Effectiveness of a Novel Porphyrin Exhibiting Dark Toxicity Against the Model Organism *Mycobacterium smegmatis*

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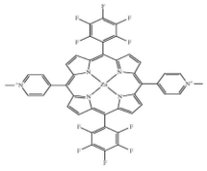
Background

Antibiotic resistance is a growing problem in the US and around the world. Porphyrin technology is emerging as a promising alternative to antibiotics to work effectively against infections caused by a variety of bacteria. Alternative and ancillary treatments are being developed as antibiotics continue to fail to treat common infections. The organism *Mycobacterium smegmatis* is used as a model for the bacterium that causes the lung infection tuberculosis.

The ZnP Porphyrin

A novel, patented porphyrin which shows evidence of dark toxicity against bacteria while leaving eukaryotic tissue unharmed.

Mechanism hypothesized to be perforation of the cell wall of bacteria and intercalation with DNA to inhibit bacterial cell growth.



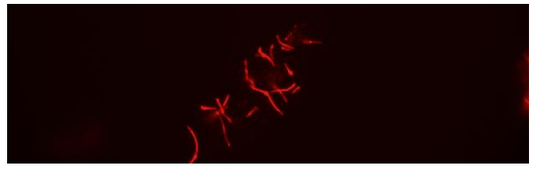
Conclusions

- ZnP can be fairly rapidly uptaken (approx. 1 hour) and penetrate the cell wall of *M. smegmatis*
- ZnP serves as a plausible alternative or ancillary treatment to antibiotics in infections caused by the genus *Mycobacterium.*
- Evidence that ZnP halts aerobic cellular processes such as protein synthesis, metabolic reactions and energy production necessary for bacterial cell growth.

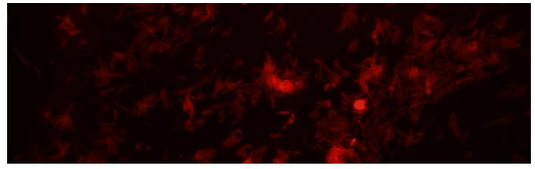
ZnP Uptake

Texas Red Fluorescent Microscopy

25mM ZnP, 45 min post exposure, 100X



50mM ZnP, 60 min post exposure, 100X

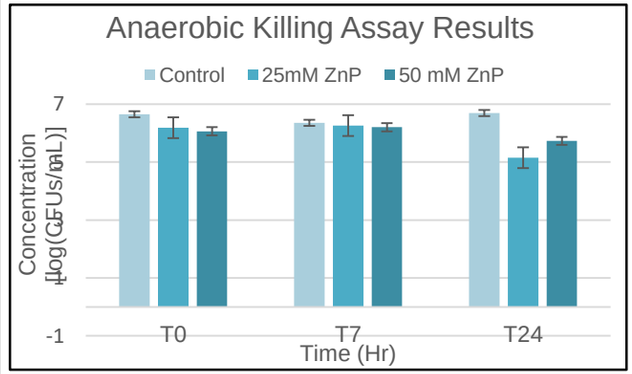


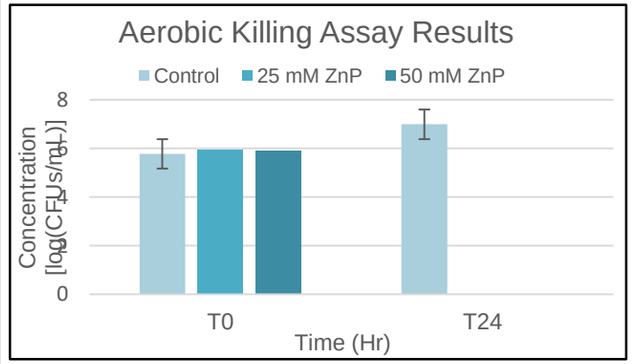
50mM ZnP, 120 min post exposure, 100X

Future Directions

Refine the concentration of ZnP find the MIC, expose formerly antibiotic-resistant *M. smegmatis* to ZnP and treat with an antibiotic, as well as understand the impact of ZnP on *M. smegmatis* biofilm formation and disruption.

Bacterial Growth Inhibition





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