

Gold Nanoparticles from *Laurus Nobilis* Leaves Extract as radiosensitizers in cancer radiotherapy

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Breast cancer remains the most prevalent cancer affecting women, with over a million new cases diagnosed annually. This underscores the significant burden it places on global health systems and the substantial costs involved. Standard treatments, such as chemotherapy and radiotherapy, are commonly administered following mastectomy, but their effectiveness can vary depending on the specific cancer subtype.

Combining these therapies can improve patient outcomes, yet radiotherapy faces challenges such as radiation resistance and a lack of specificity in targeting cancer cells.

Nanotechnologies, in particular metallic nanoparticles (NPs), offers promising solutions to improve radiotherapy outcomes. In particular, gold nanoparticles (AuNPs) are particularly suitable due to their high atomic number, which enhances the radiation effect through the photoelectric process, thereby increasing damage to cancer cells. Many researches shown that AuNPs can serve as effective radiosensitizers, boosting tumor destruction by elevating the local radiation dose.

Furthermore, the use of green chemistry methods, provide a safer and more sustainable approach to obtain high stable NPs using *Laurus Nobilis* leaves extract. Then, their potential as radiosensitizers in MCF-7 breast cancer cells were investigated exposing them to various doses of X-rays. Cell viability, cell morphology alterations and DNA damage were assessed. The results indicated that green AuNPs significantly enhanced the effectiveness of radiotherapy at lower doses, suggesting they could be a valuable addition to breast cancer treatment protocols.