Examples of CM-chitosan–gold nanocomposites for cancer theranostics

Examples of carboxymethyl chitosan (CM-chitosan)–gold nanocomposites for cancer theranostics illustrate multifunctional platforms combining targeted drug delivery, photothermal therapy, and diagnostic imaging.

1. **Curcumin Delivery Nanocomposite**: A composite of CM-chitosan with gold nanoparticles (AuNPs) and ZnO nanoparticles was developed to load a modified curcumin derivative (HCUR). This nanocomposite exhibited pH-responsive, prolonged drug release and showed enhanced cytotoxicity against colon (HCT-116) and liver (HepG-2) cancer cells, indicating high therapeutic potential for cancer treatment.[1]
2. **Paclitaxel-Loaded AuNPs**: CM-chitosan oligosaccharide (COS) was used as a stabilizing agent for AuNPs loaded with paclitaxel (PTX), a chemotherapy drug. The nanocomposite achieved sustained, pH-dependent drug release and acted as an optical contrast agent for photoacoustic imaging (PAI), enabling simultaneous cancer therapy and imaging in breast cancer cells (MDA-MB-231).[1]
3. **6-Mercaptopurine (6MP) Nanocomposites**: Chitosan nanoparticles loaded with 6MP were further conjugated with AuNPs to form 6MP-CNPs-AuNPs nanocomposites. These demonstrated enhanced cytotoxicity against breast cancer cells (MCF7) and improved therapeutic efficacy when combined with photothermal therapy via laser irradiation, reducing side effects of 6MP chemotherapy.[1]
4. **Chitosan-Gold for Multi-Modal Imaging and Therapy**: Beyond CM-chitosan specifically, similar chitosan-polypyrrole-gold nanocomposites have been investigated for photoacoustic imaging-guided photothermal ablation, showing good biocompatibility and tumor clearance in preclinical models. These highlight the potential of chitosan-based gold nanocomposites in cancer theranostics combining imaging and therapy.[2] [3]

Overall, CM-chitosan–gold nanocomposites are being engineered as highly versatile agents that deliver anticancer drugs with controlled release, enable photothermal treatment by harnessing gold's plasmonic effects, and facilitate imaging techniques like photoacoustic tomography for enhanced cancer theranostics.[3] [2] [1]

This advancement reflects a cutting-edge intersection of nanotechnology and biomaterials for personalized, effective cancer diagnosis and treatment.

1. https://pmc.ncbi.nlm.nih.gov/articles/PMC11124311/
2. https://www.nature.com/articles/srep43593

3. https://www.dovepress.com/the-advancing-role-of-nanocomposites-in-cancer-diagnosis-and-treatment-peer-reviewed-fulltext-article-IJN
4. https://pmc.ncbi.nlm.nih.gov/articles/PMC10142570/
5. https://www.sciencedirect.com/science/article/pii/S2590156724000537
6. https://pubs.acs.org/doi/10.1021/am508094e
7. https://aiche.onlinelibrary.wiley.com/doi/10.1002/btm2.10325