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Supramolecular polymeric chemotherapy based on cucurbit[7]uril-PEG copolymer

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Abstract

We develop a strategy of supramolecular polymeric chemotherapy based on a new kind of water-soluble polymer that bears cucurbit[7]uril (CB[7]) in the main-chain. To this end, we synthesized a bis-alkynyl functionalized CB[7] and polymerized it with α,ω-diazide-PEG through click reaction to form the desired CB[7] based main-chain polymer (poly-CB[7]). Anticancer drug, oxaliplatin, could be encapsulated into the cavity of poly-CB[7] to form a supramolecular polymeric complex, which displayed low cytotoxicity to normal cells. In addition, the cytotoxicity of the oxaliplatin was recovered when the complex met cancer cells that could overexpress spermine, e.g. colorectal cancer cell, through competitive replacement of oxaliplatin from CB[7] cavity by spermine. Interestingly, the cytotoxicity of the supramolecular polymeric complex to cancer cells is higher than oxaliplatin itself. The enhanced cytotoxicity should result from a combined effect by combining the release of