Abstract title (max 150 characters including spaces)

A Step Forward in Breast Cancer Research: a Preliminary Photothermal Approach Using Gold Nanoparticles

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Keywords (Max 5 separated by ;)

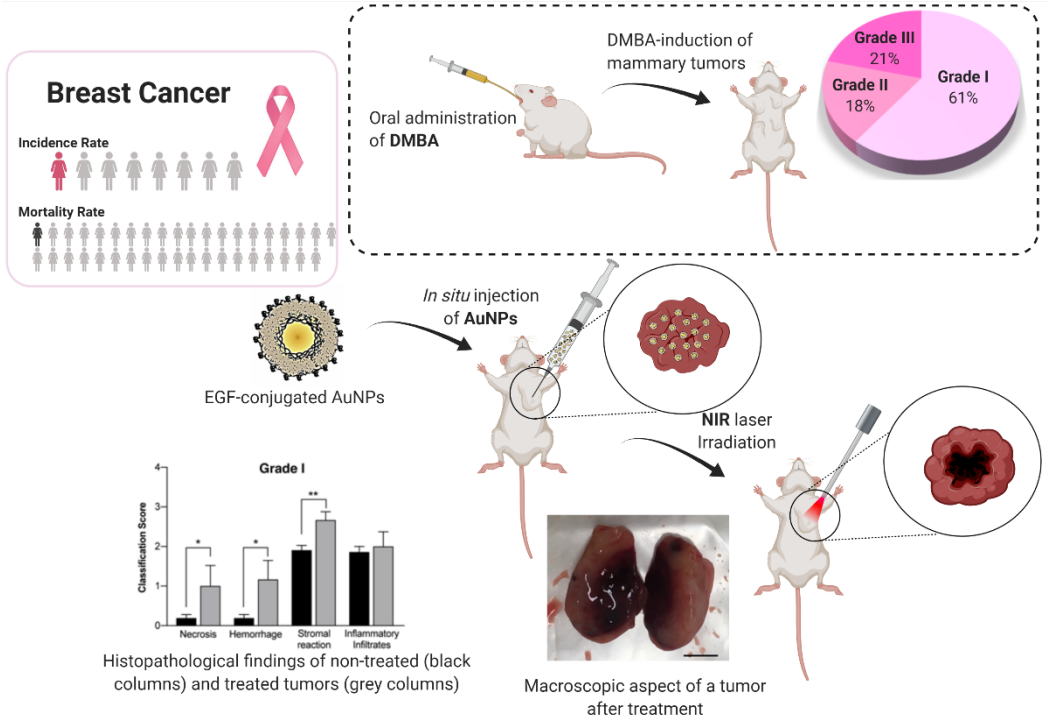
Breast cancer; Experimental model; Photothermal therapy; Gold nanoparticles

Abstract Body (Max 350 words)

Breast cancer is a leading cause of cancer deaths among women worldwide and comprehends a group of heterogeneous tumors with variable prognosis. A strong investment was made over time and several therapeutic options were proposed. Conventional treatments are still based on surgery and chemo- and radiation therapy, which are generally associated with high invasiveness, extensive side effects and low specificity. Thus, there is a continuous demand for novel therapeutic approaches with better outcomes. Photothermal therapy (PTT) has caught special attention for the treatment of localized and superficial tumors. PTT relies on irradiating tumor cells with light beams, leading to a local hyperthermia of the tumor cells [1]. Its therapeutic value depends, however, on the ability of the light to penetrate the tissues in depth and on how much heat is generated. Some strategies to improve the efficacy of PTT include the use of near infrared radiation (NIR, 650 to 900 nm) to improve the depth reached, and of gold nanoparticles (AuNPs) to enhance the photothermal effect [2]. Herein, we proposed the use of AuNPs coated with hyaluronic and oleic acids, combined with NIR laser irradiation for the treatment of breast cancer by photothermal therapy [3]. The coating was added to improve the NPs biocompatibility, biodegradability, and lifetime, as well as to promote the binding of specific ligands for targeting tumor cells. The NPs were physicochemical characterized, and subsequently characterized *in vitro* using breast cancer cell lines and red blood cells to assess their safety and efficacy. Lastly, the efficacy of the proposed system was assessed *in vivo* using a 7,12-Dimethylbenzanthracene (DMBA)-induced breast cancer model developed by the group. The AuNPs showed no toxicity *in vitro* and the laser irradiation alone proved to be safe.

However, when combining AuNPs with laser irradiation, a significant reduction of the cell's viability (more than 30%) was observed for some of the breast cell lines tested. The treatment outcomes *in vivo* were very encouraging, with the tumors treated with both AuNPs and laser irradiation showing necrosis with minimal or absent affection of surrounding healthy cells.

Images or Schemes (png ou jpeg)



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