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Nanotechnology-based combinational drug delivery systems for breast cancer treatment

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Breast cancer is arguably the most common cancer faced by females today and the second most common cause of death in women in the world. Indeed, this illness has garnered much attention in the field of pharmacology research. Modern chemotherapeutic anticancer treatments have come a long way in the fight against breast cancer, thus bringing science closer to a cure. However, the nature of these drugs is to attack both cancerous and non-cancerous cells at the same time. With this current approach, a patient's health, in addition to the cancer, can succumb to chemotherapies. To counter this problem, and increase the efficacy of cancer treatment, methods to customize therapeutic anti-cancer drugs have emerged in the form of targeted drug delivery systems. In our studies, we present a method of drug delivery using magnetic polyurethane. Here, we describe a biocompatible magnetic polymer that can be used to direct chemotherapeutic drugs to cancerous regions in a body using an external magnet. We show how a co-precipitation method with magnetic nano-particles (MNPs) followed by a silica coating process and an *in situ* polymerization yields the magnetic polyurethanes used in this study. Verification of synthesis for the drug carrier is shown using the characterization techniques of Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), Thermal Gravimetric Analysis (TGA), and a Vibrating Sample Magnetometer (VSM). The efficiency with drug loading and release of chemotherapeutic medications to the synthesized magnetic polyurethanes is monitored using an HPLC-UV detector. Our findings present a new biocompatible drug delivery system with a high capacity for loading and directing tow various chemotherapeutic drugs simultaneously to cancer sites with little to no toxicity to the surrounding non-cancerous cells.

Biography

Jafari S received her Master's degree in Analytical Chemistry from the University of Tabriz and is currently pursuing her Doctorate of Chemistry in the analytical area at Imam Khomeini International University. In addition to her Master's degree, she is well travelled in her schooling and as such has acquired a wide range of different chemistry styles. With this experience, she gleaned and culminated a wide scope of techniques to develop a novel method for targeting various cancers efficiently with relatively low costs as compared to customized patient medicines. With a generic customized cancer drug delivery system as described in her work, a new field of focus is presented that can make large strides in the fight against breast cancer.

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