

Review

A Promising Review on Cyclodextrin Conjugated Paclitaxel Nanoparticles for Cancer Treatment

Kamini Velhal ¹, Sagar Barage ^{1,2}, Arpita Roy ³, Jaya Lakkakula ^{1,2,*}, Ramesh Yamgar ⁴, Mohammed S. Alqahtani ^{5,6,7}, Krishna Kumar Yadav ⁸, Yongtae Ahn ⁹ and Byong-Hun Jeon ^{9,*}

- ¹ Amity Institute of Biotechnology, Amity University, Mumbai-Pune Expressway, Bhatan, Panvel, Mumbai 410206, India; kaminivelhal@gmail.com (K.V.); shbarage@mum.amity.edu (S.B.)
- ² Centre for Computational Biology and Translational Research, Amity Institute of Biotechnology, Amity University, Mumbai-Pune Expressway, Bhatan, Panvel, Mumbai 410206, India
- ³ Department of Biotechnology, School of Engineering & Technology, Sharda University, Greater Noida 201310, India; arbt2014@gmail.com
- ⁴ Department of Chemistry, Chikitsak Samuha's Patkar-Varde College of Arts, Science and Commerce, Goregaon (West), Mumbai 400104, India; rameshyamgar@gmail.com
- ⁵ Radiological Sciences Department, College of Applied Medical Sciences, King Khalid University, Abha 61421, Saudi Arabia; mosalqhtani@kku.edu.sa
- ⁶ BioImaging Unit, Space Research Centre, Michael Atiyah Building, University of Leicester, Leicester LE1 7RH, UK
- ⁷ Research Center for Advanced Materials Science (RCAMS), King Khalid University, Abha 61413, Saudi Arabia
- ⁸ Faculty of Science and Technology, Madhyanchal Professional University, Ratibad, Bhopal 462044, India; envirokrishna@gmail.com
- ⁹ Department of Earth Resources & Environmental Engineering, Hanyang University, 222-Wangsimni-ro, Seongdong-gu, Seoul 04763, Korea; ytahn83@hanyang.ac.kr
- * Correspondence: jrlakkakula@mum.amity.edu (J.L.); bhjeon@hanyang.ac.kr (B.-H.J.)



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Abstract: This review presented the unique characteristics of different types of cyclodextrin polymers by non-covalent host–guest interactions to synthesize an inclusion complex. Various cancers are treated with different types of modified cyclodextrins, along with the anticancer drug paclitaxel. PTX acts as a mitotic inhibitor, but due to its low dissolution and permeability in aqueous solutions, it causes considerable challenges for drug delivery system (DDS) designs. To enhance the solubility, it is reformulated with derivatives of cyclodextrins using freeze-drying and co-solvent lyophilization methods. The present supramolecular assemblies involve cyclodextrin as a key mediator, which is encapsulated with paclitaxel and their controlled release at the targeted area is highlighted using different DDS. In addition, the application of cyclodextrins in cancer treatment, which reduces the off-target effects, is briefly demonstrated using various types of cancer cell lines. A new nano-formulation of PTX is used to improve the antitumor activity compared to normal PTX DDS in lungs and breast cancer is well defined in the present review.

Keywords: paclitaxel PTX; cyclodextrin CD; nanoparticles NPs; novel drug delivery system NDDS

1. Introduction

Cancer is unregulated malignant cell growth, which can infect different parts of body. There are different types of the cancers, such as drug-resistant ovarian, metastatic breast, lung cancer, prostate, blood cancer, etc. There are multiple steps involved in the treatment that depend on the cancer stage, which include radiation, surgery and chemotherapy or it may be a combination of both along with surgery. These treatments cause several adverse effects, leading to the damage of normal tissue and organs along with cancer infected cells. As per the WHO survey, in the near future, morbidity and mortality will increase due to cancer [1]. The goal is to derive a system that has the desired drug loading capacity, a long shelf-life and lower toxic effects.