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(57) Abstract :

The present invention relates to a stimuli-responsive nanostructured lipid carrier based pharmaceutical composition for targeted cancer therapy. The invention comprises a hydroxyurea–lipid conjugate, wherein hydroxyurea is chemically conjugated to a lipid moiety through a stimuli-labile linkage, and the conjugate is encapsulated within nanostructured lipid carriers. The conjugation enhances lipophilicity and compatibility with lipid matrices, while the nanocarrier system provides nanoscale particle size, stability, and sustained drug delivery. The composition remains stable under physiological conditions and selectively releases hydroxyurea in response to tumor-specific stimuli such as acidic pH, thereby improving tumor selectivity and reducing systemic toxicity. The invention provides a safe, effective, and scalable nanomedicine platform suitable for the treatment of breast cancer and other solid tumors.

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