Supplementary Information for the following manuscript
Newly synthesized glycol chitosan-\textit{graft}-carboxymethyl $\beta$-cyclodextrin as potential pH-sensitive anticancer drug carrier

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**Fig. S1** FT-IR spectra of (a) GCH-g-CM β-CD, (b) CM β-CD, (c) β-CD, and (d) GCH. The samples were prepared as pellets using spectroscopic grade KBr. In the spectrum of β-CD (curve c), the characteristic peak at 947.1 cm\(^{-1}\) represents α-pyrranyl vibration of β-CD. Comparison with curve c, there is a strong peak at 1729 cm\(^{-1}\) in the spectrum of CM β-CD (curve b), which is ascribed to the stretching vibration of carbonyl group, indicating the carboxymethylation of β-CD was succeeded. The characteristic peak at 887.6 cm\(^{-1}\) represents β-pyrranyl vibration of GCH (curve d). In the spectrum of GCH-g-CM β-CD (curve a), there are both characteristic peaks of β-CD (947.1 cm\(^{-1}\)) and GCH (887.6 cm\(^{-1}\)) and the peak at 1729 cm\(^{-1}\) belonging to the stretching vibration of carbonyl group almost disappeared after reacting with the amino of GCH, so all the results indicate CM β-CD has been grafted onto GCH.
Fig. S2 MALDI-TOF MS spectra of CM β-CDs. By analyzing the mass to charge ratios (m/z), 1215.6 m/z presents \([\beta\text{-CDNa-CH}_2\text{COOH}]^+\), 1273.7 m/z presents \([\beta\text{-CDNa-(CH}_2\text{COOH})_2]^+\), 1331.7 m/z presents \([\beta\text{-CDNa-(CH}_2\text{COOH})_3]^+\), 1389.7 m/z presents \([\beta\text{-CDNa-(CH}_2\text{COOH})_4]^+\), 1447.7 m/z presents \([\beta\text{-CDNa-(CH}_2\text{COOH})_5]^+\), 1505.7 m/z presents \([\beta\text{-CDNa-(CH}_2\text{COOH})_6]^+\), and 1563.7 m/z presents \([\beta\text{-CDNa-(CH}_2\text{COOH})_7]^+\).
**Fig. S3** (A) Total ion current chromatogram of seven CM β-CD components. (B) The selected ion chromatograms of (a) β-CD-CH₂COOH, m/z: 1191.5–1192.5; (b) β-CD-(CH₂COOH)₂, m/z: 1249.5–1250.5; (c) β-CD-(CH₂COOH)₃, m/z: 1307.5–1308.5; (d) β-CD-(CH₂COOH)₄, m/z: 1365.5–1366.5; (e) β-CD-(CH₂COOH)₅, m/z: 1423.5–1424.5; (f) β-CD-(CH₂COOH)₆, m/z: 1481.5–1482.5; (g) β-CD-(CH₂COOH)₇, m/z: 1539.5–1540.5. Conditions: column: Agilent ZORBAX SB-C₁₈ (2.1×150 mm, 5 μm) using Agilent 1100 system; mobile phase: (A) H₂O, (B) Acetonitrile; gradient: 0–30 min, 10%–90% B; flow rate: 0.2 mL/min. The online identification was performed on electrospray ionization mass spectrometry (ESI-MS): Thermo Finnigan LCQ DECA XP MS. From figure A, it can be seen that there are five main components. From figure B, the peak area of every CM β-CD component and the total peak area can be obtained. The peak area of every CM β-CD component divided by the total peak area is equal to the relative content of every CM β-CD component. The calculated relative contents from β-CD-(CH₂COOH)₃ to β-CD-(CH₂COOH)₇ are 2.468%, 16.481%, 33.513%, 28.902%, and 18.266%, respectively.
Fig. S4 UV-vis absorption spectra of DXR-CM β-CD at different molar ratios, and the molar ratios between GCH-g-CM β-CD and DXR are (a) 0:1, (b) 0.25:1, (c) 0.5:1, (d) 2:1, (e) 1.5:1, and (f) 1:1. At the beginning [(a) 0:1, (b) 0.25:1, (c) 0.5:1], the absorbance increased upon addition of GCH-g-CM β-CD, indicating that CM β-CD has formed inclusion complex with DXR through host-guest interaction. Then, the absorbance approaches the maximum when the molar ratio between GCH-g-CM β-CD and DXR is 1:1 (curve f), but the absorbance decreased with continuing to add GCH-g-CM β-CD [curves (e) 1.5:1 and (d) 2:1]. These results indicate that 1:1 is the matching molar ratio, that is to say, one CM β-CD group grafted on GCH binds one molecule of DXR.