عنوان مقاله:

Functionalized nano-magnetic hydrotalcite particles with tannic acid: A targeted drug delivery platform for oxaliplatin-resistant HCT۱۱۶ cells

محل انتشار:

بیست و یکمین کنگره ملی و نهمین کنگره بین المللی زیست شناسی ایران (سال: 1399)

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خلاصه مقاله:

Magnetic hydrotalcite (HT)-based nanoparticles are unique carriers for anticancer drug delivery due to their two-dimensional layered structure, high biocompatibility, and their ability to respond to an external magnetic. Tannic acid (TA), a natural polyphenol, is a ligand for estrogen receptor (ER). Acquired resistance to oxaliplatin (Oxa) is an inevitable problem and one of the reasons for the failure of colorectal cancer (CRC) therapy. We aimed to explore the ability of functionalized nano-magnetic MgAl HT particles with TA (TA@HT@Fe۳O۴) as a doxorubicin (DOX) delivery carrier to Oxa-resistant ER-expressing colorectal cancer HCT۱۱۶ cells. The synthesized TA@HT@Fe۳O۴ nanoparticles and loaded particles with DOX (DOX/TA@HT@Fe۳O۴) were characterized by various analytical techniques. The entrapment efficiency (EE%), loading content (LC%), and in vitro release of DOX was measured at various pH values using UV-Vis spectrophotometer. The reduced negative value of the potential zeta of TA@HT@Fe۳O۴ nanoparticles after DOX loading and FT-IR spectra of DOX/TA@HT@Fe۳O۴ particles confirmed the successful DOX loading. The EE% and LC% values of TA@HT@Fe۳O۴ nanoparticles were about ۵۱% and ۸%, respectively. The release of DOX from TA@HT@Fe۳O۴ nanoparticles was pH-dependent with an initial rapid release (within ۱۶ h) followed by a sustained release for ۱۲۰ h. Hemolysis results revealed the highly biocompatible behavior of TA@HT@Fe۳O۴ nanoparticles. Oxa-resistant HCT۱۱۶ colorectal cancer cells were established by the exposure of HCT۱۱۶ cells to increasing concentrations (۰.۵-۴.۳ μM) of Oxa. The exponentially-growing cells in the presence of ۴.۳ μM Oxa were considered as Oxa-resistant HCT۱۱۶ cells (HCT۱۱۶/Oxa۴.۳). Fluorescence microscopy images and flow cytometry data confirmed the uptake of DOX/TA@HT@Fe۳O۴ particles by HCT۱۱۶/Oxa۴.۳ cells. MTT results showed that the anti-proliferation activity of DOX/TA@HT@Fe۳O۴ nanoparticles against HCT۱۱۶/Oxa۴.۳ cells was in a concentration dependent manner. Conclusion: TA@HT@Fe۳O۴ nanoparticles is a pH-responsive release system and

.offers promise as a safe and an effective system for targeted drug delivery to ER-expressing cells

کلمات کلیدی:

Hydrotalcite MgAl nanoparticles, Oxaliplatin, Drug resistance, Colorectal cancer, Tannic acid, Targeted drug delivery