

The Promise of Plasma Medicine in the Post-antibiotic Era

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For decades we have enjoyed the positive impact of effective, relatively safe antibiotics to help control infections within the hospital and in the community despite increasingly resistant microorganisms. It now appears, however, that there are few drugs within the pharmaceutical development pipeline to address the most resistant current strains. We have a genuine fear of entering the Post-antibiotic Era in regard to these pathogens.[1] The organisms of most concern include *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp. (dubbed the ESKAPE pathogens [2]), as well as increasingly virulent *Clostridium difficile*.

Efforts to address this challenge include the development of programs to preserve the efficacy of currently available drugs through prudent antibiotic stewardship, to encourage and reward targeted new drug development by the pharmaceutical industry, and to support the timely recognition and appropriate isolation of patients with resistant strains of bacteria to limit their potential spread within medical institutions and the community at large.

Recent and ongoing advances in plasma medicine offer hope for pushing back the advent of this Post-antibiotic Era and – should it eventually arrive – for dealing with infections for which no traditional medical therapy exists and for which surgical intervention alone might not be feasible. Studies have confirmed the ability of atmospheric non-thermal plasmas to kill many of the above organisms which are becoming increasingly resistant to available antibiotics.[3] In addition, the effectiveness of various plasma medicine applications to treat infected wounds without retarding healing is becoming well-established.

Newer areas of investigation into the delivery of non-thermal plasmas for intraluminal and intracavitary applications promise to broaden the range of infections which might potentially benefit from this technology to include empyema, peritonitis, and sinusitis. Studies have explored the role of plasmas in sterilization and environmental decontamination as well.[4]

Experiments into the beneficial role of non-thermal plasmas in the treatment of malignancies may lead to advances in delivery technologies that can be adapted for use by those seeking to eradicate infections. It may well be that our current Antibiotic Era may one day, in retrospect, be viewed as the Pre-Plasma Medicine Era.

References

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