# DEVELOPMENT AND OPTIMIZATION OF SILYMARIN-LOADED MULTI WALLED CARBON NANOTUBES (SIL-MWCNTS) FOR HEPATIC CANCER TREATMENT

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(Received 09 September 2025) (Accepted 05 January 2026)

**ABSTRACT**

This study developed silymarin-loaded multi-walled carbon nanotubes (SIL-MWCNTs) to improve hepatic cancer treatment. Silymarin, a flavonoid with hepatoprotective properties, faces challenges in conventional therapy due to poor solubility and bioavailability. The research aimed to enhance its bioavailability and targeted delivery by encapsulation within MWCNTs. Using a $3^2$-factorial design, optimal formulations achieved a particle size of 717.205 nm, zeta potential of -25.08 mV, and 71.74% encapsulation efficiency. Confirmation via DSC, FTIR, and TEM analyses validated silymarin's incorporation. *In vitro* studies showed sustained drug release and moderate cytotoxicity against HepG2 cells ($IC_{50}$: 138.23 µg $mL^{-1}$). This encapsulation strategy promises enhanced therapeutic efficacy and reduced adverse effects through targeted delivery.