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THESIS ABSTRACT

Preparation and evaluation of graphene oxide based–materials for anticancer drug delivery in an experimental mice tumor

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Background: Graphene oxide (GO) is a multifunctional carbon nanomaterial with tremendous potential in medical science including cancer therapy. It has unique physical, and chemical properties to be used as a drug carrier such as Doxorubicin (DOX). Aim: This study aimed to load DOX on (GO) and supramagnetic iron oxide GO (GO/Fe3O4) as a passive and active forms with or without folic acid (FA) and to compare the anti-tumor effects of these conjugates to free DOX. **Materials and Methods**: GO was synthesized by Hummers method, then loaded with DOX, FA or Fe3O4. All conjugates were characterized by FT-IR, TEM and TGA techniques, then their anticancer properties were investigated in vitro using EAC cell lines. In vivo study was performed using EAC-bearing mice which were divided and treated with DOX, GO/DOX, rGO/DOX/FA, GO/Fe3O4/DOX, rGO/Fe3O4/FA/DOX, GO/Fe3O4/DOX+IR and rGO/Fe3O4/FA/DOX+IR. After 10 days, number of tumor cells, splenocytes and white blood cells (WBC), apoptosis, and cell cycle of tumor cells were analyzed. **Results**: In vivo results showed that GO conjugates induced significant decrease of the total numbers of EAC cells. Interestingly rGO/Fe3O4/FA/DOX+ IR treatment showed increases in late apoptosis whereas GO/DOX and rGO/Fe3O4/FA/DOX induced necrotic cells as compared to free DOX. Free DOX induced leukopenia in spleen, however treatment with GO/DOX or GO/FA/DOX induced lesser effects. Treatment with GO/DOX conjugates induced significant increases in the blood leukocytes as compared to treatment with DOX and GO/DOX/FA which induced leukopenia. **Conclusion**: These results demonstrate that GO composites may be a highly biocompatible nanomaterial with practical applications in cancer therapy.

Keywords: Cancer; Doxorubicin; Ehrlich ascites; Folic acid, Graphene oxide

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