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Bacteria Mediated Synthesis of Iron Oxide Nanoparticles and Their Antibacterial, Antioxidant, Cytocompatibility Properties

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Abstract

Iron oxide nanoparticles (IONPs) were synthesized from the *Proteus vulgaris* ATCC-29905 using the extracellular methodology. The UV–Vis spectrophotometry showed the λ-max (maximum absorbance) absorption peak at 310 nm. The FTIR analysis showed amides and other functional groups are associated with IONPs. The TGA results showed less protein loss (ΔY = 9.045%) at a protein degradation temperature of 71.73 °C. The FESEM images showed particles are spherical in shape. The EDX confirms the presence of iron. Zeta potential interface was found to be 79.5 mV that confirms its stability. The TEM results showed particles are spherical with a diameter between 19.23 nm ad 30.51 nm. These IONPs showed good antibacterial activity and also showed good activity against methicillin resistant *staphylococcus aureus* (MRSA). It showed good antioxidant activity. These IONPs exhibits good cytotoxic effect against U87 MG—glioblastoma cancer cells, showed IC50 value at 250 µg/ml compared with healthy L-132 cells. Scratch assay showed IONPs inhibit the cell migration of the HT-29 cancer cells. The nanoparticles synthesized from bacteria are safe and non-hazardous. It was expected that these IONPs could become a potential anticancer and antibacterial agent, and in the future it opens a new path for treating the cancer patients.