

Effect of Surfactant Level of Microemulsions and Nanoemulsions on Cell Viability

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Abstract : Nanoemulsions (NEs) and microemulsions (MEs) have been an attractive tool for encapsulation of both hydrophilic and lipophilic actives. Both these systems are composed of oil phase, surfactant, co-surfactant and aqueous phase. Depending upon the application and intended use, both oil-in-water and water-in-oil emulsions can be designed. NEs are fabricated using high energy methods employing less percentage of surfactant as compared to MEs which are self assembled drug delivery systems. Owing to the nanometric size of the droplets these systems have been widely used to enhance solubility and bioavailability of natural as well as synthetic molecules. The aim of the present study is to assess the effect of % age of surfactants on cell viability of Vero cells (African Green Monkeys' Kidney epithelial cells) via MTT assay. Green tea catechin (Polyphenon 60) loaded ME employing low energy vortexing and NE employing high energy ultrasonication were prepared using same excipients (labrasol as oil, cremophor EL as surfactant and glycerol as co-surfactant) however, the % age of oil and surfactant needed to prepare the ME was higher as compared to NE. These formulations along with their excipients (oilME=13.3%, SmixME=26.67%; oilNE=10%, SmixNE=13.52%) were added to Vero cells for 24 hrs. The tetrazolium dye, 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT), is reduced by live cells and this reaction is used as the end point to evaluate the cytotoxicity level of a test formulation. Results of MTT assay indicated that oil at different percentages exhibited almost equal cell viability (oilME \approx oilNE) while surfactant mixture had a significant difference in the cell viability values (SmixME < SmixNE). Polyphenon 60 loaded ME and its PlaceboME showed higher toxicity as compared to Polyphenon 60 loaded NE and its PlaceboNE that can be attributed to the higher concentration of surfactants present in MEs. Another probable reason for high % cell viability of Polyphenon 60 loaded NE might be due to the effective release of Polyphenon 60 from NE formulation that helps in the sustenance of Vero cells.

Keywords : cell viability, microemulsion, MTT, nanoemulsion, surfactants, ultrasonication

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