

Encapsulation of miRNA in chitosan nanoparticles as a candidate for an anti-metastatic agent in cancer therapy

ABSTRACT

MicroRNAs (miRNA) have been utilised as a repressor molecule for metastasis of tumours, as it inhibits fundamental processes related to cellular and physiological pathway of the tumour at the mRNA level. However, therapeutic application of miRNAs is impaired by premature degradation in the extracellular environment by endonucleases. This research describes the optimisation, chemical, and morphological characterisation of nanoparticles for effective encapsulation of miRNA-186 and evaluate its efficiency as anti-metastatic agent in non-small cell lung carcinoma monolayer. Through ionic gelation methods, the miRNA was encapsulated in chitosan nanoparticles (CNPs), a drug carrier with high particle stability, low cellular toxicity, and robust preparation methods. Physiochemical and morphological characterization analysis through light scattering analysis showed miRNA-CNP sizes below 200 nm, with a low polydispersity index and exhibition of irregular spherical shape of the nanoparticles synthesised through FESEM analysis. Additionally, in vitro nanoparticle efficacy evaluated through scratch assay suggests a decrease in invasion ability of cancer cells exhibited by miRNA-CNP.

Keyword: Chitosan nanoparticles; miRNA-186; Anti-metastatic agent; Cancer therapy