Unlocking the Anti-Cancer Potential of Quercetin: Strategies for Nanotechnology in Encapsulation

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Cancer remains a leading cause of mortality worldwide, with conventional therapies like chemotherapy facing significant challenges, such as drug resistance and non-specific targeting. Quercetin (QUE), a naturally occurring flavonoid, has garnered attention for its potential in cancer therapy, primarily due to its antioxidant properties and ability to modulate various cancer-related pathways. Despite this, its clinical application is limited by poor solubility and low bioavailability.

Nanotechnology-based encapsulation strategies have emerged as a promising approach to overcome these limitations, offering enhanced delivery and efficacy of quercetin in cancer treatment. Various nanoformulations, including liposomes, polymeric micelles, and inorganic nanoparticles, are being explored to improve quercetin's solubility, stability, and targeted delivery. These systems hold the potential to optimize quercetin’s therapeutic effects by enabling better interaction with cancer cells while reducing side effects commonly associated with free quercetin.

By employing advanced nanocarrier systems, encapsulated quercetin can achieve more precise targeting of cancer cells, thereby enhancing its therapeutic potential as a novel anti-cancer agent in modern therapeutic approaches.