PHOTOTHERMAL CANCER THERAPY BY GOLD-FERRITE NANOCOMPOSITE AND NEAR-INFRARED LASER IN ANIMAL MODEL

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Background and Objective. Surface plasmon resonance effect of gold nanostructures makes them good candidates for photothermal therapy application. Herein, gold-ferrite nanocomposite (GFNC) was synthesized and characterized as a photothermal agent in photothermal therapy. The aim of this study was to investigate the effect of GFNC upon laser irradiation on treatment of cancer in mice bearing melanoma cancer.

Materials and Methods. Thirty mice received $1.5\times10_{6}$ B16/F10 cells subcutaneously. After 1 week, the mice bearing solid tumor were divided into four groups: control group (without any treatment), laser group (received laser irradiation without GFNC injection), GFNC group (only received intratumorally GFNC), and GFNC+laser group (received intratumorally GFNC upon laser irradiation). In GFNC+laser group, 200 μL of fl uid, 1.3×10^{-7} mol L^{-1} gold nanoparticles, was injected intratumorally and immediately the site of tumor was exposed to continuous wave diode laser beam (808 nm, 1.6 W cm^{-2}) for 15 min.

Results. All mice but four were euthanized 24 h after treatment to compare the necrotic surface area histologically by using measuring graticule. Statistical analyses revealed signifi cant differences in necrosis extent for GFNC+laser group, compared to other groups. Four subjects (control group and GFNC+laser group, two mice each) were kept for longitudinal study. Histological analyses and tumor volume measurements of the four subjects indicated that tumor in GFNC+laser group was controlled appropriately.

Conclusions. It was concluded that combining an 808 nm laser at a power density of 1.6 W cm^{-2} with GFNC has a destruction effect in melanoma cancer cells in an animal model.