

MAGNETOLIPOSOMES CONTAINING BIOACTIVE MOLECULES AS NANOCARRIERS FOR BIOLOGICAL APPLICATIONS

Zara-Danceanu Camelia-Mihaela¹, Luminita Labusca^{1,3}, Herea Daniel¹, Minuti Anca Emanuela¹, Stavila Cristina^{1,2}, Chiriac Horia¹, Lupu Nicoleta¹

¹National Institute of Research and Development for Technical Physics (NIRDTP) Iasi, Romania.

² Faculty of Physics *Alexandru Ioan Cuza* University of Iasi.

³ Emergency County Hospital Saint *Spiridon* Iasi, Romania.

Background. Proprietary magnetic nanoparticles (Fe_3O_4) with diameters around 40 nm were synthesized by the coprecipitation method and coated with oleic acid. The OA- Fe_3O_4 magnetic nanoparticles were formulated as magneto-liposomes containing ascorbic acid and dexamethasone with sizes below 210 nm. According to this study, magnetic nanoparticles loaded with bioactive molecules can be used to deliver bioactive molecules to osteoarthritic joints with minimal side effects.

Materials and methods. We investigated the magnetic behavior of magneto-liposomes by vibrating sample magnetometry (VSM). Using dynamic light scattering (DLS) and zeta potential measurements, magneto-liposomes were characterized in terms of their size, surface charge, and stability. A study of the in vitro biocompatibility, iron cell uptake, drug release, anti-senescence, and proliferation potential of the system was also conducted.

Results. The obtained magnetic nano-emulsions provided superior stability, magnetic properties, and biocompatibility when used as carriers for anti-inflammatory drugs such as dexamethasone and ascorbic acid.

Conclusions. This study showed enhanced ADSC migration potential along with chondrogenesis, which suggests magneto-liposomes containing dexamethasone could be used to alleviate symptoms of OA. Slow ascorbic acid release may further assist cartilage regeneration.

Keywords: magnetic nanoparticles, magnetoliposomes, bioactive molecules, drug-release, nanocarriers.

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