SYNTHESIS AND CHARACTERIZATION OF GELATIN NANOPARTICLES COUPLED GFP FOR POTENTIAL RELEASE OF ANTINEOPLASTIC DRUGS

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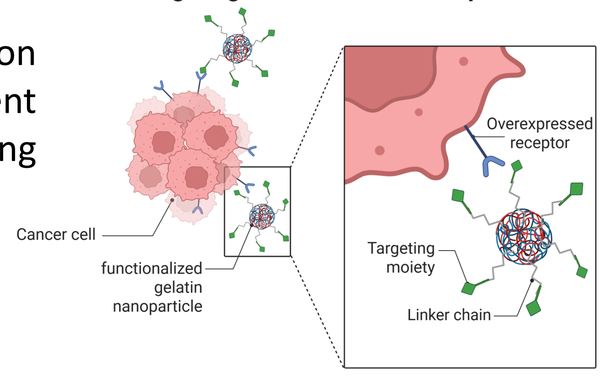
Introduction

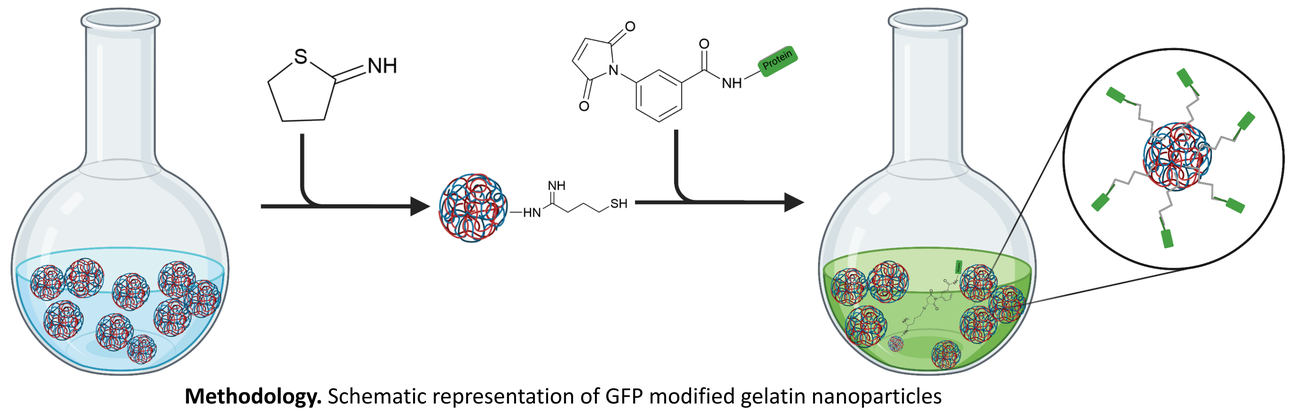
Cancer has the highest prevalence and death rate in the world. It is estimated that an additional one million new cancer cases will be diagnosed in Latin America by 2040 [1]. Although chemotherapy is the most efficient treatment for this disease, it is limited by its cytotoxicity. Recent advances in biomedical field have interesting on polymeric drug delivery systems such nanoparticles attached to ligands for active targeting of cancer cells. The aim is synthesizing gelatin nanoparticles (GNP) coupled to green fluorescent protein (GFP), as a probe concept for coupling proteins as active targeting systems.



Methods and Results

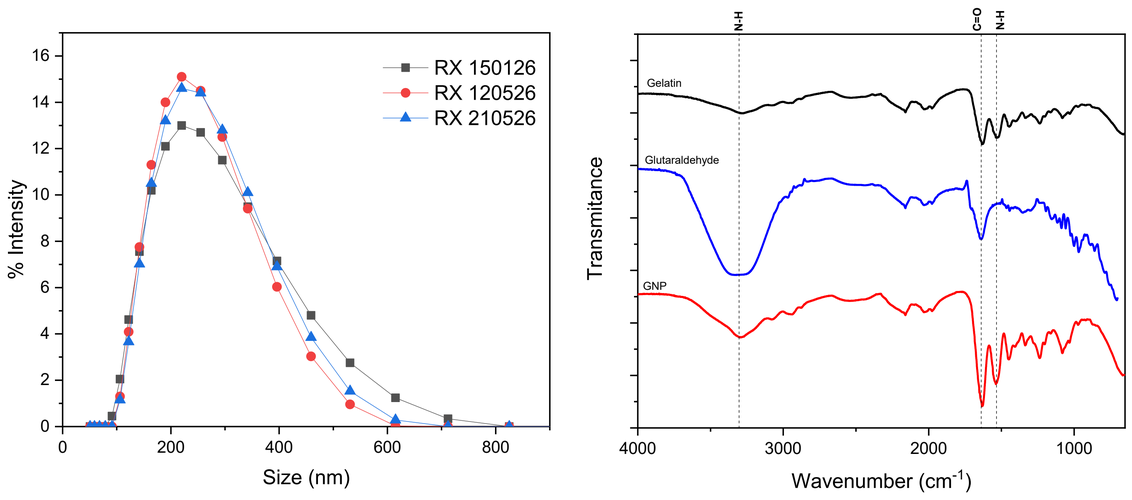
Synthesis of Gelatin Nanoparticles

1. Synthesis by double desolvation method and crosslinked with glutaraldehyde (GA).
2. Thiolation of GNP with 2-iminothiolane.
3. Activation of protein GFP with Sulfo-MBS.
4. Covalent coupling of GFP to GNP, by the incubation of GNP-SH and activated-GFP.



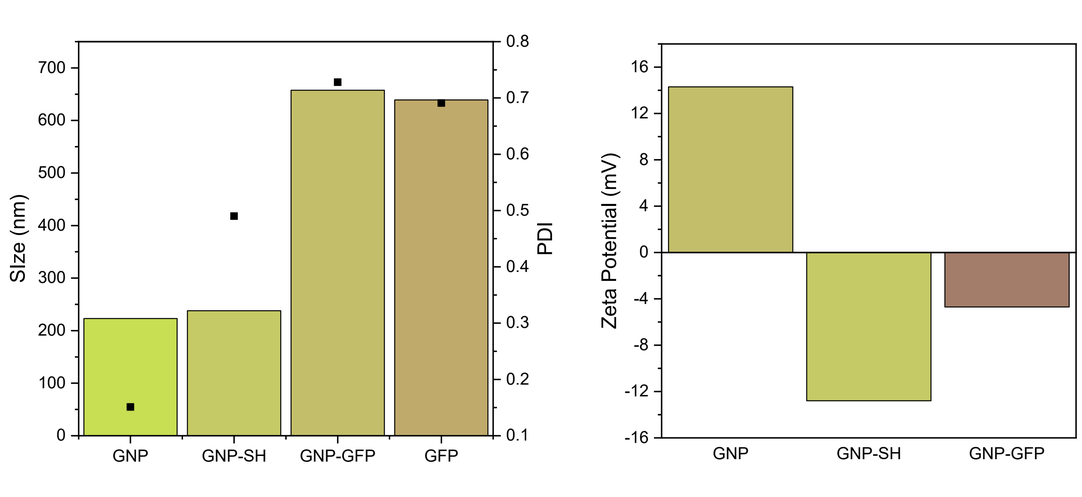
Methodology. Schematic representation of GFP modified gelatin nanoparticles

1. Characterization of Gelatin Nanoparticles



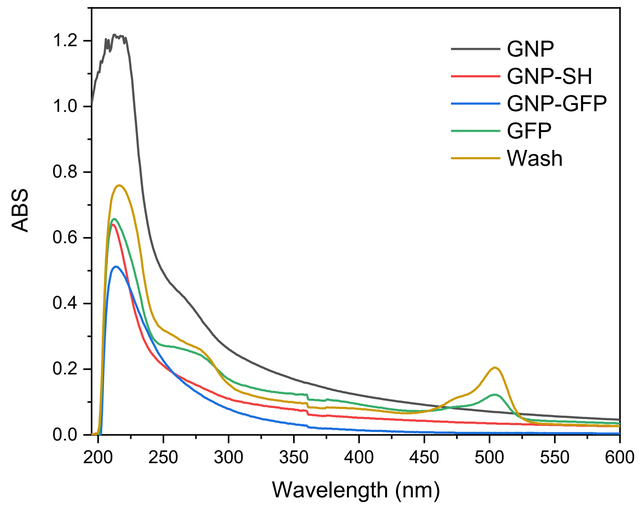
Size distribution and FITR Spectra. The size of crosslinked GNP were 217.94 ± 7.9 nm ,indicated a small size with a low PDI 0.149. and exhibit the characteristic bonds of gelatin and GA, like N-H and C=O bonds, suggesting a successful synthesis. .

2. Characterization GFP-Gelatin Nanoparticles



Size distribution and zeta potential. The change in size demonstrates the successful modification and conjugation of GFP to GFP, as well as the shift in zeta potential from positive to negative (14.4 to -4.7 mV)

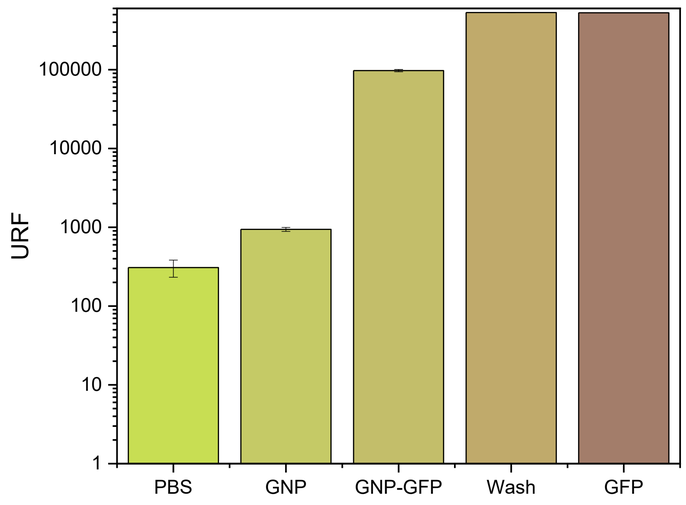
3. UV-Vis Spectra



	Wavelength (nm)
Gelatin	230
SH	210-240
GFP	280 & 490

UV-Vis absorption. The GFP absorb in 490 nm, the GNP-GFP did not shown absorption in this range because the concentration was minimal to be detected (<400 µg/mL). This method is not as sensitive as others for detecting low concentrations.

4. Fluorescence Intensity



Fluorescence Intensity. The fluorescence of GNP-GFP was 100 times higher than that of GNP, indicating successful protein conjugation to the nanoparticles; however, wash sample revealed that some protein had not bound.

Conclusions

- Gelatin nanoparticles showed homogeneous size. The changes in the size and zeta potential of the SH-modified nanoparticles confirm the chemical modification required for correct binding to green fluorescent protein, which it´s demonstrated in fluorescence intensity results.
- The methodology to modified GNP it is a promising to synthetized targeted nanosystems using other proteins as potential anticancer treatments

Acknowledgment

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Gio Laboratorio de ciencia

References

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