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Immuno chemotherapy of breast cancer using mesoporous silica magnetic nanoparticles

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Over the last decades, due to the serious side effects associated with conventional chemotherapy agents, targeted anticancer drug delivery has gained tremendous significance for cancer therapy. With the emergence of nanotechnology, fabricating a biocompaticle, effective targeted delivery system is a major challenge for pharmaceutical science. More recently, the promise of immunotherapy in cancer therapy has resulted in the development of de novo treatment strategy. Tryptophan catabolism is considered as an important immunsupressive pathway in tumor microenvironment. Indoleamine 2,3-dioxygenase (IDO) catalyzes the destruction of tryptophan through the kynurenine pathway. Thus, inhibition of IDO is believed to effectively enhane anti-tumor immune response. Previous reports have demonstrated strong anti-cancer effects by combination of an IDO inhibitor with cytotoxic agent. Recently, Silica mesoporous magnetic nanoparticles (SMMNs) have achieved noteworthy attention as both therapeutic and theranostic agents. Due to their physicochemical advantages such as large and uniform pore size, SMMNs enjoy high surface area and silanol groups that can be replaced with other functionalities. As, there is widely held perception for methotrexate as chemotherapiutic agent in breast cancer, herein we report on the fabrication of a drug delivery system in which the mesoporous silica magnetic nanoparticles carry IDO inhibitor agent along with Methotrexate into breast cancer cell lines.

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