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Synthesis of acidity triggered cisplatin encapsulated slow release zinc oxide targeted drug delivery nano composite for cancer treatement

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Cisplatin is a frequently used anticancer drug with a cis configuration that facilitates the covalently binding of the coordination complex to DNA strands and thus crosslinking the DNA strands triggering the cells to die in a programmed manner. However, cisplatin is associated with several side effects which can be either reduced or overcome if cisplatin could be encapsulated in a suitable host material and directed towards cancer cells in a targeted manner. To achieve these targets, we have prepared porous nanoparticles of zinc oxide (ZnO) and encapsulated cisplatin in them and studied their release kinetics in buffered solutions of defined pH values. Since cancerous cells are more acidic compared to normal cells and that ZnO is stable in neutral pH media while decompose slowly in low acidic conditions, it can be a highly suitable host to release drug slowly only at the vicinity of the cancer cells. We developed a novel surfactant-assisted method to synthesize porous nanoparticles of ZnO. The encapsulation of cisplatin was characterised by XRF, SEM, FT-IR and XRD studies. The release kinetics of cisplatin at different pH values was investigated by measuring the amount of Pt released as a function of time using ICP-AES. It shows the release of cisplatin is pH dependent and there is hardly any release of cisplatin at neutral and basic pH values. As such, 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.

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