A multimodal chemo-photo thermal nano platform for cancer management using doxorubicin-loaded gold nano rods

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The limited efficacy and significant dose-related side effects of anticancer medications are two of the constraints associated with cancer treatment. The goal of this research was to create biocompatible multifunctional drug-loaded nanoscale moieties for co-treatment (chemo-photothermal therapy) with the highest efficacy and fewest negative effects possible. The anticancer effects of doxorubicin (DOX) loaded on gold nanorods coated with the polyelectrolyte poly (sodium-4-styrenesulfonate) (PSS-GNRs) with and without NIR laser (808 nm, power density = 1.5 W/cm 2 for 2 min) irradiation are reported in this paper. With a drug loading content of 3.2 mg DOX/mL, PSS-GNRs had a drug loading capacity of about 76 percent.

When compared to non-irradiated samples, cumulative DOX release increased considerably following laser exposure (p 0.05). GNRs, PSS-GNRs, and DOX-PSS-GNRs all had zeta potential values of 42 0.1 mV, 40 0.3 mV, and 39.3 0.6 mV, respectively. Biocompatibility and photothermal stability of PSS-GNRs nanocomplexes were discovered. DOX-conjugated nanocomplexes with NIR laser irradiation appear to be more effective at inhibiting cells (93%) than those without laser exposure (65%) or doxorubicin alone (84 percent).

With laser irradiation, the IC 50 values of PSS-GNRs-DOX and PSS-GNRs-DOX were measured to be 7.99 and 3.12 g/mL, respectively. As a result, a combination of chemotherapy and photo thermal methods appears to be a promising platform for cancer treatment.

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Biography

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