

TITLE: ANTIBACTERIAL ACTIVITY AND ANTIBIOFILM OF RUTHENIUM COMPLEXES [Ru(ant)₃] on *Staphylococcus aureus* and *Staphylococcus epidermidis*

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ABSTRACT:

Ruthenium-based complexes are described in the literature as promising in relation to biological activities, due to their ability to bind strongly to nucleic acids and proteins and their property to mimic biological molecules. In nature, microorganisms are found in free-living (planktonic) or sessile, attached to a substrate, called biofilm. Biofilms promote an improved rate of gene exchange and greater tolerance to antimicrobials, a role played by the self-produced polymer matrix that surrounds the biofilm cells. The objective of this work was to evaluate an antibacterial and antibiofilm activity of the ruthenium complex, [Ru(ant)₃], on *Staphylococcus aureus* and *Staphylococcus epidermidis*. The strains used are from the American Type Culture Collection (ATCC). To determine the antibacterial activity, the compounds were diluted in concentrations ranging from 250 to 3.9 µg/mL and distributed in 96-well polystyrene plates with flat bottom, with adjusted bacterial suspension (1 x 10⁶ CFU/mL) in TSB medium and were incubated for 24 hours at 37°C. The effect of the ruthenium complexes was evaluated by the minimal inhibitory concentration (MIC) and the minimal bactericidal concentration (MBC). For the biofilm inhibition assay, the biomass was quantified by crystal violet (CV) staining method, and the number of viable cells in the biofilm was quantified by counting colony-forming units (CFU). The complex showed bacteriostatic action with MIC of 15.6 µg/ml for *S. epidermidis* ATCC 12228, 125 µg/ml for *S. epidermidis* ATCC 35984 and *S. aureus* ATCC 25923 and 31.25 µg/ml for *S. aureus* ATCC 700698, but did not show bactericidal action. Regarding antibiofilm activity, the tested complex was able to reduce the biomass in all strains with values ranging from 90% to 68% at a concentration of 250 µg/mL. In addition, the number of viable cells in the biofilm reduced with values ranging from 6.22 logs to 0.2logs at a concentration of 250 µg/ml for *S. epidermidis* ATCC 12228, *S. epidermidis* ATCC 35984, *S. aureus* ATCC 700698 and *S. aureus* ATCC 25923. These results demonstrate that the [Ru(ant)₃] complex should be further investigated, since it presented promission antimicrobial activity against *Staphylococcus* strains.

Keywords: Ruthenium Complex, Antibacterial, Antibiofilm, *Staphylococcus*.

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