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Hydrophobic Metals Nanoparticles Encapsulated In A Lipid Bilayer Of Thermosensitive-Liposome.

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Extended Abstract

Thermosensitive liposomes (TSLs) have gained significant attention in recent years due to their potential applications in drug delivery and biomedical therapeutics. This study investigates developing and characterising TSLs encapsulated with hydrophobic gold (Au) and silver (Ag) nanoparticles for enhanced therapeutic efficacy.

The TSLs were prepared using a thin-film hydration method, and hydrophobic Au and Ag nanoparticles were incorporated into the lipid bilayers [1]. The physicochemical properties of the TSLs, including size, surface charge, and thermal stability, were evaluated using dynamic light scattering, zeta potential measurements, and differential scanning calorimetry.

Hydrophobic Au and Ag nanoparticles were encapsulated within the TSLs, resulting in stable and uniform nanocarriers. The average size of the TSLs was determined to be within the desirable range for efficient cellular uptake and circulation in the bloodstream. The presence of hydrophobic nanoparticles did not significantly affect the overall size and surface charge of the TSLs.

Furthermore, the thermal stability of the TSLs was evaluated, and it was found that the incorporation of hydrophobic nanoparticles improved the heat sensitivity of the liposomes [2]. This enhanced thermos sensitivity can be exploited for triggered drug release at elevated temperatures, such as hyperthermia-induced tumour targeting [3].

In conclusion, this study presents the successful encapsulation of hydrophobic Au and Ag nanoparticles within thermosensitive liposomes. The developed nanocarriers exhibit favourable physicochemical properties and enhanced thermal stability, making them promising candidates for targeted drug delivery and thermal therapy applications. Further investigations are warranted to assess their in vitro and in vivo performance for potential clinical translation [4].

References

[1] Akbarzadeh, R. Rezaei-Sadabady, S. Davaran, S.W. Joo, N. Zarghami, Y. Hanifehpour, M. Samiei, M. Kouhi, K. NejatiKoshki, *Liposome: classification, preparation, and applications. Nanoscale Res. Lett.* 8(1), 102 (2013). doi:10.1186/1556-276X-8- 102

[2] L. Paasonen, T. Laaksonen, C. Johans, M. Yliperttula, K. Kontturi, A. Urtti, *Gold nanoparticles enable selective light-induced contents to release from liposomes. J. Control. Release* 122(1), 86–93 (2007). doi:10.1016/j.jconrel.2007.06.009.

[3] Liu, D., Yang, F., Xiong, F. and Gu, N., 2016. *The smart drug delivery system and its clinical potential*. *Theranostics*, *6*(9), p.1306. Doi: 10.7150/thno.14858.

[4] L. Paasonen, T. Laaksonen, C. Johans, M. Yliperttula, K. Kontturi, A. Urtti, *Gold nanoparticles enable selective light-induced contents release from liposomes. J. Control. Release* 122(1), 86–93 (2007). doi:10.1016/j.jconrel.2007.06.009.