

Efficacy Enhancement of Hydrophobic Antibiotics Employing Rhamnolipid as Biosurfactant

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Abstract : Antibiotic resistance has become a global public-health problem, thus it is imperative that new antibiotics continue to be developed. Major problems are being experienced in human medicine from antibiotic resistant bacteria. Moreover, no new chemical class of antibiotics has been introduced into medicine in the past two decades. The aim of the current study presents experimental results that evaluate the capability of bio surfactant rhamnolipid on enhancing the efficacy of hydrophobic antibiotics. Serial dilutions of azithromycin and clarithromycin were prepared. A bacterial suspension (approximately 5×10^5 CFU) from an overnight culture in MSM was inoculated into 20 ml sterile test tube each containing a serial 10-fold dilution of the test antibiotic(s) in broth with or without 200 mgL-1 rhamnolipid. The tubes were incubated for 24 h with vigorous shaking at 37°C. Antimicrobial activity in multiple antibiotic-resistant gram-negative bacteria pathogens and gram-positive bacteria were assessed using optical density technique. The results clearly demonstrated that the presence of rhamnolipid significantly improved the efficiency of both antibiotics. We hypothesized that the addition of rhamnolipid at low concentration, causes release of LPS which results in an increase in cell surface hydrophobicity. This allows increased association of cells with hydrophobic antibiotics resulting in increased cytotoxicity rates.

Keywords : hydrophobic antibiotics, biosurfactant, rhamnolipid, azithromycin, clarithromycin

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