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Development of Epirubicin-Loaded Biocompatible Polymer PLA–PEG–PLA Nanoparticles: Synthesis, Characterization, Stability, and In Vitro Anticancerous Assessment

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Abstract

Epirubicin (EPI) is an anti-cancerous chemotherapeutic drug that is an effective epimer of doxorubicin with less cardiotoxicity. Although EPI has fewer side effects than its analog, doxorubicin, this study aims to develop EPI nanoparticles as an improved formula of the conventional treatment of EPI in its free form. Methods: In this study, EPI-loaded polymeric nanoparticles (EPI-NPs) were prepared by the double emulsion method using a biocompatible poly (lactide) poly (ethylene glycol) poly(lactide) (PLA–PEG–PLA) polymer. The physicochemical properties of the EPI-NPs were determined by dynamic light scattering (DLS), transmission electron microscopy (TEM), differential scanning calorimetry (DSC), entrapment efficiency and stability studies. The effect of EPI-NPs on cancer cells was determined by high throughput imaging and flow cytometry. Results: The synthesis process resulted in monodisperse EPI-NPs with a size of 166.93 ± 1.40 nm and an elevated encapsulation efficiency (EE) of 88.3%. In addition, TEM images revealed the spherical uniformness of EPI-NPs with no aggregation, while the cellular studies presented the effect of EPI-NPs on MCF-7 cells' viability; after 96 h of treatment, the MCF-7 cells presented considerable apoptotic activity. The stability study showed that the EPI-NPs remained stable at room temperature at physiological pH for over 30 days. Conclusion: EPI-NPs were successfully encapsulated within a highly stable biocompatible polymer with minimal loss of the drug. The used polymer has low cytotoxicity and EPI-NPs induced apoptosis in estrogen-positive cell line, making them a promising, safe treatment for cancer with less adverse side effects.

References

1. Massadeh, S.; Omer, M.E.; Alterawi, A.; Ali, R.; Alanazi, F.H.; Almutairi, F.; Almotairi, W.; Alobaidi, F.F.; Alhelal, K.; Almutairi, M.S.; et al. Optimized Polyethylene Glycolylated Polymer–Lipid Hybrid

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Nanoparticles as a Potential Breast Cancer Treatment. Pharmaceutics 2020, 12, 666.

2. Gewirtz, D. A Critical Evaluation of the Mechanisms of Action Proposed for the Antitumor Effects of the Anthracycline Antibiotics Adriamycin and Daunorubicin. Biochem. Pharmacol. 1999, 57, 727–741.

Biography

Dr. Salam Massadeh is a Research Scientist in the Developmental Medicine Department at the King Abdullah International Medical Research Center (KAIMRC). Dr. Massadeh is leading the therapy development lab under the Developmental Medicine Department (DMD) at KAIMRC. Besides, she is the principle investigator of major research projects, and a co-Investigator of many other research projects related to therapy development, gene therapy, gene discovery and pharmacogenetics. In her current position, she has initiated collaborations with international research groups in her field; she is also keen to work with colleagues from different research areas. Dr. Massadeh has published her research outcomes in international peer reviewed journals. Dr. Massadeh is also a member of editorial boards of scientific journals and scientific books.

Dr. Massadeh is experienced in therapy development, drug delivery systems, bio-nanotechnology, and the use of nanotechnology for gene therapy.

Dr. Salam Massadeh has a PhD degree in the field of Nanotechnology in bio-imaging; from the University of East Anglia, United Kingdom. And a Master's degree, in the field of Drug Delivery Systems, college of pharmacy, University of Reims Champagne Ardennes, France. In addition, she has a Bachelor's degree in Pharmacy from Jordan University of Science and Technology. Dr. Massadeh is Member of the Royal Pharmacists Society (RPS), United kingdom. And a member of the International Federation of Pharmacists (FIP), and several other bodies.

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