

**Electronic Supplementary Material (ESI) for Materials Advances**

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Electronic Supplementary Information (ESI)

**Water solubilization of paclitaxel using polypeptides for cancer therapy**

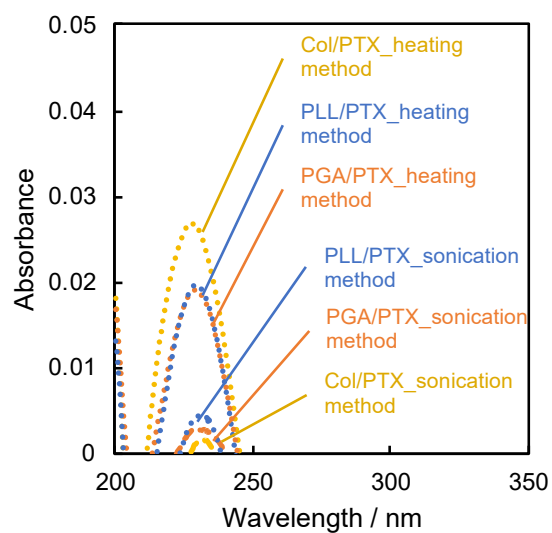
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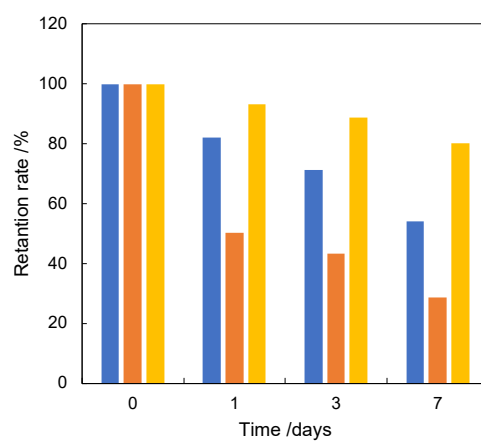
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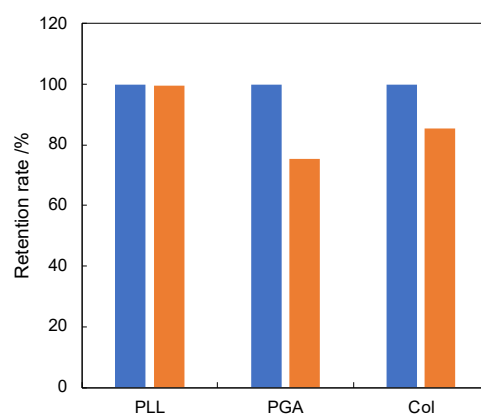
**Fig. S1** UV-Vis absorption spectra of PLL/PTX (blue), PGA/PLL (red), and Col/PTX (yellow) re-dissolved in DMSO (1 mm cell, 25 °C) prepared by heating method (dotted line) and sonication method (dashed line).

**Table S1** Molecular weight changes of the polypeptides following HSVM according to GPC measurement

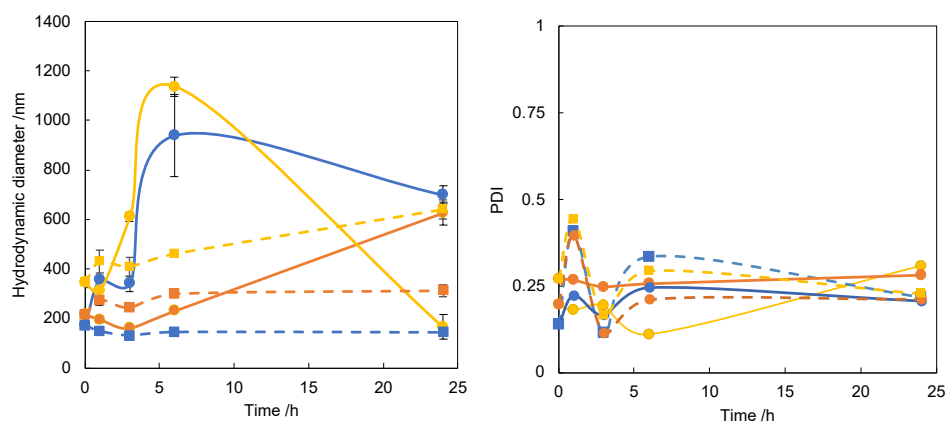
	HSVM	<i>M<sub>n</sub></i>	<i>M<sub>w</sub></i>	<i>M<sub>w</sub>/M<sub>n</sub></i>
PLL	—	84000	123000	1.5
PLL	+	78000	136000	1.8
Col	—	105000	244000	2.3
Col	+	30000	54000	1.8



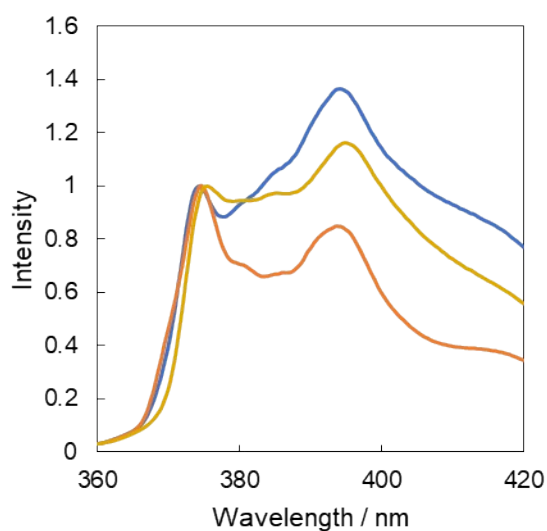
**Fig. S2** Long term stability of the Polypeptide/PTX complex (PLL, blue; PGA, red; Col, yellow). The retention rate was calculated as  $\text{Abs}_{@230 \text{ nm}}/\text{Abs}_0@230 \text{ nm}$ .



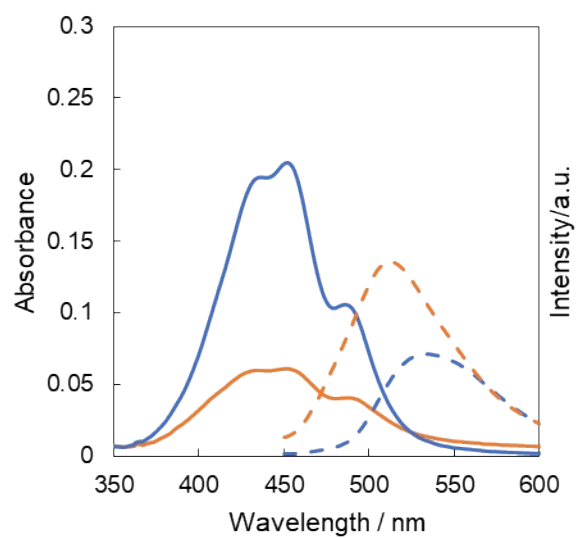
**Fig. S3** Thermal stability of the Polypeptide/PTX complex (25 °C, blue; 80 °C). The retention rate was calculated as  $\text{Abs}_{@230 \text{ nm}}/\text{Abs}_0@230 \text{ nm}$ .



**Fig. S4** Colloidal stability of Polypeptide/PTX complex (PLL, blue; PGA, red; Col, yellow) in water (Solid line) and in cellular medium (Dashed line). (a) hydrodynamic diameter changes and (b) PDI value changes.



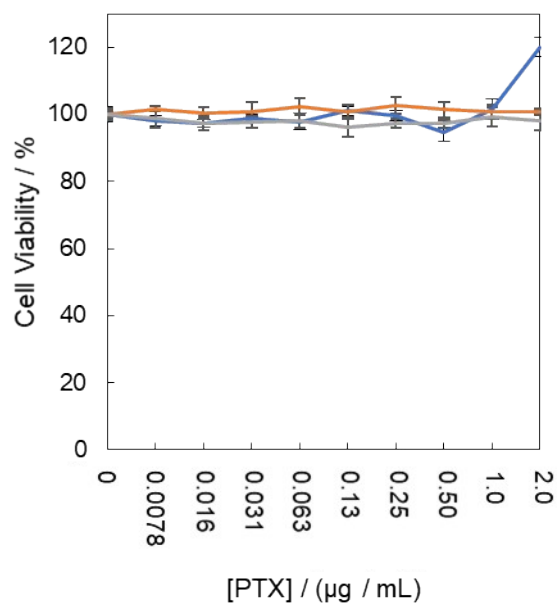
**Fig. S5** Fluorescence spectrums of the complex were measured using a fluorometer (excitation wavelength, 336 nm). PLL/pyrene (blue), PGA/pyrene (red), and Col/pyrene (red).



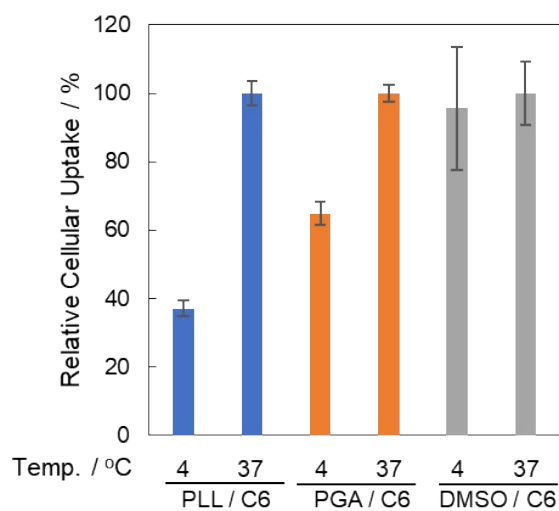
**Fig. S6** UV–Vis absorption spectra (1-mm cell, 25°C) of PLL/C6 (blue solid line) and PGA/C6 (red solid line) and fluorescence spectra (excitation wavelength, 420 nm) of PLL/C6 (blue dashed line) and PGA/C6 (red dashed line).

**Table S2** Basic characterization of the complexes of C6 with polypeptides

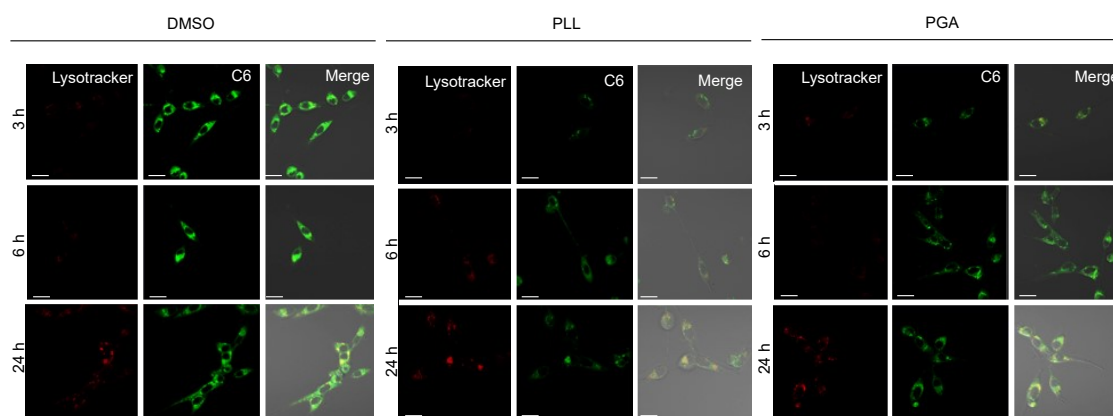
	[C6] / $\mu\text{M}$	$D_{hy}$ / nm	PDI	$\zeta$ -potential / mV
PLL/C6	590	$290 \pm 6$	0.25	$+61.0 \pm 0.6$
PGA/C6	210	$130 \pm 1$	0.16	$-65.5 \pm 0.9$



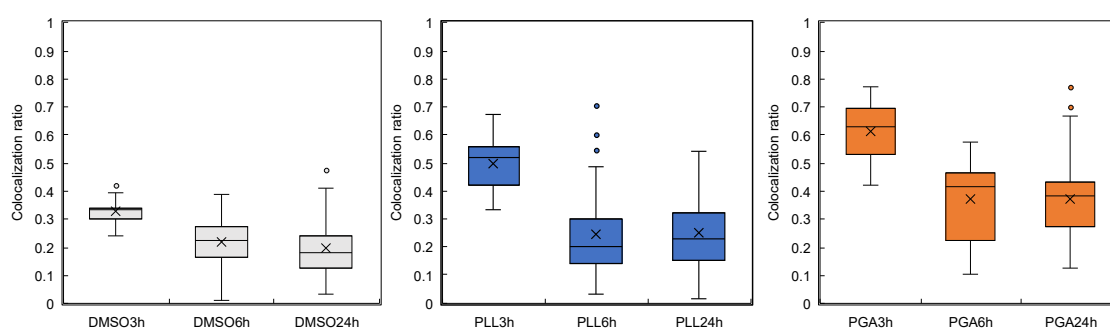
**Fig. S7** Cytotoxicity assessment in L929 cells. L929 cells were co-incubated with PLL/PTX (blue), PGA/PTX (orange), or DMSO/PTX (gray) at various concentrations. Error bars represent the standard deviation (n = 6).



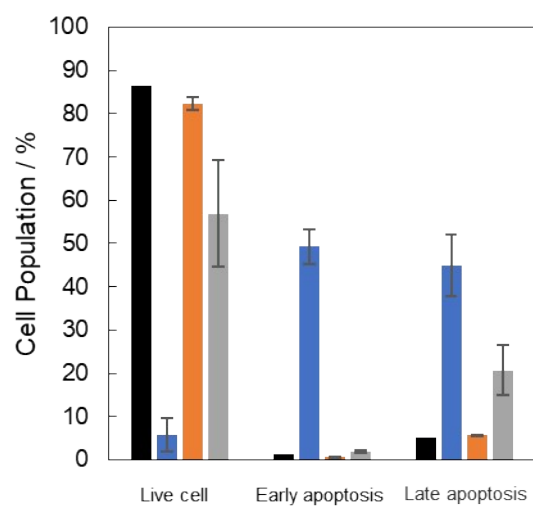
**Fig. S8** Cellular uptake of C6 at 4°C or 37°C by measuring its fluorescence intensity in the lysate. PLL/C6 (blue), PGA/C6 (red), DMSO/C6 (gray). Error bars represent the standard deviation (n = 3).



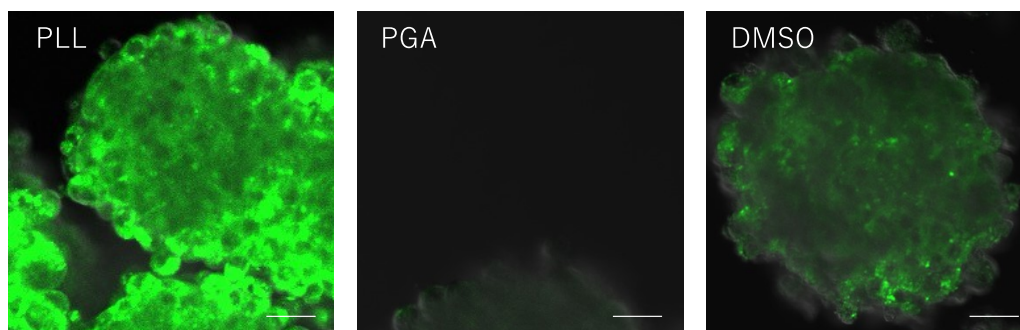
**Fig. S9** Subcellular distribution of delivered C6. Colon 26 cells were co-incubated with C6 dissolved in DMSO, PLL/C6 complex, PGA/C6 complex for 3, 6, and 24 h. Late endosome and lysosome were visualized by Lysotracker Red. The cells were observed by confocal laser scanning microscope. Scale bar represent 15  $\mu$ m.



**Fig. S10** Colocalization ratio of delivered C6 with lysosome. Colon26 cells were co-incubated with C6 dissolved in DMSO (gray), PLL/C6 complex (blue), and PGA/C6 complex (red), respectively. Lysosomes were visualized by Lysotracker Red and the cells were observed by confocal laser scanning microscope. The colocalization ratio was calculated as overlapped pixel from delivered C6 with Lysotracker Red/whole pixel from delivered C6. Over 35 cells were used to calculate the colocalization ratio.



**Fig. S11** Ratio of early apoptosis and late apoptosis. PTX dissolved in DMSO (black), PLL/PTX (blue), PGA/PTX (red), DMSO/PTX (gray).



**Fig. S12** Distribution of delivered C6 in spheroid using PLL, PGA, and DMSO. Spheroids were co-incubated with PLL/C6 complex, PGA/C6 complex, and C6 in DMSO for 24 h. The cells were observed by confocal laser scanning microscope. Scale bar represent 20  $\mu$ m.