ELECTRICAL AUGMENTATION OF THE ANTI-BACTERIAL ACTIVITY OF SILVER NYLON

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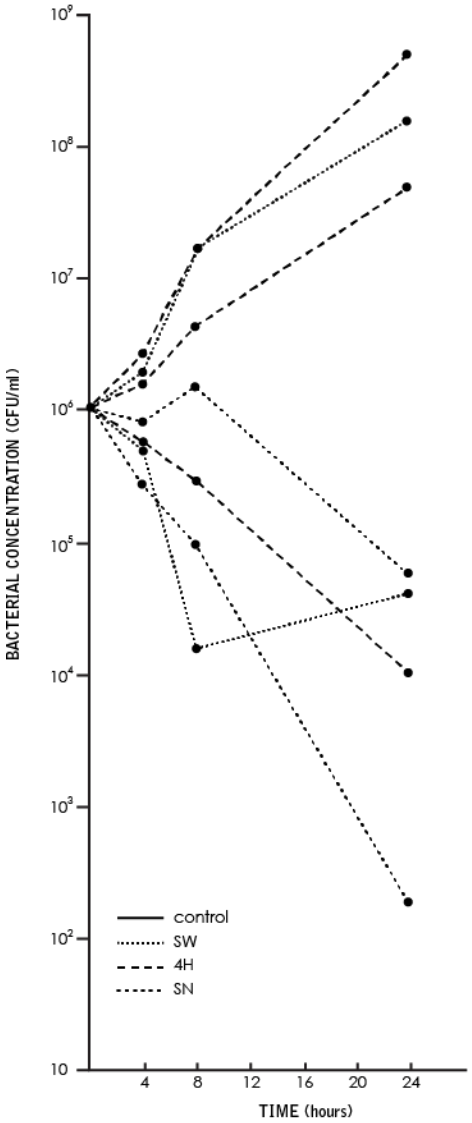
Heavy metals, especially silver, have been used to treat soft tissue and bony infections. Yet, little information is available on how best to deliver these metals to the infected wound. In previous work we have shown that bacteria, as well as fungi can be killed *in vitro* by silver liberated oligodynamically (O) from a silver nylon cloth (AAC 23:356 1083). The experiments were performed to quantitate the bactericidal activity of electrolytically (E) generated silver ions, and to compare the effectiveness of O versus E release of silver from silver wire (SW) and two different silver nylon cloths (SN and 4H). METHODS & RESULTS: The O and E (1 volt) effects of these materials on bacterial growth (*S. aureus* $1x10^6$ CFU/ml) was tested at 37°C. Aliquots of the broth were assayed for silver (atomic absorption spectroscopy), and the number of viable organisms (CFU/ml) determined (pour plate assay) after 4, 8, & 24 hours of incubation. The bactericidal effects of all three materials were greatly enhanced by the administration of a one volt electrical current (Figure). Similar results were seen with currents of 2 and 4 volts. Significantly more silver was liberated from each material by E than by O action alone (Table).



		O AG µg/ml	E AG µg/ml
SW	24 hours	0	21.27 ± 0.68
SN	24 hours	11.5 ± 1.16	21.29 ± 1.74
4H	24 hours	3.02 ± 0.92	31.62 ± 1.69

CONCLUSION: The passage of an electrical current through each material increased its *in vitro* bactericidal action by increasing the rate of release of silver from the material. In the case of SN & 4H, the administration of the electrical current converted an ineffective to an effective bactericidal agent. The ability to deliver biologically significant levels of silver directly into an infected area has major clinical implications. Utilizing the principles of E generated silver outlined in this report it should be possible to ultimately treat infections occurring in poorly Vascularized areas, such as the burn wound, where conventional antimicrobial therapy frequently fails. In summary, the results of these experiments indicate that it is possible by using a controlled electrical current to achieve adequate levels of silver to potentially eradicate soft tissue or bony infections.

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