GOLD NANOPARTICLES ENABLE ELLAGIC ACID DETECTION IN LEUKEMIA THERAPY

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Bioactive compounds present in pecan nuts, particularly ellagic acid (EA), exhibit promising potential as adjuncts in leukemia treatment. Gold nanoparticles (AuNPs) serve as effective carriers for these compounds, given their biocompatibility and ability to target leukemic cells. In this context, the focus shifts towards utilizing AuNPs bound to EA not solely for a delivery system but rather as a means to detect the released EA in systems such as polymer emulsions encapsulating EA-AuNPs. In this study, AuNPs were synthesized using two gold precursors: $HAuCl_4$ (Au^{3+}) and AuCl (Au^{+}). Various concentrations of $HAuCl_4$ (0.3 mM, 1.5 mM, and 15 mM) were assessed with a constant sodium citrate ratio (0.6:1) to explore their impact on AuNP size. Additionally, AuNPs were prepared using AuCl (1.5 mM) and sodium citrate (2.5 mM). Characterization of the AuNPs was conducted via UV-Vis spectroscopy and scanning electron microscopy (SEM). Results revealed that the concentration of the gold precursor significantly influenced the size and optical properties of the AuNPs, demonstrating a spherical morphology with size variation based on precursor concentration and oxidation number. AuNPs synthesized with AuCl exhibited larger sizes compared to those synthesized with HAuCl4, while a λmax was recorded at 220 nm (Au+) and 530 nm (Au3+). The red-shifted λmax observed in AuNP-EA spectra indicates successful ellagic acid conjugation, resulting in increased particle size due to attached molecules. Traditional methods like Folin´s reagent for EA detection suffer from low specificity and matrix interference. However, EA conjugation to AuNPs facilitates the development of plasmonic biosensors with enhanced specificity, sensitivity, and user-friendliness. EA bound to AuNPs enable precise detection of EA release, particularly in complex systems like polymer emulsions encapsulating EA-AuNPs, and hold potential for advancing leukemia therapies by leveraging EA´s antiproliferative and proapoptotic properties against leukemia cells.

Keywords: Gold nanoparticles, Plasmonics, Bioactive compounds

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