The molecularly imprinted polymer essentials: curation of anticancer, ophthalmic, and projected gene therapy drug delivery systems

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PII: S0168-3659(18)30489-9
DOI: doi:10.1016/j.jconrel.2018.08.023
Reference: COREL 9432

To appear in: *Journal of Controlled Release*

Received date: 19 May 2018
Revised date: 10 August 2018
Accepted date: 11 August 2018

Please cite this article as: Christian Antonio Tuwahatu, Chi Chung Yeung, Yun Wah Lam, Vellaisamy Arul Lenus Roy , The molecularly imprinted polymer essentials: curation of anticancer, ophthalmic, and projected gene therapy drug delivery systems. Corel (2018), doi:10.1016/j.jconrel.2018.08.023

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Abstract

The development of polymeric materials as drug delivery systems has advanced from systems that rely on classical passive targeting to carriers that can sustain the precisely controlled release of payloads upon physicochemical triggers in desired microenvironment. Molecularly imprinted polymers (MIP), materials designed to capture specific molecules based on their molecular shape and charge distribution, are attractive candidates for fulfilling these purposes. In particular, drug-imprinted polymers coupled with active targeting mechanisms have been explored as potential drug delivery systems. In this review, we have curated important recent efforts in the development of drug-imprinted polymers in a variety of clinical applications, especially oncology and ophthalmology. MIP possesses properties that may complement the traditional delivery systems of these two disciplines, such as passive enhanced permeability and retention effect (EPR) in cancer tumors, and passive drug diffusion in delivering ophthalmic therapeutics. Furthermore, the prospects of MIP integration with the emerging gene therapies will be discussed.

Keywords: imprinting, cancer, ophthalmic, gene therapy, sustained release, drug delivery

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1. Introduction