Sociedad Argentina de Microbiología General

XIX CONGRESO DE LA SOCIEDAD ARGENTINA DE MICROBIOLOGÍA GENERAL

22 al 25 de octubre del 2024
Centro cultural y Pabellón Argentina de la Universidad Nacional de Córdoba, Córdoba, ARGENTINA.

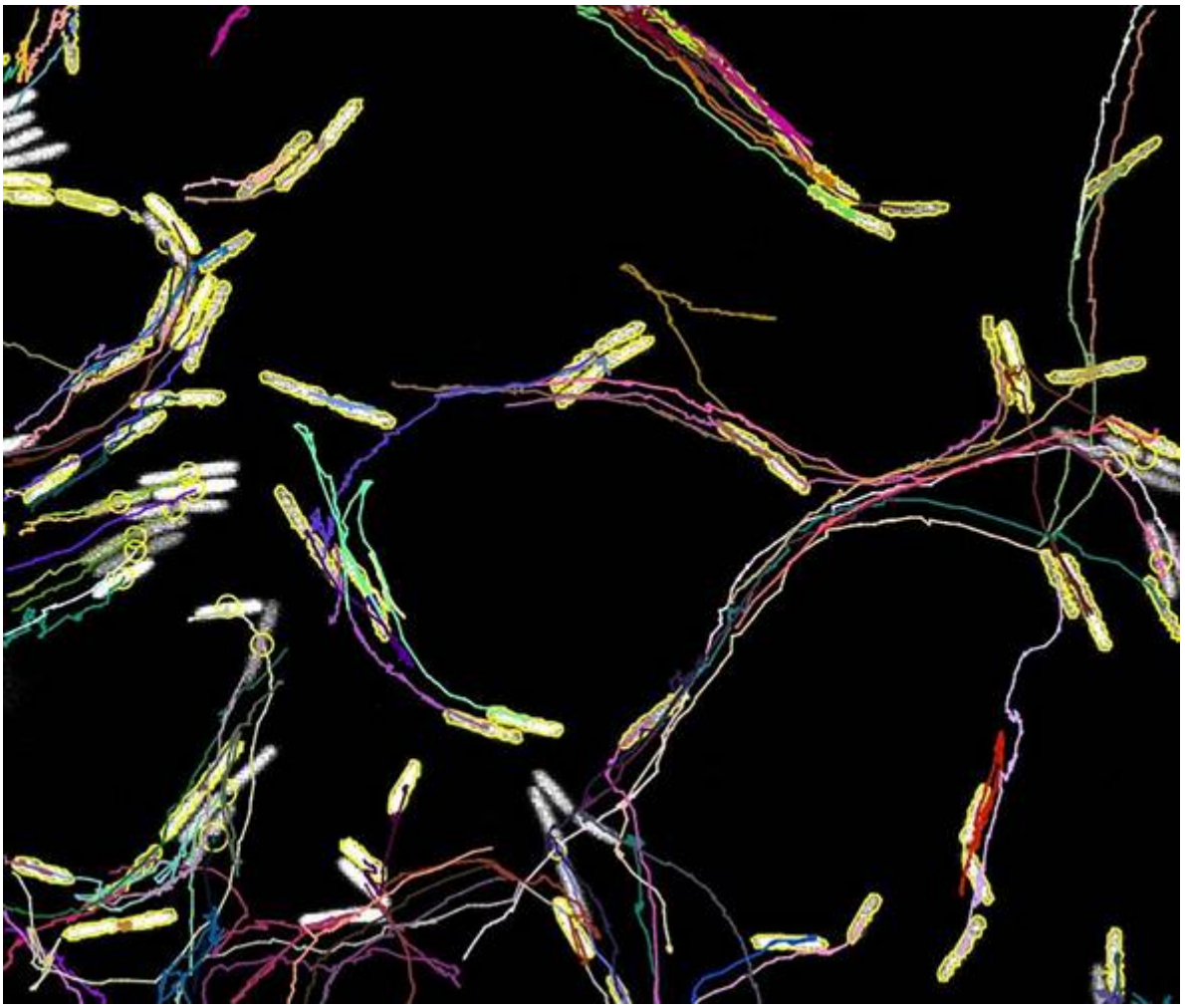

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

MEMBRANE VESICLE-MEDIATED TRANSPORT OF PDC ?-LACTAMASE IN CYSTIC FIBROSIS PATHOGENS

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Pseudomonas aeruginosa is an opportunistic pathogen responsible for life-threatening acute infections in individuals with weakened immune systems. It is also the primary cause of chronic respiratory infections and the leading contributor to morbidity and mortality in patients with cystic fibrosis (CF). Another key aspect of *P. aeruginosa* is its interaction with other CF pathogens, including *Staphylococcus aureus*. CF patients co-infected with *P. aeruginosa* and *S. aureus* have a faster decrease in lung function than patients colonized by a single species. One of the most remarkable traits of these pathogens is their ability to evolve and become resistant to many antibiotics. A primary mechanism of resistance is the production of ?-lactamases (BLs): class C BL PDC in *P. aeruginosa* and class A BL PC1-1 (BlaZ) in *S. aureu*s. The expression of BLs by bacteria reduces the amount of active ?-lactam available, acting as "shared resources" that can benefit other coexisting bacterial species. By releasing the enzyme into their environment, its activity extends beyond the producing bacterium to affect the entire bacterial community. Membrane vesicles (MVs) play a crucial biological role in this process, facilitating the release of BLs into the environment. In this study, we investigated the role of MVs produced by *P. aeruginosa* in the transport of PDC-3. We first assessed the levels of endogenous PDC-3 in PAO1 cells induced by ?-lactams, detecting PDC-3 via western blot only in the presence of penicillin (PenG) and cephalosporin cefoxitin (FOX). Then, membrane vesicles were purified from the supernatants of PAO1 cultures grown with and without PenG and FOX. SDS-PAGE and western blot analyses confirmed the presence of PDC-3 in vesicles from cultures exposed to both ?-lactams, indicating that PDC-3 is packaged and transported via these vesicles. Furthermore, the activity of these vesicles containing PDC was measured using a qualitative assay with nitrocefin (a chromogenic cephalosporin), revealing that the PDC detected in the vesicles is active. Future experiments will focus on evaluating the protective role of these vesicles in

shielding *S. aureus* populations from ?-lactam antibiotics. Additionally, we will analyze vesicles derived from clinical isolates of mono- and co-infected CF patients with *P. aeruginosa* and *S. aureus*. This research aims to elucidate how vesicle-mediated bacterial interactions affect survival during antibiotic treatment in polymicrobial infections.

Palabras clave: ?-lactam resistance - cystic fibrosis pathogens - ?-lactamase PDC-3 - bacterial membrane vesicles