



**UNIVERSITI TEKNOLOGI MARA**

**DETECTION OF GENETIC VARIATION OF DNA GYRASE  
ENCODING FLUROQUINOLONE-RESISTANT  
*ACINETOBACTER BAUMANNII***

**MOHAMAD DZULHILMI MOHAMAD KAMARULZAMAN**

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## ABSTRACT

Mutations of the *gyrA* gene have been reported to contribute to *Acinetobacter baumannii* resistance towards quinolones. This study investigates the variation of DNA sequences of *gyrA* gene in 2 different isolates of *A.baumannii* which were the resistant and susceptible strains. The main aim of this project is to determine the genetic variation that encode resistance towards fluoroquinolones. In this study, primers that allow amplification of the region spanning *gyrA* was designed. The amplicons were amplified and subsequently purified before sequencing to determine the DNA sequences of the isolates. From bioinformatics analysis, there was a sequence change from cytosine to thymine in resistant strain of *A.baumannii*. The nucleotide change caused a change in amino acid codon from Serine to Leucine at position 21. Serine is hydrophilic in properties while Leucine are hydrophobic. Quinolones drugs having hydrophilic properties probably cannot bind to receptor due to hydrophobic changes. The mutation has probably caused the underlying resistance towards quinolones shown by the *A.baumannii*.

# CHAPTER 1

## INTRODUCTION

### 1.1 *Acinetobacter baumannii*

Nosocomial infections caused by *Acinetobacter baumannii* is reported to increase steadily (Vila et al., 1995; Vila et al, 2002). The control of *Acinetobacter baumannii* infections is challenging due to its versatile ability to develop resistance towards antimicrobial resistance (Cisneros & Rodriguez-Bano, 2002). Groups that are highly at risk to infection caused by *Acinetobacter baumannii* are immunocompromised patients, critically ill patients and patients that receive long-term treatment such as severe burns and traumatic injury (Buchan, Ledebouer, & Edmiston, 2011). Last few decades, the emergence of resistance towards multiple groups of antibiotics by *Acinetobacter baumannii* are due to broad use of antimicrobials within hospitals and also the chemical disinfectant used in sterilizing surgical environment (Adams-Haduch et al., 2008; Buchan et al., 2011; Shehata, 2012).

Groups of antibiotics that *Acinetobacter baumannii* are resistant to include  $\beta$ -lactams, carbapenems (e.g., imipenem, meropenem and doripenem), aminoglycosides (e.g., gentamicin, amikacin), ampicillin-sulbactam, extended-spectrum cephalosporin (e.g., ceftazidime) and quinolones (e.g., ciprofloxacin and levofloxacin) (Adams-Haduch et al., 2008; Hujer et al., 2009). When *Acinetobacter baumannii* are resistant to three or more groups of antimicrobial agents, it is classified as multidrug resistant (MDR) (Hujer et al., 2009).