

TITLE: ANTIBIOFILM ACTIVITY OF THE RUTHENIUM–BIPYRIDINE-ANTHRACENE IRRADIATED WITH BLUE LED AGAINST *Staphylococcus* STRAINS.

AUTHORS: ANDRADE, A.L.¹; LOPES, J.A.B.C.¹; VASCONCELOS, M.A.¹; OLIVEIRA, G.F.S.²; CARVALHO, I.M.M.²; LOPES, L.G.F.²; GONDIM, A.C.S.²; SOUSA, E.H.S.²; TEIXEIRA, E.H.¹

INSTITUTION: ¹LABORATÓRIO INTEGRADO DE BIOMOLÉCULAS, DEPARTAMENTO DE PATOLOGIA E MEDICINA LEGAL, UNIVERSIDADE FEDERAL DO CEARÁ, FORTALEZA, CE (CEP 60.441–750, FORTALEZA - CE, BRASIL); ²LABORATÓRIO DE BIOINORGÂNICA, DEPARTAMENTO DE QUÍMICA ORGÂNICA E INORGÂNICA, UNIVERSIDADE FEDERAL DO CEARÁ, FORTALEZA, CE (CEP 60.440-900, FORTALEZA - CE, BRASIL)

ABSTRACT:

Biofilm formation is the primary mechanism of virulence used by many bacterial pathogens, and serves as a useful strategy to survive in natural environments and colonized host tissues. It is estimated that bacterial biofilms play an important role in more than 80% of bacterial infections and 65% of hospital infections can be attributed to the formation of biofilms in implantable medical devices. Recently, a variety of metal complexes were synthesized and their antimicrobial activities against infectious diseases caused by antibiotic-resistant bacteria were tested. Studies based on ruthenium (II) complexes have shown the antimicrobial activity when associated with photodynamic therapy, representing an alternative for microbial control. Thus, the aim of this study was evaluated the antibiofilm effect of Ruthenium-bipyridine-antracene [Ru(bpy)₂(bpy-ant)]²⁺ irradiated with blue LED irradiation (460 nm) against *Staphylococcus aureus* ATCC 25923, *Staphylococcus aureus* ATCC 700698 (MRSA) *Staphylococcus epidermidis* ATCC 12228 and *Staphylococcus epidermidis* ATCC 35984. To determine the antibiofilm activity, the compound was diluted in Trypticase Soy Broth (TSB) in concentrations ranging from 1.9 to 125 µg/ml and dispensed into 96-well plates with each bacterial suspension (1 × 10⁶ CFU/ml). The plates were submitted to irradiation with blue LED for 1 hour, and then incubated overnight at 37°C. The susceptibility of the biofilm to ruthenium complex was evaluated by crystal violet (CV) staining and viable cell count. The results showed that [Ru(bpy)₂(bpy-ant)]²⁺ irradiated with blue LED, inhibited the biomass formation in all concentrations tested, with reduction ranging from 87 to 100%. The [Ru(bpy)₂(bpy-ant)]²⁺ complex significantly reduced the number of viable cells from the biofilms of *Staphylococcus* species, with reduction between 4 to 7 logs. These results may be related to the capacity of ruthenium complexes to produce reactive oxygen species (ROS) when they are photoactivated, which can result in degradation of biomolecules and especially of DNA. In conclusion, the ruthenium (II) complex, when irradiated with blue LED, showed antibiofilm activity against *Staphylococcus* spp.

Keywords: Antibiofilme activity, Ruthenium (II) complex, Blue led irradiation, *Staphylococcus* spp.

Development Agency: CAPES, CNPq, FUNCAP.