

# Elucidating the antimicrobial and cytotoxic responses of silver nanoparticle synthesised using *Pongamia pinnata* leave extract

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Biosynthesized nanoparticles, for their unique additional properties, have received global attention in nanomedicine [1]. Medicinal plants have extensively been screened for eco-friendly and efficient synthesis of metal nanoparticles [2]. Owing to the ever increasing applications of biosynthesized metal nanoparticles, the manuscript demonstrates the biogenic synthesis of silver nanoparticle (AgNP) using *Pongamia pinnata* leave extract. The characterization of biosynthesized AgNP indicated the highest yield of approximate 25 nm size face centred cubic silver nanocrystal with negative surface potential was obtained, when the plant extract taken in ten folds excess to metal salts. The biological corona, included bioactive molecules from the plant leave extract, is stabilising the AgNP core, as confirmed by elemental mapping of the nanoparticle. The biosynthesised AgNP found to have antimicrobial activity against *Escherichia coli* and *Staphylococcus aureus*, via predominantly enhanced intracellular ROS generation, at very low concentration. Interestingly, the nanoparticle showed higher cytotoxicity towards fibrosarcoma (HT1080) cells than differentiated monocytes (dTHP1), and also found to co-localise with nucleic acid. Additionally, the concentration inhibiting the microbial growth is found to be significantly higher than the cytotoxic concentration against HT1080 cell. The work will further be extended towards optimizing medicinal nanoformulations using these nanoparticles, and will be assessed for different therapeutic applications.

## References in Vancouver format:

1. Sanvicens N, Marco MP. Multifunctional nanoparticles—properties and prospects for their use in human medicine. *Trends in biotechnology*. 2008 Aug 1;26(8):425-33.
2. Pradeep M, Kruszka D, Kachlicki P, Mondal D, Franklin G. Uncovering the phytochemical basis and the mechanism of plant extract-mediated eco-friendly synthesis of

*silver nanoparticles using ultra-performance liquid chromatography coupled with a photodiode array and high-resolution mass spectrometry. ACS Sustainable Chemistry & Engineering. 2021 Dec 16;10(1):562-71.*

## Introduction

❖ Medicinal plants have gained attention for its potential to reduce metal salts and capping the resulting elements growth at nanometre size, which it does to counter metal ion toxicity and detoxify the system.

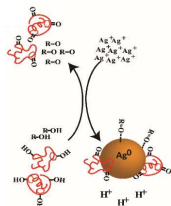


Figure 1. schematic diagram of biomolecules, like polyphenols, mediated Ag<sup>+</sup> reduction into Ag<sup>0</sup> and capping at nano-size crystal.

❖ Fabricated AgNP has also been reported to internalize in cells, and exhibits effective toxicity against cancerous cells compared to normal cells, hence likely to be used in cancer therapy.

## Objective

The objective of the study is to elucidate the antimicrobial and cytotoxic responses of biosynthesized silver nanoparticle (AgNP) is the synergistic effect of bioactive compound and metal ion reducing entities of medicinal plant extract.

## Results and discussion

