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STUDY OF THE SYNERGIC INTERACTION EFFECT BETWEEN NISIN AND THE *Shigella flexneri* 2'S ANTIMICROBIAL PEPTIDE, ON FOODBORNE BACTERIAL PATHOGENS

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Bacteriocins are antimicrobial peptides that have antagonistic effects against the development of other organisms. Nisin is the most studied bacteriocin able to inhibit a broad spectrum of food spoilage. We demonstrated that the *Shigella flexneri* 2 AC172 strain produces a peptide, which has similar characteristics to that of bacteriocins that display antimicrobial activity against the *Escherichia coli* AB1133 strain. In this work, we evaluated the synergistic effect produced by the combination of nisin and *S. flexneri* 2 AC172's cell-free supernatant on the growth of different pathogenic strains, which cause foodborne illnesses. The antimicrobial activity of these peptides, alone or in combination, against foodborne bacterial pathogens, was determined by the minimal inhibitory concentration (MIC) method, followed by the determination of the optical density at 600 nm in a microplate reader. For this purpose, a 96-well microplate containing serial double dilutions of nisin, *S. flexneri* 2 AC172's cell-free supernatant, or different nisin/cell-free supernatant amount combination, were inoculated with a suspension of testing bacterial containing 104–105 CFU/mL. These microplates were then incubated for 24 h at 37°C. The MIC values were used to determine the Fractional Inhibitory Concentration (FIC) and the FIC index (FICI), which finally defined the synergistic effect exerted by both antibiotic compounds. In this work, we observed a synergistic effect between both bacteriocins, capable of increasing the antibiotic sensitivity of pathogenic strains. These natural antimicrobial combinations represent a biotechnological strategy applicable to the preservation of food, in order to combat foodborne pathogens that can affect human health.

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MICROBIOMES STUDY IN MEDICAL-ASSISTENTIAL ENVIRONMENTS BY ELECTRON MICROSCOPY SWEPT TECHNIQUES

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The identification of microbiomes present in the health field is extremely important given the close relationship with human diseases. The aim of this study was to investigate the composition of microorganisms on the laboratory surfaces of the Central Blood Bank "Dr. César Guerra", (PRIS-SI.PRO.SA). Duplicate samples from the countertops, air conditioners and the equipment on the Production, Distribution and Molecular Biology services were taken using paper tape and swabs. Plating was carried out in LB pH7 culture medium containing Cycloheximide (CH) and Cyclohehimide/Nalidixic Acid (CH/NA) antibiotics. Both the paper tape and the colonies obtained from the cultures were subjected to Scanning Electron Microscopy (SEM). Sampling using paper tape allowed the presence of microbial biofilms to be detected in the internal part of the Production service centrifuge, in the Distribution service platelet shaker and in the Molecular Biology service countertops. They presented a complex three-dimensional organization characterized by microorganisms of different morphology arranged in layers immersed in abundant extracellular material. The tape analysis also revealed the presence of isolated bacteria (cocci and bacilli) or the formation of small groups of them at the different sampling sites. The cultures allowed the isolation of predominant microorganisms from countertops, air conditioners and equipment. A total of 45 colonies (Gram+ and Gram−) that exhibited various morphotypes (cocci, bacilli, and coccobacilli) were isolated. Using SEM, it was possible to analyze in detail the structure, organization, and morphology of the bacteria in culture. Furthermore, it was observed that many colonies established close contacts. The SEM study revealed a wide spectrum of associations among them. It was possible to analyze the contact points among interacting colonies, revealing morphological changes in the bacteria as well as a large amount of extracellular material at the interaction sites. In addition, the topographic analysis of the colonies showed differences in the conformation of the different sectors in some of them. This work, aimed at analyzing the microbiological communities developed *in situ* in healthcare settings, proposes high-resolution microscopy techniques as key tools for the study in situ of biofilms on a surface, which study is lacking in our country.

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COMBINED TREATMENT WITH AMPHOTERICIN B AND CLOMIPRAMINE AGAINST MACROPHAGES J774.A1 INFECTED WITH *Leishmania amazonensis*

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Leishmaniases are important neglected tropical diseases caused by parasites of the genus *Leishmania* (Trypanosomatidae) with broad geographical dispersion. Current antileishmanial available drugs have shown to be limited by toxicity, high cost, and long-term treatment, resulting in low patient compliance with the treatment. Combined therapies based on available drugs for Leishmaniasis treatment and novel uses for old drugs, have been proposed as promising therapeutic alternatives. On the one hand, Amphotericin B (Amph-B) is a drug that exerts its leishmanicidal action by increasing permeability, leading to cell death due to the leakage of cellular content. However, it has shown serious toxic effects. On the other hand, Clomipramine (Clo), a tricyclic antidepressant, is a competitive inhibitor of the enzyme trypanothione reductase (TR), which is only found in *Leishmania* and *Trypanosoma cruzi*. Inhibition of TR produces an increase of non-reduced intracellular peroxides, leading to toxic effects on the parasite. The aim of this work was to study the combined effect of Amph-B and Clo against macrophages from J774.A1 line infected with *L. amazonensis*. Macrophages (2×10^5 cells/mL) were infected with promastigotes in a ratio of 5 parasites per mammalian cell. Then, the infected