Effect of N-Acetylcysteine alone and in combination with rifampicin on *Staphylococcus epidermidis* biofilms

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Medical device-associated infections caused by pathogens such as *Staphylococcus epidermidis* might involve biofilm formation and those are particularly challenging. The involvement of antibiotic resistant Staphylococci, exacerbates the problem. Rifampicin cannot be used as a single agent to treat infections because of the rapid selection of resistant mutants. However, combinations of rifampicin with other anti-staphylococcal agents could prevent the emergence of rifampicin resistance during therapy. N-acetylcisteine (NAC) decreases biofilm formation by a variety of bacteria and reduces the production of extracellular polysaccharide matrix. The goal of this study was to assess the antimicrobial activity of NAC in combination with rifampicin against biofilm of *S. epidermidis*. Two *S. epidermidis* strains biofilm-producing (9142 and 1457) were used in this study. 1xMIC (4mg/ml) and 10xMIC (40mg/ml) of NAC and 10mg/l of rifampicin, based on preliminary *in vitro* data, were added to 24h biofilm cells. Biofilm susceptibility to tested antimicrobial agents was assessed through scanning electron microscopy, crystal violet staining (total biofilm biomass) and cellular viability through XTT and colony forming units (CFU). The effect of NAC 1xMIC was similar to that of the control. Rifampicin, NAC 10xMIC alone and NAC-rifampicin combination (independently of NAC concentration used) showed significant bactericidal effect, promoting a 3-4 $\log_{10}$ decrease in biofilm cells. In conclusion, the results didn't point to any synergistic effect between the two agents. Nevertheless, NAC seems to be a possible alternative to antibiotics in the treatment of infections associated to *S. epidermidis* biofilm.