

ABSTRACT

Adv Drug Deliv Rev. 2022 Jan 22;182:114115. doi: 10.1016/j.addr.2022.114115.
Online ahead of print.

Nanomedicine for brain cancer.

Quader S(1), Kataoka K(2), Cabral H(3).

Author information:

(1)Innovation Center of NanoMedicine, Kawasaki Institute of Industrial Promotion, 3-25-14 Tonomachi, Kawasaki-ku, Kawasaki 212-0821, Japan.

(2)Innovation Center of NanoMedicine, Kawasaki Institute of Industrial Promotion, 3-25-14 Tonomachi, Kawasaki-ku, Kawasaki 212-0821, Japan. Electronic address: k-kataoka@kawasaki-net.ne.jp.

(3)Department of Bioengineering, Graduate School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan. Electronic address: horacio@bmw.t.u-tokyo.ac.jp.

CNS tumors remain among the deadliest forms of cancer, resisting conventional and new treatment approaches, with mortality rates staying practically unchanged over the past 30 years. One of the primary hurdles for treating these cancers is delivering drugs to the brain tumor site in therapeutic concentration, evading the blood-brain (tumor) barrier (BBB/BBTB). Supramolecular nanomedicines (NMs) are increasingly demonstrating noteworthy prospects for addressing these challenges utilizing their unique characteristics, such as improving the bioavailability of the payload via controlled pharmacokinetics and pharmacodynamics, BBB/BBTB crossing functions, superior distribution in the brain tumor site, and tumor-specific drug activation profiles. Here, we review NM-based brain tumor targeting approaches to demonstrate their applicability and translation potential from different perspectives. To this end, we provide a general overview of brain tumor and their treatments, the incidence of the BBB and BBTB, and their role on NM targeting, as well as the potential of NMs for promoting superior therapeutic effects. Additionally, we discuss critical issues of NMs and their clinical trials, aiming to bolster the potential clinical applications of NMs in treating these life-threatening diseases.

Copyright © 2022 Elsevier B.V. All rights reserved.

DOI: 10.1016/j.addr.2022.114115
PMID: 35077821

Conflict of interest statement: Declaration of Competing Interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.