P2622 Use of negative and positive ions for reducing bacterial pathogen load to control infections

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Background: In recent years, there has been renewed interest in the use of air ionizers to control the spread of airborne infections. Bacteria and viruses attached to air particles circling in a room can be charged by ions, so they fall out and are removed from the air. Furthermore, negative and positive ions have been shown to have microbicidal effects on various bacterial and fungal species. Thereby the use of ionizers may contribute to disinfecting the atmosphere and stopping the transmission of microorganisms. The aim of this study was to determine if the sensitivity of bacteria to ions could be influenced by variation in experimental parameters.

Materials/methods: An ionizer producing positive and negative ions was used to determine potential effect on bacterial cells related to: 1) bacterial type; 2) bacterial load; 3) action area and 4) distance of the ion generator. Hence, ion effects on Gram positive (*Staphylococcus aureus*) and Gram negative (*Escherichia coli*) ATCC bacteria, at two different concentrations (10^4 and 10^7 UFC/ml) have been studied. Bacteria were plated on Petri dishes of two different diameter (90 or 150 mm) and placed at two different distances from the ionizer (5 or 10 cm), for different incubation times (1, 3, 8, 12 hours) in aerobic sterile conditions at room temperature and constant relative humidity.

Results: The average concentration of positive and negative ions emitted by the ionizer was 12 million ions/cm^3 at 5cm of distance and 2.6 million ions/cm^3 at 10cm of distance**.** The results evidenced a promising efficacy of ions on both the Gram positive or negative bacterium. A more significant ($p<0.05$) ion activity was observed on *S. aureus* both at 10^4 or 10^7 UFC/ml, independently from the distance from the ionizer and from the plate diameter, already starting from 3 hours of incubation and up to 12 hours.

Conclusions: These results indicate that negative and positive ions are responsible for reducing bacterial survival in different experimental conditions, suggesting the ionizer use as a promising alternative treatment for a microbial load reduction in various fields, such as healthcare facilities, with the potential to reduce the amount of antimicrobials used.