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Self-assembled theranostic nanoparticles of chondroitin sulfate: A conjugation of bile acid and phenyl boronic acid for enhanced tumor-targeting and penetration

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Deoxycholic Acid (DOCA) and 3-Aminomethyl Phenylboronic Acid (AMPB)-conjugated self-assembled Nanoparticles (NPs) of Chondroitin Sulfate A (CSA) were prepared for tumor targeting and penetration. The hydrophobic DOCA derivative was conjugated to the hydrophilic chondroitin sulfate A (CSA) backbone, followed by conjugation of AMPB to CSA-DOCA. Loading doxorubicin (DOX) to these CSA-DOCA and CSA-DOCA-AMPB NPs resulted in NPs of around 230 nm mean diameter, narrow size distribution, negative zeta potential, and relatively high drug encapsulation efficiency (up to 85%). CSA-DOCA and CSA-DOCA-AMPB NPs exhibit improved *in vitro* cellular uptake and penetration as evidenced by confocal laser scanning microscopy and flow cytometry. *In vivo* tumor targeting and penetrating by these NPs, based on both CSA-CD44 receptor and boronic acid-sialic acid interactions, was revealed using Near-Infrared Fluorescence (NIRF) imaging in the tumor-xenografted mouse mode. Both passive and active strategies seem to have contributed to the *in vivo* tumor targetability of the NPs. These NPs could be a promising theranostic nano-platform for cancer therapy and imaging.

Biography

Dae-Duk Kim has completed his PhD in 1995 from Rutgers-The State University of New Jersey in the USA and worked as a Post-Doctoral Fellow at the University of Washington in Seattle. He was a faculty member of the College of Pharmacy at Pusan National University until he was transferred to his current position at Seoul National University in 2003. He has published more than 150 papers in peer-reviewed international journals, and has served as the Editor-in-Chief of the *Journal of the Pharmaceutical Investigation*.

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