The Effect of Media Type on ZnO Cytotoxicity

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The increasing prevalence of antibiotic-resistant bacteria, including *Staphylococcus aureus*, has intensified the search for alternative antimicrobial strategies. Metal oxides have emerged as promising candidates, with zinc oxide (ZnO) attracting particular interest due to its low cost, thermal and mechanical stability, and minimal generation of harmful by-products. ZnO has potential applications in medical device coatings, food preservation, and topical therapeutics. Previous work in our laboratory demonstrated that growth inhibition of *S. aureus* correlates with the release of Zn^{2+} ions from ZnO Sigma particles in Mueller–Hinton broth (MHB) (Caron et al., 2024). However, it has been reported that the media can influence Zn^{2+} dissolution and ZnO toxicity. In support of this, we find that ZnO particles exhibit increased dissolution in saline compared to MHB, resulting in enhanced cytotoxicity toward *S. aureus*. To further investigate the influence of different media types on ZnO dissolution and bacterial survival, we will investigate HEPES and MOPS buffers as media alternatives to assess ZnO toxicity. By evaluating how different chemical environments affect Zn^{2+} release and antimicrobial activity, this work aims to maximize the potential of ZnO-mediated cytotoxicity.

Works Cited

Caron AJ, Ali IJ, Delgado MJ, Johnson D, Reeks JM, Strzhemechny YM, and McGillivray SM (2024) Zinc oxide nanoparticles mediate bacterial toxicity in Mueller-Hinton Broth via Zn2+. Front. Microbiol. 15:1394078. doi: 10.3389/fmicb.2024.1394078