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473 oral

Photodynamic and Sonophotodynamic inactivation of *Rhizopus oryzae* biofilm

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Significance: Mucormycosis is a highly aggressive fungal disease with high mortality. Traditional treatment involves high doses of antifungal agents and surgical resection, but outcomes remain poor. Photodynamic inactivation (PDI) and Sono-photodynamic inactivation (SPDI) are emerging as promising alternatives or complements to conventional therapies.

Approach: This study evaluated the antimicrobial effects on *Rhizopus oryzae* biofilms using PDI and SPDI protocols with Photodithazine (PDZ) as the photosensitizer. Amphotericin B (AMB) was used as a comparative antifungal. Variables included PDZ concentration, associations with surfactants and potassium iodide (KI), and fluence at 660 nm.

Results: Complete inactivation was not achieved in any protocol, but PDI and SPDI showed potential as complementary tools for controlling *Rhizopus oryzae* biofilms.

Conclusions: PDI and SPDI reduced viable cells, degraded fungal biomass, and reduced metabolism. However, biofilm eradication was not achieved, highlighting the need for combination treatments with antifungal drugs.

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475 oral

Treatment Plan Robustness Under iPDT Source Position Uncertainty

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Significance: Clinical iPDT operations cannot guarantee perfect dose delivery due to unavoidable uncertainties in both the power emitted precise position of a source. We use software tools to simulate and analyze the impact of uncertainties under angular varied insertions.

Approach: Evaluate angular variation of each light source in 8 directions. Simulations are run on Colin27 brain models with nine virtual brain tumours constructed from GBM images from the cancer imaging archive. Analyze the volume of 100% dose for grey, white matters and tumour using a random combination of deviated directions for each light source for each model.

Results & Conclusions: The final result is on average less desirable than the nominal due to uncertainty in positions. The next steps for this work is to summarize a pattern for each tumour model and to find a way of improving the PDT-SPACE optimization algorithm that is more robust to position uncertainty.

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476 oral

Ultraviolet Radiation – C in decontamination of organ during hypothermic perfusion

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Significance: Bacterial properties of 254nm (ultraviolet-C) have been explored in organ decontamination *ex vivo* during hypothermic perfusion for *Staphylococcus aureus*, a disseminated gram-positive pathogen.

By combining Ps80%+UV-C, full reduction (perfusate) and 2-log reduction (macerate) are achieved. Our aim is to verify these results for *Escherichia coli*, a common gram-negative urinary pathogen.

Approach: *E. coli* (ATCC25922) strain was used to contaminate porcine kidneys *ex vivo*. After harvesting, the kidneys were cannulated and perfused with a UV-C decontamination system, and 10% PS80 was added to HTK solution for 4 h. During and after experimentation, samples were collected for analysis.

Results: Results indicate no bacterial growth in samples collected after 70 min of UV-C irradiation whereas growth was consistent with initial inoculated load for control groups. Kidney macerate revealed a 99% reduction in bacterial load compared to control.

Conclusions: This study verified the effectiveness of the decontamination process for *E. coli*.

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479 oral

Increased PpIX Production Following Infrared Photobiomodulation in Normal Skin

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The exogenous administration of 5-aminolevulinic acid (ALA) has been widely studied, particularly for photodynamic therapy (PDT) in the treatment of skin cancer, as ALA is a natural precursor of protoporphyrin IX (PpIX) - an endogenous, fluorescent, and photosensitive molecule. One way to enhance PpIX production, and consequently achieve a better photodynamic response, is through photobiomodulation (PBM), which acts on the mitochondria where PpIX is produced. For this reason, a protocol was tested to determine whether PBM increases PpIX production in healthy skin. Topical application of methyl aminolevulinate (MAL) was performed, followed by PBM at 780 nm, and the cream was reapplied for 3 hours. Through fluorescence spectrum analysis, an increase in PpIX production was observed in the PBM group compared to the group without PBM, with a range of 20–60%. These results suggest that the photodynamic response in skin tumors can be enhanced.

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480 oral

Photodynamic combined with vitamin A to treat white spots on the back of the tongue

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A patient with lingual dorsal vitiligo was collected. After clinical examination and local biological tissue examination, the diagnosis of oral vitiligo with moderate abnormal proliferation and tumor-like proliferation was made. After neodymium laser pretreatment, oral vitamin A combined with PDT treatment was given for 5 months to observe the therapeutic effect and prognosis. Results: After neodymium laser pretreatment, oral vitamin A combined with PDT was treated for 5 months, and the therapeutic effect was obvious.

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