2013-14

Rajnibhai V. Patel
PharmInnova Award
Best M. Pharm Thesis

WINNER

Runner-Up

Mr. Nilesh Chaudhari

Research Guide

Mr. Prashant Deshmukh

Subject:
Pharmaceutics & Pharmaceutical Technology

Thesis Title :
Synthesis and Characterisation of Graphene Based Hybrid Magnetic Nanocomposites for Selective Tumor Targetting

College:
H R Patel Institute of Pharma. Education & Research, Dhule

Tumor targeted delivery of anticancer drugs using Magnetic nanocomposites

Outcome of Research:

Anti-cancer drugs are associated with many systemic adverse events produced due to non-targeted drug delivery. This study proposed a simple one step preparation method of a new drug carrier system consisting of Graphene Oxide (GO) and Iron Nanoparticles. Anastrazole (cytotoxic drug) was used to evaluate the utility of this carrier system. The drug loaded composite carrier system showed reduced cytotoxicity as compared to pure anastrozole. Tumor suppression ability may also be due to local increase in temperature by GO and iron nanoparticles. The iron nanoparticles further, can act as a contrast agent for MRI imaging of cancer cells. The method can be extended to other chemotherapeutic agents for enhancing drug delivering efficiency to particular site.

Thesis Title: Synthesis and Characterization of Graphene Based Hybrid Magnetic Nanocomposites for Selective Tumor Targeting

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ABSTRACT

The present work reports a simple one step synthesis of nanoscale graphene oxide magnetic composites (GO–IO) using ferrofluid (GO–IOF). The obtained GO–IO were compared with GO–IO obtained from in situ (GO–IOI) methods. Anastrozole (ANS) was loaded on the GO–IOI and GO–IOF via simple stirring method to form GO–IOA and GO–IOFA respectively. These GO–IO prepared by two techniques were characterized using spectroscopic techniques and vibrating sample magnetometer (VSM) analysis. Particle size and potential were measured using Malvern Zetasizer. Scanning electron microscopy (SEM) was used for studying the surface morphology of GO–IO, and in addition to this elemental analysis was also performed for confirming the presence of iron. The cell viability assay was carried out using the MCF-7 cell line. It revealed that GO–IOFA had reasonably high cytotoxicity (49.7%) compared to GO (13.1%), ANS (16.6), GO–IOI (13%), GO–IOF (13.6) and GO–IOIA (18.34%). Both, GO–IOIA and GO–IOFA showed improved cytotoxicity when compared with pure ANS. GO–IOF were found to exhibit superior magnetic activity due to higher iron content along with smaller particle size and higher loading efficiency compared to GO–IOI. The overall effect suggests that GO–IO can be utilized as efficient carriers for the loading of chemotherapeutic agents.