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## Evaluation of the effect of silver nanoparticles associated with eugenol on methicillin-resistant *staphylococcus* by scanning electron microscopy

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In recent years, with the emergence of resistant strains to several antimicrobials, new alternatives for infection control have been proposed resulting in better antimicrobial effects, lower costs associated with the treatment of patients, and lower adverse effects in the host. Different types of nanoparticles, such as silver, have been studied in the fight against several microorganisms that cause important human and other animal diseases. The broad spectrum antimicrobial properties of silver encourage its use in medical, cosmetic, environmental and technological applications. Another category of compounds that also exhibit antimicrobial activity are essential oils derived from spices and containing a wide variety of secondary metabolites that are able to inhibit or slow down the growth of bacteria and fungi. The eugenol, component of the clove of India presents anti-inflammatory, healing and analgesic effects. It commonly used as antimicrobial and antifungal, with broad spectrum of action against bacteria, fungi and yeast. The objective of this work was to evaluate the effect of the antimicrobial action of biological silver nanoparticles (AgNP) associated with eugenol by Scanning Electron Microscopy (SEM) against *Staphylococcus aureus* MRSA N315 bacteria. From the MEV images, were observed modifications in the cellular morphology of MRSA N315 after three hours of incubation. Treatment with eugenol and AgNP indicated changes, with prominence forming in most cells, including many deformed cells. Some perturbations were visible on the cell surface, with many fragments, indicating damage to the surface of the cell, suggesting degradation process of the peptidoglycan with consequent cell deformation and inhibition of the growth process. Results showed the action of eugenol and AgNP against the MRSA strain, suggesting as a possible alternative for microbial control. In addition, studies on morphological changes are important to help elucidate the possible mechanisms of action brought about by the compounds under study.

### Biography

Giovana C Bodnar is a PhD student from Londrina State University, Brazil, and she is doing an internship in Oklahoma State University. She had studied about natural antimicrobials against human pathogens and multi-resistant bacteria. She works with biological silver nanoparticle obtained from *Fusarium oxysporum* and eugenol. This study can help to develop another option for treatment. Her interest includes application of this compound which showed synergistic effects and the molecular interaction with bacteria.

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