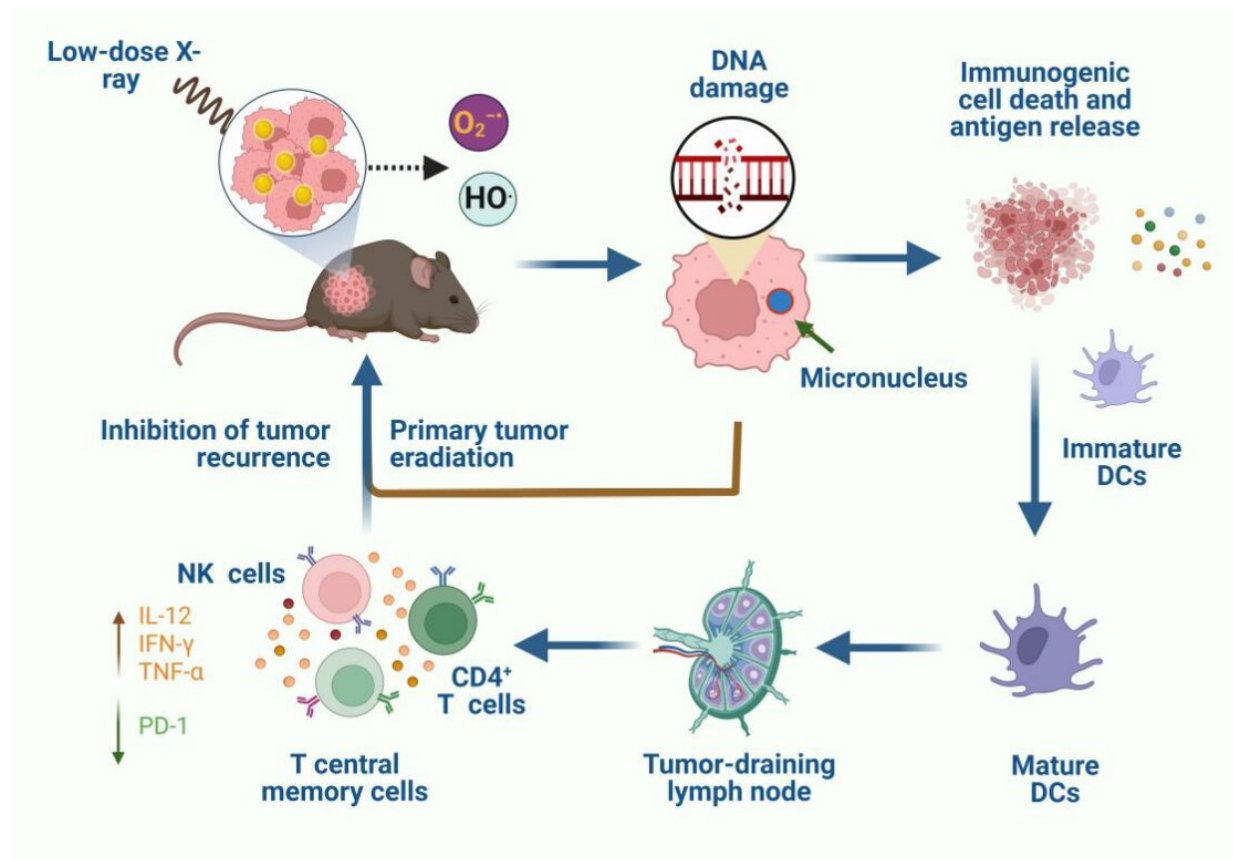


# Researchers develop novel gold-nanocluster-based tumor radiodynamic therapy

January 10 2023, by Zhang Nannan



Gold-nanocluster-based radiodynamic therapy. Credit: IGDB

Radiotherapy (RT) is a primary method of tumor treatment. However, in clinical practice, radiotherapy still suffers from shortcomings such as serious side effects, limited efficacy, and tumor metastasis and

recurrence due to the tumor microenvironment (hypoxia, low pH, high  $\text{H}_2\text{O}_2$ , etc.). Therefore, there is an urgent need to develop efficient, safe and low toxicity advanced tumor radiotherapy technology for clinical tumor treatment.

In a recent study, Prof. Dr. Jiang Yuqiang's group at the Institute of Genetics and Developmental Biology (IGDB) of the Chinese Academy of Sciences (CAS) developed a novel gold-nanocluster-based tumor radiodynamic therapy (RDT) and successfully applied it to efficient tumor treatment.

The researchers demonstrated a radiodynamic therapy system based on gold nanoclusters (AuNCs) and low-dose X-ray. These AuNCs not only achieved effective enrichment of the tumor site under the induction of acidic tumor microenvironment, but also effectively killed solid liver cancer tumors under low dose ( $\leq 1.0$  Gy) X-ray irradiation and a hypoxic [tumor microenvironment](#).

Furthermore, they revealed that the radiodynamic mechanism was a type I mechanism (producing superoxide anion  $\text{O}_2^{\cdot-}$  and hydroxyl radical  $\text{HO}\cdot$ ), rather than the common type II mechanism (producing singlet oxygen,  $^1\text{O}_2$ ).

More importantly, strong anti-tumor [immune response](#) and immune memory effect have been occurring during the process of RDT, which can not only help kill tumors in situ, but also effectively prevent tumor recurrence or metastasis. In addition, no obvious systemic toxicity was observed. Therefore, the AuNCs-based RDT is an ideal novel tumor treatment method, with the advantages of great biosafety, strong universality, large penetration depth, excellent therapeutic effect and no drug resistance.

This work entitled "Low-dose X-ray radiodynamic therapy solely based

on gold nanoclusters for efficient treatment of deep hypoxic solid tumors combined with enhanced antitumor immune response" was published in *Theranostics*.

**More information:** Shengcang Zhu et al, Low-dose X-ray Radiodynamic Therapy Solely Based on Gold Nanoclusters for Efficient Treatment of Deep Hypoxic Solid Tumors Combined with Enhanced Antitumor Immune Response, *Theranostics* (2023). [DOI: 10.7150/thno.78649](https://doi.org/10.7150/thno.78649). [www.thno.org/ms/acceptms](http://www.thno.org/ms/acceptms)

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