

LIPID VERSUS POLYMERIC NANOCAPSULES AS CARRIERS FOR FERULIC ACID IN TREATMENT OF COLORECTAL CANCER: PREPARATION AND IN VITRO/IN VIVO APPRAISAL

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Background: Despite the various proven therapeutic effects of the polyphenolic compound, ferulic acid (FA), as an antioxidant, anti-inflammatory and anticancer, its clinical application has been hampered by its low solubility and bioavailability. In the current work, the efficiency of two types of nanocapsules (NCs), polymeric and lipidic, as carriers for FA was compared.

Methods: The two nanosystems were prepared, characterized, and tested on colorectal cancer (CRC) cell lines (HCT-116 and Caco2 cells), with mechanistic anticancer elucidation using flow cytometry. The NCs formulation showing higher cytotoxicity was further tested in vivo on rats after inducing CRC using 1,2 dimethylhydrazine (DMH), followed by biochemical analysis, molecular and histological examinations.

Results: Results revealed that both types of NCs showed acceptable physicochemical properties with the lipidic showing smaller size and higher cumulative percent released of FA. Moreover, the lipidic NCs displayed better anticancer activity than the drug and polymeric NCs on both cell lines; with apoptosis being the dominant cell death mode. The in vivo study revealed that FA lipid NCs exhibited significant antioxidant and anti-inflammatory activities. Their apoptotic and anti-angiogenic potential were confirmed by the downregulation of cyclin D1, IGF II, and VEGF, and autoregulation of the apoptotic/anti-apoptotic gene BAX/Bcl-2, which was further confirmed by histological examination

Conclusions: Findings proved that the proposed FA lipid NCs is a promising modality for treatment of CRC, and can serve as a preventive measure against metastasis.