Mannose targeted Doxorubicin Micelle for Enhanced Selectivity and Anticancer Activity.

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Abstract:
Cancer therapy based on chemotherapy has the advantage to reduce the progress of cancer and prevent the overgrowth of cancer cells. However, it causes a lot of side effects as it attacks also the rapid divided normal cells such as the hair cells, bone marrow and the kidney cells which induce serious side effects. In this project, micelles decorated with mannose molecules were synthesized based of a hydrophobic skeleton of polydiacetylene (PDA) in order to encapsulate the anticancer drug, Doxorubicin. This formed micelles will deliver DOX selectively as the targeting agent (mannose) will direct the micelles specifically to the cancer cells. The critical micelle concentration of the synthesized micelles was determined using the pyrene method to give a 1×10^{-3} mg/ml with a loading capacity of 55% of DOX. Moreover, the in vitro drug release profile has been determined using the dialysis technique at two pH (5.4 and 7.4) obtaining much higher release at the acidic pH. In a final step, the anticancer and cytotoxicity profiles were determined using the MTS method. The empty micelle showed good biocompatibility with the treated cells, in addition an improvement of the anticancer activity of DOX against HeLa cells was obtained in comparison to the free DOX especially at low concentration of 0.5 µg/mL.