

البحث الخامس:

Virulence Characteristics of Biofilm-Forming *Acinetobacter baumannii* in Clinical Isolates Using a *Galleria mellonella* Model

Authors:

Mahmoud A. F. Khalil 1,* , Fatma A. Ahmed 2, Ahmed F. Elkhateeb 3, Eman E. Mahmoud 4, Mona I. Ahmed 5, Randa I. Ahmed 6, Amal Hosni 7, Saad Alghamdi 8 , Ahmed Kabrah 8 , Anas S. Dabool 9 , Helal F. Hetta 10,* ,Sawsan S. Moawad 11 and Enas Mamdouh Hefzy

1 Department of Microbiology and Immunology, Faculty of Pharmacy, Fayoum University, Fayoum 63514, Egypt

2 Department of Medical Microbiology and Immunology, Faculty of Medicine, Fayoum University, Fayoum 63514, Egypt

3 Department of Critical Care Medicine, Faculty of Medicine, Fayoum University, Fayoum 63514, Egypt;

4 Department of Clinical and Chemical Pathology, Faculty of Medicine, Fayoum University, Fayoum 63514, Egypt;

5 Department of Chest Diseases and Tuberculosis, Faculty of Medicine, Fayoum University, Fayoum 63514, Egypt;

6 Department of Chest Diseases, Faculty of Medicine, Fayoum University, Fayoum 63514, Egypt;

7 Department of Clinical Pathology, Faculty of Medicine, Assiut University, Assiut 71515, Egypt;

8 Laboratory Medicine Department, Faculty of Applied Medical Sciences, Umm Al-Qura University, Makkah 24381, Saudi Arabia

9 Department of Public Health, Health Sciences College at Al-Leith, Umm Al-Qura University, Makkah 24381, Saudi Arabia

10 Department of Medical Microbiology and Immunology, Faculty of Medicine, Assiut University, Assiut 71515, Egypt

11 National Research Center (N.R.C), Department of Pests and Plant protection, Giza

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Abstract:

Acinetobacter baumannii is a Gram-negative coccobacillus responsible for severe hospital-acquired infections, particularly in intensive care units (ICUs). The current study was designed to characterize the virulence traits of biofilm-forming carbapenem-resistant *A. baumannii* causing pneumonia in ICU patients using a *Galleria mellonella* model. Two hundred and thirty patients with hospital-acquired or ventilator-associated pneumonia were included in our study. Among the total isolates, *A. baumannii* was the most frequently isolated etiological agent in ICU patients with pneumonia (54/165, 32.7%). All *A. baumannii* isolates were subjected to antimicrobial susceptibility testing by the Kirby–Bauer disk diffusion method, while the minimum inhibitory concentrations of imipenem and colistin were estimated using the broth microdilution technique. The biofilm formation activity of the isolates was tested using the microtiter plate technique. Biofilm quantification showed that 61.1% (33/54) of the isolates were strong biofilm producers, while 27.7% (15/54) and 11.1% (6/54) showed moderate or weak biofilm production. By studying the prevalence of carbapenemase-encoding genes among isolates, blaOXA-23-like was positive in 88.9% of the isolates (48/54). The blaNDM gene was found in 27.7% of the isolates (15/54 isolates). blaOXA-23-like and blaNDM genes coexisted in 25.9% (14/54 isolates). Bap and blaPER-1 genes, the biofilm-associated genes, coexisted in 5.6% (3/54) of the isolates. For in vivo assessment of *A. baumannii* pathogenicity, a *Galleria mellonella* survival assay was used. *G. mellonella* survival was statistically different between moderate and poor biofilm producers ($p < 0.0001$). The killing effect of the strong biofilm-producing group was significantly higher than that of the moderate and poor biofilm producers ($p < 0.0001$ for each comparison). These findings highlight the role of biofilm formation as a powerful virulence factor for carbapenem-resistant *A. baumannii* that causes pneumonia in the ICU.