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Topic of Research**: Synthesis of silver nanoparticles using myricetin and its chemopreventive efficacy in the colorectal cancer cell line**.

Findings

Cancer treatment continues to grapple with challenges such as limited efficacy, drug resistance, and adverse effects. Conventional modalities, including chemotherapy and radiation therapy, often exhibit suboptimal performance and unwanted side effects. In response, this study investigates nanoparticle-based drug delivery systems, specifically silver nanoparticles conjugated with myricetin—a flavonoid known for its anticancer properties. The research focuses on synthesizing and characterizing these nanoparticles to enhance therapeutic outcomes in colorectal cancer.

Characterization techniques such as UV-visible spectroscopy, dynamic light scattering (DLS), Fourier transform infrared spectroscopy, scanning electron microscopy and Transmission Electron Microscopy (TEM) confirmed the successful synthesis of myricetin-conjugated silver nanoparticles. These nanoparticles demonstrated improved bioavailability, targeted delivery, and reduced cytotoxicity compared to conventional treatments. The nanoparticles exhibited significant anticancer activity against HCT 116 colorectal cancer cell lines, impacting key processes such as cell proliferation, migration, apoptosis, and cell cycle arrest.

Molecular analyses revealed that the nanoparticles induce reactive oxygen species-mediated stress, DNA fragmentation, and structural abnormalities in cancer cells. Integrating computational approaches with gene expression data elucidated the underlying molecular mechanisms, validating the observed effects. This study highlights the potential of myricetin-conjugated silver nanoparticles as an innovative and targeted therapeutic strategy, offering reduced toxicity and enhanced efficacy in colorectal cancer treatment.