Title:	Biofabrication of cerium oxide nanoparticles using emulsification for an efficient delivery of Benzyl isothiocyanate
Authors:	Kumar, Rajendra (/jspui/browse?type=author&value=Kumar%2C+Rajendra)
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Abstract:	The arena of drug delivery is intensifying; hence, it becomes seemingly significant to develop efficient fabrication methodologies while, contemporaneously preserving human health and environment for future generations. The present work dwells upon designing of Ceria nanoparticles (Nps) based drug delivery system in a reproducible and rather restrained controlled manner using nano-emulsion as the template and further, exploiting them as potential candidates in treating one of the pernicious diseases, Cancer. The cavitation procedure employed reinforces the rate of synthesis, resulting in a swift fabrication. The as-synthesized Nps (size ≤ 5 nm) were loaded with Benzyl isothiocyanate (BITC) and in-depth characterization procedures were conducted exploiting Fourier transform infrared spectroscopy, X-ray diffraction, Raman spectroscopy, Zeta potential and Zeta sizer. Small angle X-ray scattering and Brunauer–Emmett–Teller reveal the morphological disposition of these synthesized systems. The structural investigation was carried out using field emission electron microscopy. The biocompatibility studies having Bovine serum albumin (BSA) as a model biomolecule signified the configuration of ground state complex between the ceria loaded BITC (CB) Nps and BSA. Further, the thermodynamic parameters for the complex formation were assessed using fluorescence, UV–visible and circular dichroism spectroscopy. The hemolysis was conducted to evaluate the safety levels of the carrier system on the blood components. The MTT assay demonstrated the adeptness of the formulation on MDA MB-231 cell lines. The proficiency of CB Nps against the bacterial infections is strikingly indicated by the antimicrobial studies which proves that the nano formulation is monumental in inhibiting the growth of E. coli and S. aureus.
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