5 - 56 Radiosensitization Mechanism of Gadolinium Oxide Nanoparticles under Different Irradiation Modes

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In a previous study, it was demonstrated that the use of gadolinium oxide nanoparticles (GONs) can significantly enhance the radiosensitivity of 4T1 breast cancer cells to X-rays. Additionally, the combination of GONs and 8.0 Gy of irradiation was found to markedly improve the efficacy of X-rays in killing tumor cells. In order to verify the radiosensitization effect of GONs *in vivo*, a subcutaneous xenograft tumor model was utilized. At first, the obtained results were unexpected the combination of GONs and 8.0 Gy of irradiation did not significantly improve tumor inhibition compared to irradiation alone (Fig. 1(a)). In light of the aforementioned findings, we investigated modifying the radiation protocol to more effectively leverage the radiosensitizing effects of GONs. Our results revealed that the use of a fractionated irradiation protocol consisting of 3.0 Gy delivered in three fractions, in combination with GONs, significantly enhanced the growth inhibition of tumors (Fig. 1(b)). In addition, our subsequent research provided further evidence that fractionated irradiation in combination with GONs activated the cGAS-STING immune-related signaling pathway, thereby more effectively activating downstream anti-tumor immune responses. Contrastingly, a single dose of radiation was found to be inadequate at activating an effective anti-tumor immune response *in vivo* (Fig. 2).

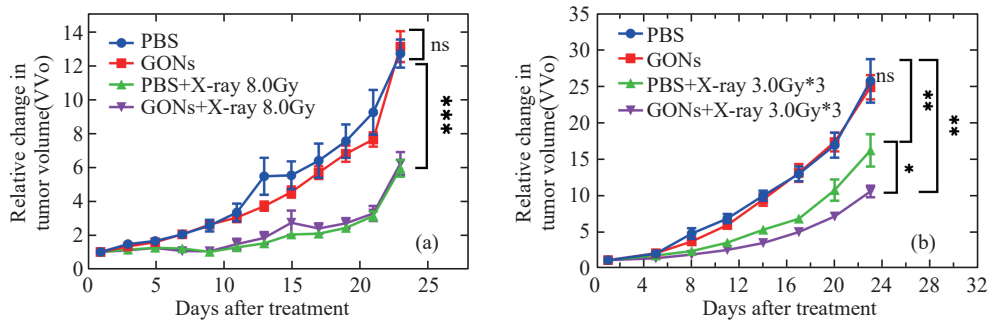

Fig. 1 (color online) Tumor growth curves under different irradiation modes (a) 8.0 Gy1Fr, (b) 3.0 Gy3Fr.

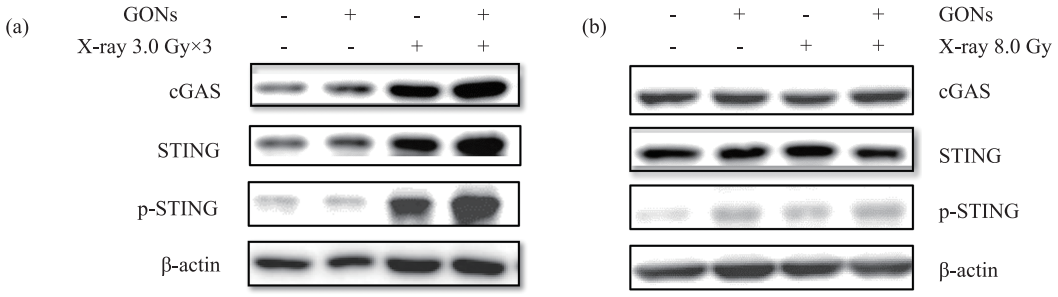

Fig. 2 (color online) Expression levels of cGAS-STING pathway related proteins and genes under different irradiation modes.

References

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