Dispersion of Liposomes Produced by a Supercritical CO_2 process in Thermosensitive Hydrogel for Intratympanic Injection

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Sensorineural hearing loss has limited treatment options. Dexamethasone (Dexa) has shown potential in protecting hair cells, but sustained delivery remains a challenge [1]. In this study, liposomes encapsulating Dexa are produced using a single-step, scalable and eco-friendly supercritical CO_2 method [2]. These liposomes are dispersed in a Poloxamer 407 (P407) hydrogel, which transitions from liquid to gel at body temperature, ensuring prolonged release. Liposomes produced via $scCO_2$ are comparable in size and encapsulation efficiency to those made with thin film hydration but exhibit superior stability.

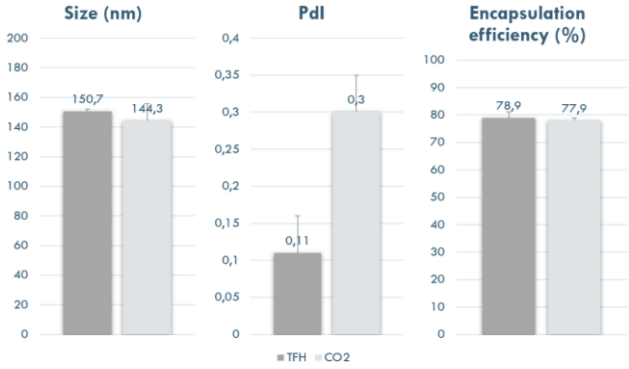

Figure 1. Comparison of TFH and $scCO_2$ methods.

P407 hydrogels (16.25-18.75%) were characterized for injectability, gelation and viscosity, with promising results for *in vivo* retention. Ongoing studies will evaluate Dexa's sustained release from these formulations, aiming to enhance therapeutic efficacy and reduce systemic side effects.

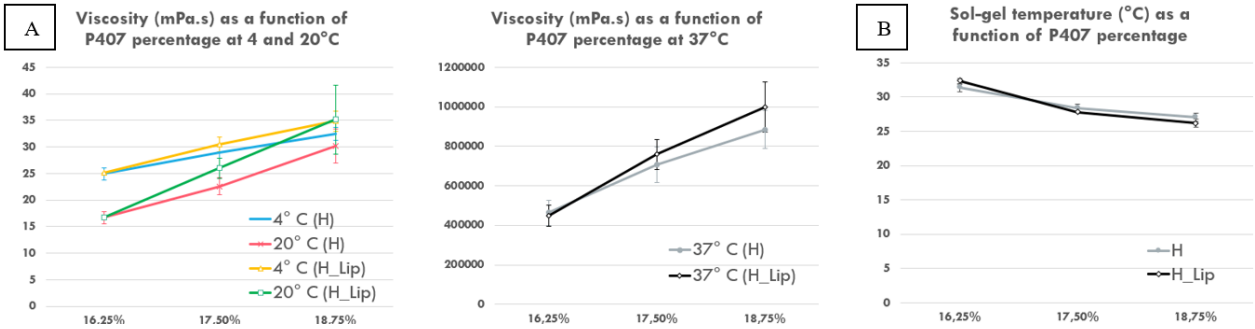

Figure 2. Comparison of the P407 hydrogels.

References:

[1] Delaney, D.S. et al. Overcoming barriers: a review on innovations in drug delivery to the middle and inner ear, Front. Pharmacol. 14, 1207141 (2023).
[2] Penoy, N. et al. Development and optimization of a one step process for the production and sterilization of liposomes using supercritical CO_2, Int. J. Pharm. 651, 123769 (2024).

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