Magnetic drug targeting in cancer therapy

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Cancer remains one of the leading causes of death in most parts of the world. In cancer therapy a major difficulty is to destroy tumour cells without harming the normal tissue. Radiotherapy attempts to focus irradiation on the tumour, but nevertheless damages healthy tissue which cannot always be protected in the desired way. Chemotherapy involves the use of powerful drugs which are unfortunately rather unspecific, yielding unwanted side effects because of their toxicity.

Over the past few decades, there has been considered interest in developing colloidal carriers based on biodegradable and biocompatible polymeric nanospheres. They have largely influenced the controlled and targeted drug delivery concept. Nanospheres (NSP) are sub-nanosized colloidal structures composed of synthetic or semi-synthetic polymers that vary in size from 10—1000 nm. Depending on the method of preparation, NPS can be obtained in which drug either is dissolved, entrapped, encapsulated or attached to the nanoparticle matrix. But, particulate drug carriers are subject to rapid removal from the circulation by the macrophages of MPS, the main obstacle in targeting various non-phagocytic cells of the body. In order to improve the therapeutic efficacy of the drug, the incorporation of surface modificated magnetic particles together with drug into polymer nanospheres has been developed. This idea has shown promising results in magnetic drug targeting in cancer therapy, for example. The main approach is the i.v. injection of a drug bound or encapsulated in a magnetic drug carrier (such as magnetite in our case) , which can then be concentrated in the desired area (e.g., the tumor) by an external magnetic field.

The purpose of the present work is to encapsulate anticancer drug Taxol into magnetic polymer poly(D,L-lactic-co-glycolic acid) (PLGA) nanospheres by modified nanoprecipitation method. and to investigate the surface morphology, magnetic characteristics and drug release behaviour.