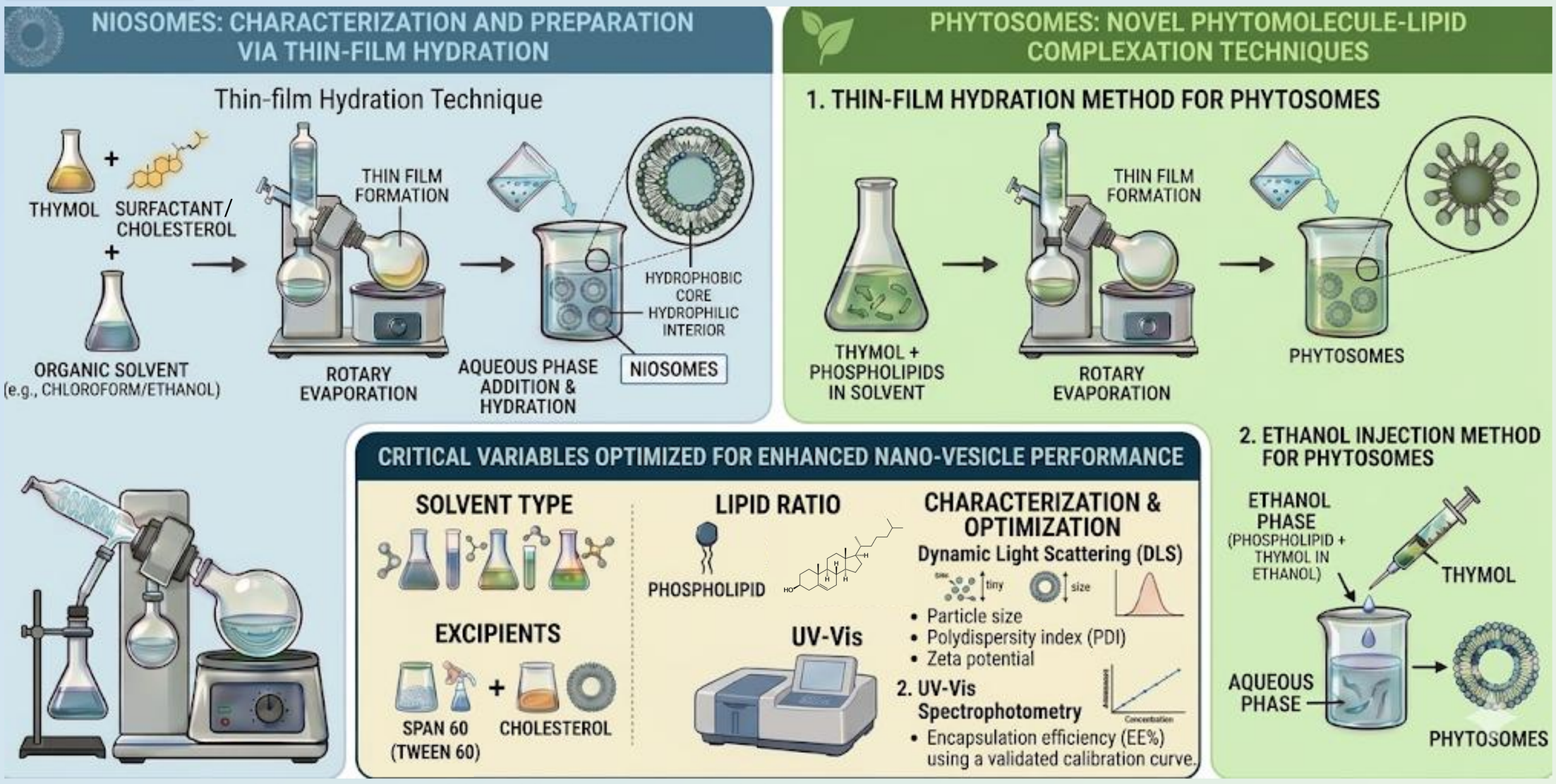

Figure 1. Preparation and characterization of thymol-loaded niosomes and phytosomes

Results

Table 1. DLS results as mean particle size(nm) and PDI and encapsulation efficiency of phytosome formulations. (Mean ± SD, n=3)

	F1-P	F2-P	F3-P	F4-P	F5-P	F6-P	F7-P	F8-P	F9-P	F10-P	F11-P
Mean particle size (nm)	137.0 ± 15.8	69.0 ± 2.0	108.4 ± 10.4	75.85 ± 0.92	78.0 ± 7.84	91.73 ± 3.48	102.87 ± 7.17	126.7 ± 1.2	95.13 ± 3.90	60.33 ± 4.01	77.67 ± 6.42
Mean PDI	0.52 ± 0.07	0.17 ± 0.08	0.59 ± 0.03	0.34 ± 0.06	0.33 ± 0.15	0.26 ± 0.08	0.38 ± 0.09	0.29 ± 0.07	0.40 ± 0.08	0.15 ± 0.01	0.25 ± 0.07
EE (%)	46 ± 0.2	9 ± 0.1	6 ± 0.2	15 ± 0.1	80 ± 0	63 ± 0.1	43 ± 0	42.5 ± 0	40 ± 0	43 ± 0.2	72 ± 0

Table 2. DLS results as mean particle size(nm) and PDI and encapsulation efficiency of niosome formulations (Mean ± SD, n=3)

	N1-E	N1-C	N2	D1-C	D1-E
Mean particle size (nm)	111.57 ± 5.03	111.00 ± 4.69	100.37 ± 9.46	140.93 ± 4.02	102.10 ± 4.18
Mean PDI	0.45 ± 0.10	0.52 ± 0.08	0.42 ± 0.08	0.46 ± 0.22	0.24 ± 0.11
EE (%)	58.8 ± 0.8	52.1 ± 1.0	47.3 ± 0.6	20.0 ± 0.1	72.7 ± 0.2

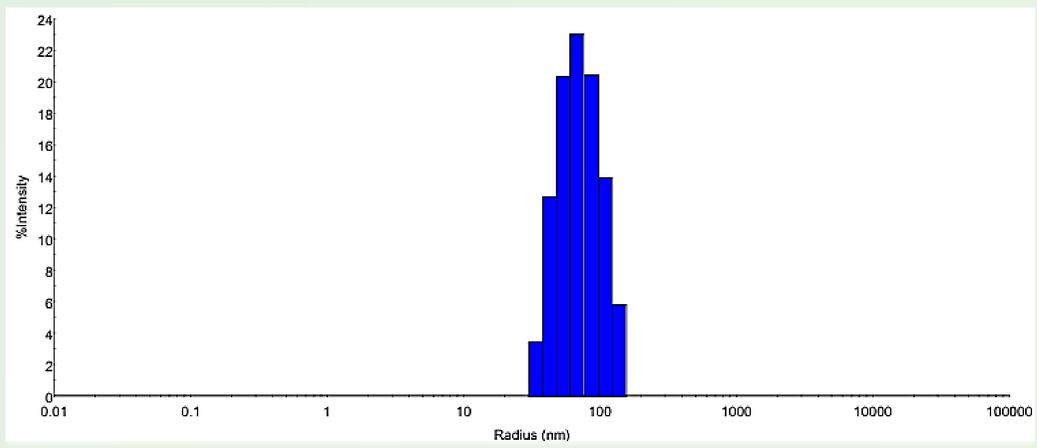

Figure 2. Particle size distribution of optimized (F5-P) phytosome formulation

Conclusion

Encapsulation Capacity: Phytosomes > Niosomes

Optimal Formulation: Phytosome at 1:1 molar ratio exhibited the most favorable physicochemical profile.

Controlled sonication and filtration (0.45 µm) significantly enhanced vesicular homogeneity and stability.

References

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