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tripartite diagnostic framework is critical for early and precise management.

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803 oral

The development of high-performance photosensitizers to enhance photodynamic therapy for anti-tumor effects

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There are several limitations in the clinical research of photodynamic therapy (PDT) that warrant attention, including enhancing the selectivity and specificity of photosensitizers, as well as addressing the challenges posed by the hypoxic microenvironment in tumors. Our research team has been dedicated to the preparation and application of photosensitizers for an extended period. We have successfully synthesized a variety of nanomaterials, such as carbon dots and metal-organic frameworks, which can be utilized for enhanced PDT in treating tumors.

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804 oral

Wearable Photodynamic Devices for Combating Drug-resistant Bacterial Infections

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Currently, the clinical application of photodynamic therapy (PDT) predominantly depends on large-scale optical devices such as laser, broad-spectrum discharge lamp, and integrated LED system. The bulkiness and immobility of these traditional light sources restrict the professional administration of PDT to specialized medical institutions. Our research team has made substantial progress in the development of flexible wearable PDT devices through the miniaturization and flexibilization of light sources, thereby enhancing the convenience of PDT and improving patient adherence.

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805 Poster

Breaking bacterial tolerance and persistence with photodynamic inactivation

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Significance: Tolerance and persistence phenotypes critically drive chronic infections and therapeutic failure. Such failure facilitates resistance-conferring mutations, exacerbating global bacterial resistance. This necessitates studies on combinatorial strategies to curb resistance escalation and address recurrent infection management.
Approach: Gentamicin's Minimum Inhibitory Concentration (MIC) was determined via standard protocols. Time-kill assays were conducted at MIC and post-photodynamic inactivation (PDI) using methylene blue as a 660 nm-activated photosensitizer.
Results: Gentamicin caused an exponential bacterial reduction on Day 1 (achieving MDK99 and a 3-log reduction), though persistent cells survived. Day 2 revealed heteroresistance, with unexpected post-1-hour growth. PDI pretreatment accelerated bacterial death (MDK99.99%) and induced a persistence-characteristic biphasic death curve in untreated progeny.
Conclusions: Findings demonstrate that PDI pretreatment prior to antibiotics significantly altered mortality kinetics in bacterial cells and progeny.

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806 invited speech

Green silver nanoparticles curcumin conjugate induced photodynamic therapy of lung cancer and lung cancer stem cells

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Lung cancer remains a dreaded disease globally due to its high mortality rates. Conventional treatment regimens are inefficient due to their failure to eradicate lung cancer stem cells (LCSCs). LCSCs are noted to self-renew, cause relapse, strengthen metastasis, preserve tumorigenicity, and are very resistant to treatment. This study examines a bioformulated photoactive curcumin-silver nanoparticle-polymer conjugate (Cum-PEG-BpAgNPs) and free curcumin (Cum) in eradicating lung cancer via photodynamic therapy (PDT). The LCSCs characterization confirmed the presence of CD133+ and CD44+ LCSCs subpopulations. The Cum-PEG-BpAgNPs-mediated PDT induced substantial cytotoxicity in lung cancer cells and LCSCs compared to curcumin-mediated PDT. It also induced elevated ROS production, resulting in damage to the mitochondria and apoptosis. The apoptotic mechanism was triggered through the upregulation of apoptotic proteins, including caspase-3 and p53, and the downregulation of Bcl-2 anti-apoptotic proteins. The nanoconjugate (Cum-PEG-BpAgNPs) thus shows superior lung cancer PDT efficacy over curcumin, suggesting potential for resistant cancer treatment.

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810 Poster

Methylene Blue-Mediated Photodynamic Therapy Combined with Corticosteroids for Erosive Oral Lichen Planus: Clinical and Antibacterial Effects

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Objective: The aim of this study is to evaluate the clinical efficacy of methylene blue-mediated photodynamic therapy (MB-PDT) combined with local corticosteroids in the treatment of erosive oral lichen planus (E-OLP).
Methods: This study is a randomized controlled trial involving 40 patients diagnosed with erosive lichen planus. Patients were divided into two groups: the experimental group received methylene blue-mediated PDT combined with local corticosteroids, while the control group received only local corticosteroids. Both effectiveness and safety was assessed.
Results: The experimental group showed a higher clinical efficacy rate (94.7%) compared to the control group (90.4%) after 4 weeks of treatment. There was no statistical differences between the two groups($p>0.05$).
Conclusion: MB-PDT may have potential application value in the treatment of E-OLP, but further studies with larger sample sizes and longer follow-up are needed to confirm these findings.

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