Combination Therapy and Methods for Treating Bacterial Biofilms

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Overview

Bacterial biofilms associated with infections are an increasing problem for antibiotic treatments and delivery techniques because they form a natural boundary that prevents delivery to the bacteria and infected site. This discovery is that in the absence of photoactivation, photosensitive porphyrins enhance the killing effect of known antibiotics against pathogenic bacteria. This not only serves to break down the protective barrier of the biofilms but it actually attacks the biofilm's extra-cellular DNA. By breaking down and destroying the structural elements of the biofilm the porphyrin creates pathways that permeate the biofilm and allow the antibiotics to work in a dark environment where previously thought ineffective.

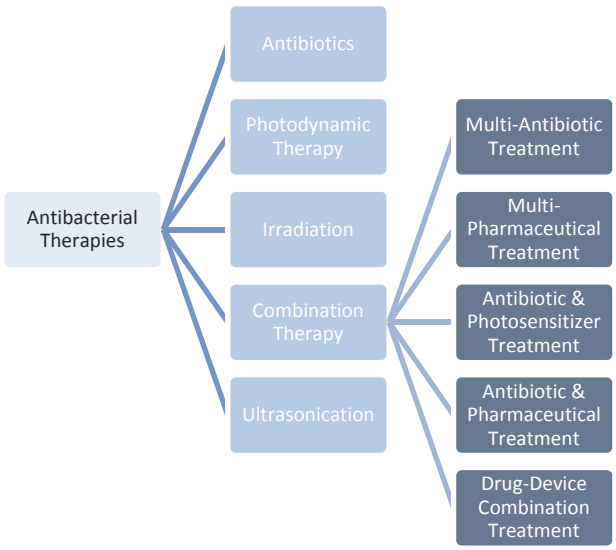
	Before	Now
Light Activation Therapy	X	X
Dark Environment Therapy		X
Combination (Light & Dark) Therapy		X
Pre-treatment for Light Therapy		X
Post-treatment for Light Therapy		X

This discovery allows for highly effective dark environment therapy, a combination of dark and light therapies and also increases the effectiveness of existing photoactivated light therapies by realizing results with a dark environment pre or post-treatment in addition to applying traditional light activation therapy.

The non-toxic nature of the porhpyrins means a safe method to treat human and animal cells as well as inanimate components such as stents or catheters and also increase the quality of clean environments with surfaces free from bacterial biofilms that could lead to infection. There is a high demand for new antibiotics or ancillary treatments that override bacterial resistance and this discovery takes another step by increasing and prolonging antibiotic effectiveness by preventing resistance and developing new combination therapies.

Characteristics

- Non Toxic
- Breaking down biofilms and biomasses
- Improved effectiveness for existing therapies and sanitization techniques
- No evidence of bacterial resistance



Applications

- New treatment methods for bacterial infections
    - Cystic fibrosis
    - Tissue transplantation
- Pre-treatment to existing light therapy to bolster effectiveness
- Combination therapies
- Dark environments
- Topical treatments (antibacterial gels, lotions, and sprays)
- Antiseptic washes
- Inhalers
- Deep tissue
- Medical devices (stents, catheters, arthroscopes)
- Bandages
- Bacterial Contamination Prevention/Treatment
    - Fuel & oil tanks (biofuels, aviation, kerosene, heavy fuels)
    - Air filtration/ HVAC systems
    - Water systems
- Surface treatments
    - Food preparation
    - Hospitals (HAI prevention)
- Tissue banks
- Food and beverage disinfection
- UV disinfectant methods
    - Post treatment
    - Combination

Features & Benefits

Features	Benefits
No Photoactivation of Porphyrins (TMP) Required	• Enhances effectiveness of treatment • Able to treat areas/infections not accessible for irradiation • Wider range of conditions can be treated
TMP Disruption of Biofilm	• Improves effectiveness of antibiotics by disrupting biofilm structure • Prevents bacterial acquisition of resistance • Enhanced by photoactivation of TMP • Enhanced by addition of antibiotic
Combination Therapy	• Increases antibiotic efficacy • Decreases chance of bacterial resistance • Utilized with or without photodynamic therapy • Allows for supplemental application

Details (Link to full patent)

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