

## Supplementary Information

### Icebreaker-inspired Janus nanomotors to combat barriers in the delivery of chemotherapeutic agents

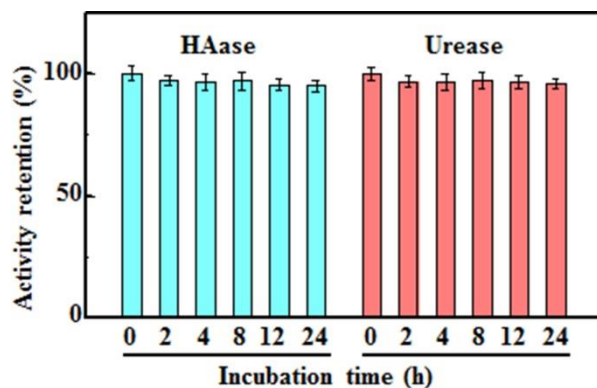
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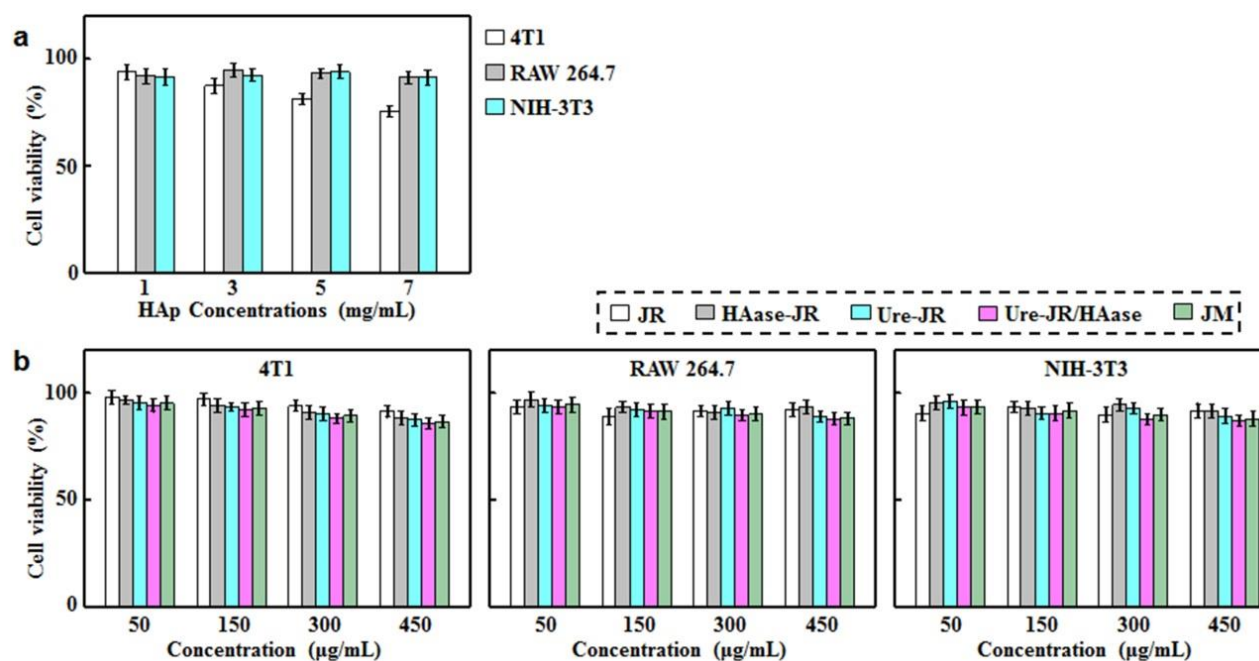
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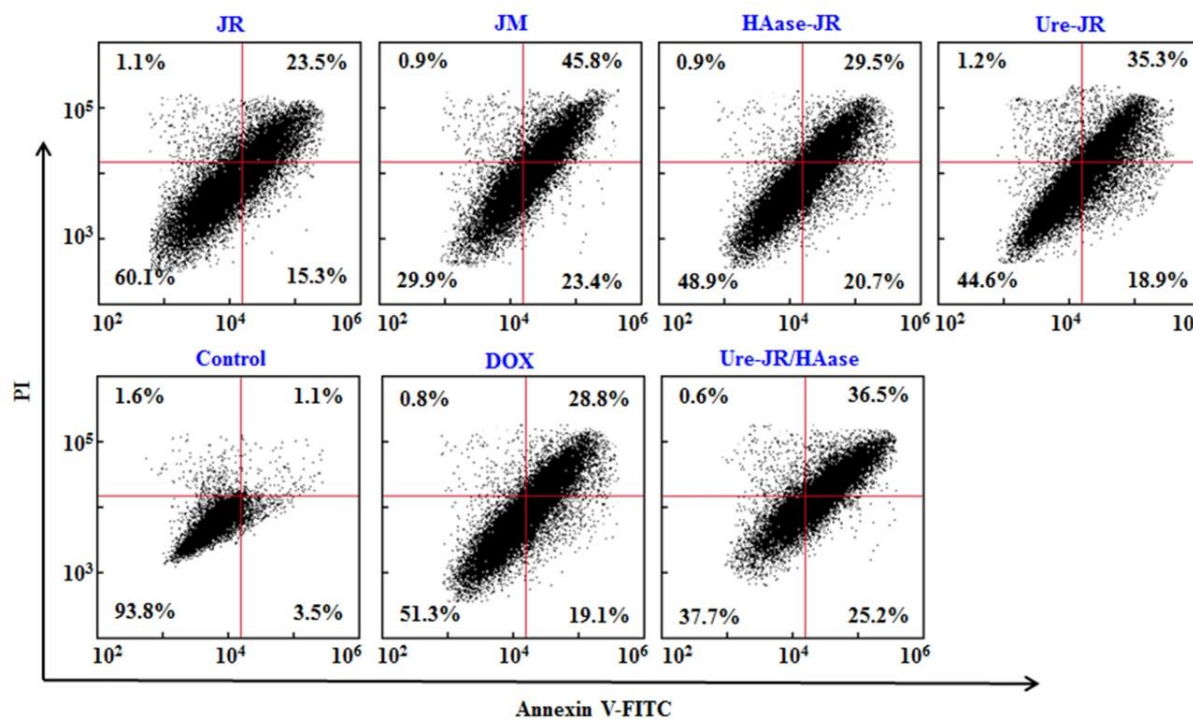
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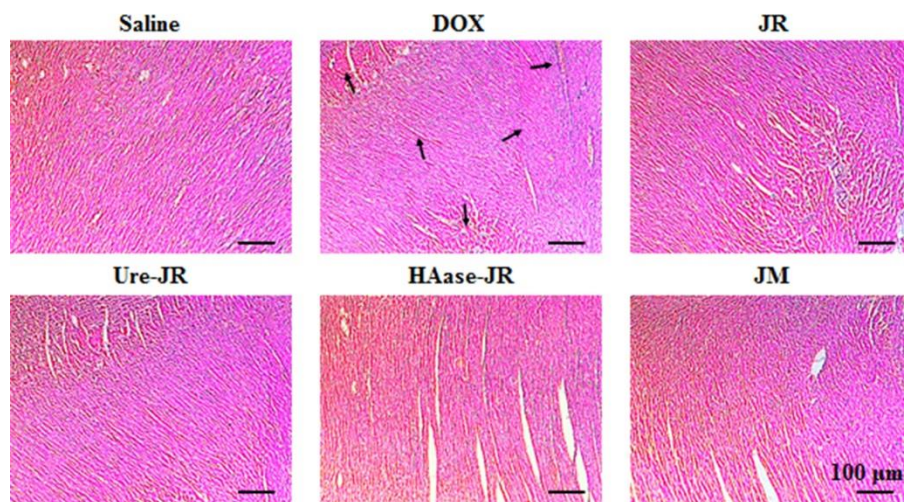
**Fig. S1.** Catalytic activities of HAase and urease on JMs after incubation for 24 h in the media containing 50% of FBS ( $n = 3$ ).



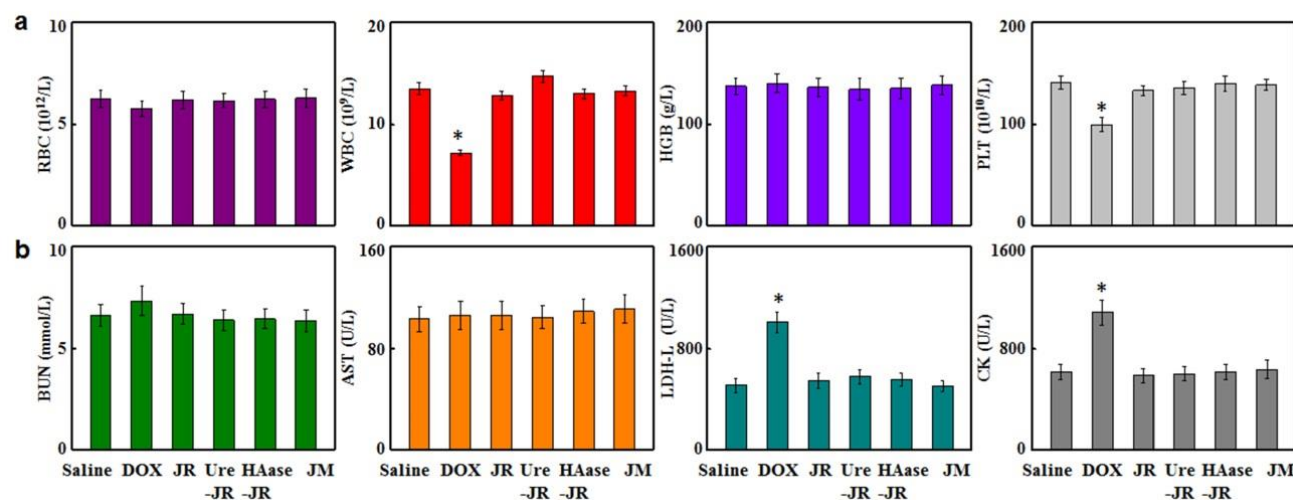
**Fig. S2.** (a) Viability of 4T1, RAW 264.7, and NIH-3T3 cells after incubation with empty HAp nanorods of different concentrations ( $n = 5$ ). (b) Viability of 4T1, RAW 264.7, and NIH-3T3 cells after incubation with empty JRs, HAase-JRs, Ure-JRs, Ure-JRs/HAase, and JMs of different concentrations ( $n = 5$ ).



**Fig. S3.** Apoptosis analysis of 4T1 cells after treatment with free DOX, JRs, HAase-JRs, Ure-JRs, JMs, and Ure-JR/HAase in media containing urea and HA, using PBS treatment as control (Inserted numbers indicate the percentage of cells present in each area).



**Fig. S4.** H&E staining images of heart tissues retrieved on day 21 after treatment with JRs, Ure-JRs, HAase-JRs, and JMs, using free DOX and PBS treatment as control. Arrows indicate the presence of inflammatory cells.



**Fig. S5.** Hematological analysis of blood (RBC, WBC, HGB, and PLT counts) and (b) biochemical analysis of serum (BUN, AST , LDH-L, and CK levels) after treatment for 24 h with JRs, Ure-JRs, HAase-JRs, and JMs, using free DOX and PBS treatment as control ( $n = 6$ , \*:  $p < 0.05$  vs other groups).