Silver Nitrate's Effect on Natural vs. Induced Antibiotic Resistance in Escherichia coli

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Using the Kirby Bauer Protocol, my recent findings show silver ions can override antibiotic resistance in E. coli. Control trials were cultured E. coli on Mueller-Hinton agar with the addition of two ampicillin magazines. After 24-hours incubation, diameters were compared to standardized charts. I repeated this protocol with the addition of 30ul silver nitrate on the magazines. Resulting diameters were compared to previous measurements. This same method was used with induced plasmid resistance, and natural resistance developed through gradient ampicillin agar. Diameters increased almost two-fold in all trials, suggesting silver ions affect cells differently than common antibiotics. Both types of resistance began with 10-11mm resistant diameters; however, after silver exposure the natural resistance increased 12mm, while induced plasmid increased 9mm. I propose these differences are due to plasmid insertion that prepares E. coli for relatively more extreme antimicrobial conditions enabling less permeable membranes due to morphological changes in proteins; more protected enzymes; and DNA more capable to handle antimicrobial properties. Controls increased 14mm, as DNA wasn't modified against antibacterial stress. My data shows a strong indication of silver ions' ability to override antibiotic resistance. It's able to kill not only E. coli effectively, but even the highest level of antibiotic resistant mechanisms. With a continual increase in resistant E. coli strains, this outside source of antimicrobial properties could potentially break the current loop of treating antibiotic resistance with simply adapted antibiotics. The addition of silver into treatments could save millions of resistant patients awaiting the development of the newest antibiotic.

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