

Theme: Clinical / Biology

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Abstract Title: Comparative Study on Radiation Sensitization Effects of Different Radiation Beams on Gadolinium Oxide Nanoparticles

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Background / Aims:

- Triple-negative breast cancer (TNBC) exhibits inherent resistance to radiotherapy.
- Gadolinium oxide nanoparticles ( $Gd_2O_3$  NPs) exhibit considerable potential as a promising candidate for radiosensitization applications.
- This study investigates whether gadolinium oxide nanoparticles ( $Gd_2O_3$  NPs) can differentially enhance the radiosensitivity of TNBC to X-ray versus carbon-ion irradiation.

Subjects and Methods:

- Using 4T1 murine TNBC cells, we evaluated the radiosensitizing effects of  $Gd_2O_3$  NPs in vitro through clonogenic survival assays, proliferation analysis, apoptosis detection, and reactive oxygen species (ROS) measurement.
- A tumor-bearing mouse model was employed for in vivo validation.
- The activation of the cGAS-STING pathway and subsequent immune response were assessed via RT-qPCR and Western blot analysis.

Result:

- In vitro experiments demonstrated that  $Gd_2O_3$  NPs significantly potentiated the cytotoxic effects of both X-ray and carbon-ion irradiation by augmenting ROS generation and apoptosis induction. In vivo, however, only fractionated X-ray irradiation combined with  $Gd_2O_3$  NPs exhibited a pronounced radiosensitizing effect, leading to enhanced activation of the cGAS-STING pathway and increased intratumoral infiltration of CD8+ T cells.

Images

