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Synthesis of Cisplatin Encapsulated Porous Calcium Carbonate Nanoparticles from Local Dolomite and Possibilities of Targeted Delivery via Folate Receptors

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Sri Lanka is rich in extensive deposits of dolomitic marble minerals with enormous quantities, which have not been exploited on the industrial-scale to manufacture value added materials such as Calcium carbonate Nanoparticles (CCNP). Cisplatin is a frequently used anticancer drug which is the first generation of platinum-based anticancer drugs developed. The cis configuration enables the binding of the coordination complex to one or two DNA strand(s) and thereby crosslinking the DNA strands triggering the cells to die in a programmed manner. A synthesis and stabilization of CCNP of vaterite, their characterization, encapsulation of cisplatin and the slow minimum amount of constant release kinetics of the drug at various pH values and also targeting via folate receptors using folic acid in the vicinity of cancerous cells are described in this research work. SEM images XRF, XRD and FTIR studies reveal that the spherical thermodynamically unstable vaterite porous CCNP were synthesized. FTIR, XRF and EDXS studies show the interactions between Porous CCNP and the anticancer drug cisplatin. Coupling of the folic acid into the drug carrier is done for targeted delivery. By analyzing data from in vitro drug release, at physiological pH of blood and that of healthy cells cisplatin is not released while at mildly acidic pH values of cancer cells cisplatin is slowly released. This is a way forward for safe and convenient chemotherapeutic route to various cancers.

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