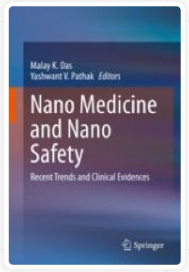

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Stimuli-Responsive Polymers for Cancer Nanomedicines

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Abstract

Chemotherapy involves many anticancer drugs, which have mild to severe adverse effects, when administered in conventional dosage forms. However, the lack of adequate supply of drug to the target site, as well as biodistribution to irrelevant body compartments has limited such drug-delivery systems. The major challenge in the delivery of such drugs is the site specificity. This task can be made simpler to a remarkable extent

by employing stimuli-responsive polymers for designing nanocarriers. The stimuli may be physical, chemical, or biological, but should be sufficient enough to elicit structural changes in those polymers at the local site to enable the release of drugs in a controlled manner. The cancer cells exaggerate some biological phenomena as compared to the normal cells, which can be utilized as site-specific stimuli. Nanocarriers fabricated by using these polymers respond to stimuli like pH, temperature, redox potential light, etc. Multiple stimuli responsiveness can also be exploited for more specific drug delivery. This area of research seems to be very promising by exploring the physiological environment minutely. This chapter highlights the recent trends in different stimuli-responsive polymers, especially for delivering anticancer drug and challenges on the way of developing nanoformulations as well as their clinical translation.

Keywords

Chemotherapy **Stimuli-responsive polymer**

Site-specific drug delivery

Nanoformulations **Nanomedicine**

Abbreviations

AIBN: Azobisisobutyronitrile

CRP: Controlled Radical Polymerisation

CST: Critical Solution Temperature

DOX: Doxorubicin

HLB: Hydrophilic Lipophilic Balance

LCST: Lower critical solution temperature

MMPs: Matrix metalloproteinases

MTX: Methotrexate

PEG: Poly Ethylene Glycol

PEtOx: Poly(N-ethyl oxazoline)

PMVE: Poly(methyl vinyl ether)

PNIPAM: poly (*N* -isopropylacrylamide)

PNP: Polymeric Nanoparticles

PNVC: Poly(N-vinylcaprolactam)

POZ: Poly(Oxazoline)

RAFT: Reversible-Addition Fragmentation Chain-Transfer

ROS: Reactive Oxygen Species

SRPs: Stimuli-Responsive Polymers

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Conflict of Interest

The authors declare that there is no conflict of interest. The Figures and Tables used in this chapter are original and prepared by the authors themselves.

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