



# **Dispersion of biofilm formed by some Gram negative bacteria using microbial by-products**

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Thesis submitted for Partial Fulfillment of Master Degree in  
Microbiology

By

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B.Sc. Microbiology, 2008

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## **Approval Sheet**

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## Abbreviations

AST	Antibiotic Susceptibility Testing
BAIs	Biofilm Associated Infections
BAL	Bronchoalveolar Lavage
BS	Biosurfactants
BSI	Blood Stream Infection
CCU	Coronary Care Unit
CDC	Centers for Disease Control and Prevention
CF	Cystic Fibrosis
CFS	Cell Free Supernatant
CLSI	The Clinical and Laboratory Standards Institute
CMC	Critical Micelle Concentration
CoNS	Coagulase Negative <i>Staphylococcus</i>
CSF	Cerebrospinal Fluid
CVCs	Central Venous Catheters
CVL	Central Venous Line
DA-HAIs	Device-Associated Health Care–Associated Infections
DANIs	Device-Associated Nosocomial Infections
DNA	Deoxyribonucleic Acid
eDNA	Extracellular Deoxyribonucleic Acid
ELISA	Enzyme-Linked Immunosorbent Assay
EMCC	Egyptian Microbiological Culture Collection
EPS	Extracellular Polymeric Substances
ETT	Endotracheal Tube
Global PPL	Global Priority Pathogens List

GRAS	Generally Regarded As Safe
HAIs	Health care–associated infections
ICUs	Intensive Care Units
INICC	International Nosocomial Infection Control Consortium
IPC	Infection Prevention and Control Interventions
IUD	Intrauterine Devices
MDR	Multi-Drug Resistant
MIC	Minimum Inhibitory Concentration
NCCLS	National Committee for Clinical Laboratory Standards
NHSN	National Healthcare Safety Network
NICU	Neonate Intensive Care Unit
NIH	National Institutes of Health
NVE	Natural Valve Endocarditis
OD	Optical Density
OM	Otitis Media
PICU	Pediatric Intensive Care Unit
PVE	Prosthetic Valve Endocarditis
QS	Quorum Sensing
RNA	Ribonucleic Acid
RTI	Respiratory Tract Infection
SD	Standard Deviation
ST	Surface Tension
TCP	Tissue Culture Plate
TM	Tube Method

TSB	Tryptone Soy Broth
UTI	Urinary Tract Infection
WHO	World Health Organization

## Abstract

Antimicrobial agents have been used for the last 70 years to treat patients who have infectious diseases. However, these drugs have been used for long time that the infectious organisms have adapted to them through different mechanisms. Bacterial biofilms cause chronic infections because they show increased tolerance to antibiotics and disinfectants as well as body's defense system.

Bacteria in biofilms embed themselves in extracellular matrix that acts as shield from antibacterials and help them to overcome harsh nutritional and environmental conditions. One promising way of disabling biofilm resistance is through breaking up this matrix using biosurfactants. *A. baumannii* & *P. aeruginosa* isolated from Egyptian hospitals were tested for their antibiotic resistance and ability to form biofilm. Out of 22 Multi-drug resistant (MDR) *P. aeruginosa* isolates, 100 % were biofilm formers. While in *A. baumannii* out of 36 MDR, 77% showed biofilm formation ability.

The anti-biofilm activity of a bio-surfactant extracted from *Bacillus subtilis* was tested against biofilms of *P. aeruginosa* and *A. baumannii*. The dispersion of biofilm occurred in 44-46 % of *P. aeruginosa* and 64% - 66 % of *A. baumannii*. using 0.25 and 0.5 mg/ml of the *Bacillus subtilis* extract.

**Keywords:** Biofilm, Multi-drug resistant, Anti-biofilm, Bio-surfactant, *Bacillus subtilis*.