

# ANTIMICROBIAL ACTIVITY AND POTENTIAL EFFICACY OF WOUND DRESSING BASED ON CHITOSAN-Ag (I) COMPLEX AGAINST METHICILLINRESISTANT *Staphylococcus aureus*

J. P. GONZÁLEZ<sup>1</sup>, J. DÍAZ-VISURRAGA<sup>1</sup>, A. GARCÍA<sup>2</sup> and G. CÁRDENAS<sup>1</sup>

<sup>1</sup> CIPA-Chile, Advanced Materials Laboratory, Department of Polymers, Faculty of Chemistry, University of Concepcion, Chile. e-mail: jgonzalezj@ussmail.cl.

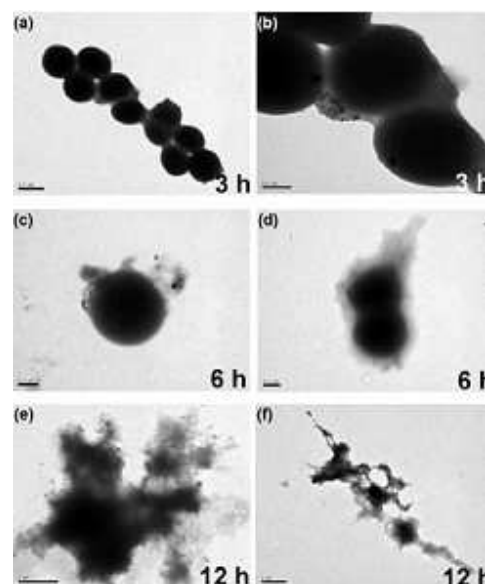
<sup>2</sup> Department of Microbiology, Faculty of Biology, University of Concepcion, Chile.

In Chile, Methicillin-resistant *Staphylococcus aureus* (MRSA) is the major cause of hospital-acquired infections in surgery, medicine (skin wounds, 27.6%) and ICU (intensive care units), accounting for 60.8% of the *Staphylococcus aureus* isolates [1]. MRSA is an *S. aureus* mutant that has an additional PBP, i.e., PBP 2', which binds poorly to  $\beta$ -lactams but still can function in the synthesis of peptidoglycan [2]. Severe skin and soft tissue infections (SSTIs) provoked by MRSA frequently require management in the ICU, in part related to associated septic shock or toxic shock syndrome or associated organ failure [3]. This study investigates the lethal effect and morphological changes on MRSA produced by chitosan-Ag (I) wound dressings [4] as observed by electron microscopy.

The antimicrobial activity of wound dressing against MRSA UA 2120 (clinical isolate from wound secretion, Hospital Regional de Antofagasta, MIC > 512  $\mu$ g/mL Oxacillin, resistant to P-AMP-SAM-OXA-EM-RIF-GE-CIP-C-AK, sensitive to TE-VA-SXT,  $\beta$ -lactamase: +, gene Blaz PCR: +, gene mecA PCR: +) was determined using the broth dilution method and agar diffusion test. Killing curves, transmission and scanning electron microscopy (TEM and SEM) techniques were employed to evaluate the bacterial death and morphological changes in bacterial cells after exposure to chitosan-Ag (I) wound dressing.

Obtained images clearly show that chitosan-Ag (I) wound dressings have a notable bactericidal activity against MRSA UA 2120. Wound dressings affected the cell structure of MRSA causing disaggregation of grape-like cluster, contraction of bacterial cytoplasm, cell disruption with loss of intracellular material and bacteriolysis, as seen in

the micrographs following 3, 6 and 12 h of incubation (Fig.1).



**Fig. 1.** (a-f) Transmission electron micrograph of MRSA UA 2120 after exposure to 8 cm<sup>2</sup> of HMW CS-Ag (I) wound dressing at 3, 6 and 12 h respectively, bar 0.5, 0.2, 0.2, 0.2, 2.0, 2.0  $\mu$ m.

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