

# **IN VITRO SYNERGY BETWEEN $\beta$ -LAPACHONE AND $\beta$ -LACTAM ANTIBIOTICS AGAINST MULTIDRUG-RESISTANT *PSEUDOMONAS AERUGINOSA* STRAINS**

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## **Resum:**

*Pseudomonas aeruginosa* is an opportunistic pathogen found in the soil and water and sometimes on animals, including humans. It is a Gram-negative, rod-shaped bacterium known to be highly antibiotic resistant and able to grow in a variety environments. Because of its ubiquity, *P. aeruginosa* is constantly introduced into the hospital environment through of food, visitors, and patients. Transmission occurs from patient to patient by the hands of healthcare workers, by patient contact with contaminated reservoirs, and by the ingestion of contaminated materials. This microorganism is a etiological agent of serious infections especially in immunocompromised patients and it is a problem in patients with cancer, cystic fibrosis, and severe burns. Pseudomonal infections are treatable and potentially curable, but bacteremic pneumonia, sepsis, burn wound infections, and meningitis, generally have high mortality rates. Secondary metabolites of plants, as  $\beta$ -lapachone are promising to provide diverse bioactive compounds with antimicrobial activity. Based on the above description, the objective of this study was to evaluate the interaction of  $\beta$ -lapachone with conventional antimicrobial agents. Initially, it was determined the antimicrobial activity of  $\beta$ -lapachone and four antimicrobials (polymyxin B, ceftazidime, piperacillin / tazobactam, cefepime, ciprofloxacin and meropenem) against ten strains of *Pseudomonas aeruginosa* with a resistant phenotype previously determined by the disk diffusion method. Four strains of *P. aeruginosa* (LFBM 01 LFBM 02 LFBM 16 LFBM 18) presented resistance profile to ciprofloxacin, meropenem and cefepime hydrochloride and were chosen for subsequent stages of this work. The study of the interaction between  $\beta$ -lapachone and antimicrobials was performed by checkerboard method. The criteria used to evaluate the synergistic activity were defined by the Index of Fractional Inhibitory Concentration (FIC index). The FIC index values ranged from 0.12 to 0.50 indicating a synergistic effect for all combination except to  $\beta$ -lapachone/ meropenem on LFBM 16 strain. The  $\beta$ -lapachone associated with meropenem or cefepime hydrochloride acts synergistically against multidrug-resistant *P. aeruginosa* strains.

**Key words:** *Pseudomonas aeruginosa*,  $\beta$ -lapachone, synergism.

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