Send Orders for Reprints to reprints@benthamscience.net

Current Drug Delivery, XXXX, *XX,* 000-000

REVIEW ARTICLE

Natural Polymers as a Carrier for the Effective Delivery of Antineoplastic Drugs

Rajat Patel[1], Utkarsha Kuwar[1], Nidhi Dhote[1], Amit Alexander[2], Kartik Nakhate[3], Parag Jain[4] and Ajazuddin[5,*]

[1]*SVKM's NMIMS, School of Pharmacy & Technology Management, Shirpur, Dhule, Maharashtra, India – 425405;* [2]*National Institute of Pharmaceutical Education and Research (NIPER) Guwahati , Assam, India, 781101;* [3]*Department of Pharmacology, Shri Vile Parle Kelavani Mandal's Institute of Pharmacy, Dhule 424001, Maharashtra, INDIA;* [4]*Department of Pharmacology, Chhatrapati Shivaji Institute of Pharmacy, Durg, Chhattisgarh – 491001;* [5]*Rungta College of Pharmaceutical Sciences and Research, Kohka-Kurud Road, Bhilai, Chhattisgarh, India, 490024*

ARTICLE HISTORY

Received: June 30, 2022
Revised: October 21, 2022
Accepted: November 14, 2022
DOI: 10.2174/1567201820666230112170035

Abstract: Cancer is a broad term for a set of disorders marked by the development of physically and functionally changed cells that proliferate uncontrollably, infect neighboring tissues, and result in malignant tumours, 'neoplasm'. Cancer remains a difficult disease to treat because of the significant adverse effects and poor pharmacokinetic profile of antineoplastic drugs, despite advancements in our understanding of the features and behavior of tumor cells in recent decades. In this series, the role of natural polymers is prominent as a component of a novel delivery system of anticancer drugs. These natural polymeric drug delivery systems (NPDDS) have many advantages over synthetic polymers like controlled delivery, biodegradability, inexpensive, low toxicity profile, and easily obtainable. These polymers further modify for the targeting of tumour cells. This review discusses and critically analyses the different natural polymers, such as chitosan, cellulose, starch, albumin, dextran, fucoidan, gelatin, *etc*., in terms of natural ingredient-based polymeric nanocarriers specifically for cancer therapy. It also describes benefits, drawbacks, and opinions and provides insights about the efficacy of NPDDS as well as its future perspectives and tabulated recent patents and cases under clinical trials exploited for cancer treatment.

Keywords: Natural polymer, antineoplastic drug, natural polymers, nanocarriers, targeting, cancer.

1. INTRODUCTION

Drug delivery system (DDS) plays a vital role in modulating the efficacy and potency of any drug molecule. The delivery parameters like distribution, molecular breakdown, cellular entry, and removal from the body are some of the major factors that have a great impact on the site-specific delivery of drug molecules in unchanged form to produce the therapeutic effect. There has been significant progress in the research, discovery, and study of new diseases, making conventional drug delivery forms unviable to solve the increased demands for treating the diseases. As a result, new drug delivery systems have been discovered at an accelerating rate, and diverse therapeutic strategies are progressively being presented globally. Advanced drug delivery systems have the ability to improve the specificity of the treatment, and the drug release can be triggered by internal or external stimuli. The carriers' characteristics are matched to the drug's physicochemical characteristics as well as the desired route of administration [1]. Certain diseases need a site-specific or target-oriented delivery of drugs to avoid any unctuous effects on other parts of the body. Amongst these, cancer therapy requires more focused and site-oriented drug delivery. Despite advances in our understanding of the characteristics of tumour cells and how they behave in recent decades, cancer remains a challenging disease to treat, contributing to the second biggest cause of death worldwide after cardiovascular diseases.

In comparison to traditional chemotherapy, DDS has a number of benefits in cancer treatment like transport of the pharmaceuticals to the site of action, encouragement of drug clearance from the body, advancement of the medication properties, reduction of dose, and maintenance of the release of medication from the formulation [2]. To achieve such a drug delivery profile, drug delivery carriers like metallic particles, proteins, polymers, and lipids are used. Natural or synthetic materials can be categorized based on the origin of the carriers. Natural resources are frequently abundant and affordable in nature. The advantages of using natural polymers include their biocompatibility with a wide range of medications, biodegradability, nontoxic nature, and inability to inflict autoimmune response [3]. In addition, the functional groups present in these polymers are easy to conjugate with drug molecules. Some of the polymers also contain specific protein binding sites as biological signals, which help

*Address correspondene to this author at the Rungta College of Pharmaceutical Sciences and Research, Kohka-Kurud Road, Bhilai, Chhattisgarh 490024, India; E-mail - write2ajaz@gmail.com

1567-2018/XX $65.00+.00

Current Drug Delivery

Editor-in-Chief

ISSN (Print): 1567-2018
ISSN (Online): 1875-5704

Review Article

Natural Polymers as a Carrier for the Effective Delivery of Antineoplastic Drugs

Author(s): Rajat Patel, Utkarsha Kuwar, Nidhi Dhote, Amit Alexander, Kartik Nakhate, Parag Jain and Ajazuddin*

(E-pub Ahead of Print)
Published on: 27 January, 2023
DOI: 10.2174/1567201820666230112170035

Price: $95

Abstract

Cancer is a broad term for a set of disorders marked by the development of physically and functionally changed cells that proliferate uncontrollably, infect neighboring tissues, and result in malignant tumours, 'neoplasm'. Cancer remains a difficult disease to treat because of the significant adverse effects and poor pharmacokinetic profile of antineoplastic drugs, despite advancements in our understanding of the features and behavior of tumor cells in recent decades. In this series, the role of natural polymers is prominent as a component of a novel delivery system of anticancer drugs. These natural polymeric drug delivery systems (NPDDS) have many advantages over synthetic polymers like controlled delivery, biodegradability, inexpensive, low toxicity profile, and easily obtainable. These polymers further modify for the targeting of tumour cells. This review discusses and critically analyses the different natural polymers, such as chitosan, cellulose, starch, albumin, dextran, fucoidan, gelatin, etc., in terms of natural ingredient-based polymeric nanocarriers specifically for cancer therapy. It also describes benefits, drawbacks, and opinions and provides insights about the efficacy of NPDDS as well as its future perspectives and tabulated recent patents and cases under clinical trials exploited for cancer treatment.

Keywords: Natural polymer, antineoplastic drug, natural polymers, nanocarriers, targeting, cancer.

Refine Your Search Results

Current Drug Delivery | Search | Sort By: Relevancy

Search Results

Found 11,438 results (Page 1) Share These Results

Exact Match Found

CURRENT DRUG DELIVERY

Publisher: BENTHAM SCIENCE PUBL LTD , EXECUTIVE STE Y-2, PO BOX 7917, SAIF ZONE, SHARJAH, U ARAB EMIRATES, 1200 BR
ISSN / eISSN: 1567-2018 / 1875-5704
Web of Science Core Collection: Science Citation Index Expanded
Additional *Web of Science* Indexes: Biological Abstracts | BIOSIS Previews | Essential Science Indicators

Filters Clear All
Web of Science Coverage
Open Access
Category
Country / Region