

The Effects of Antibiotics RP59500 on Mixture Toxicity to

Staphylococcus aureus and


Methicillin- resistant *Staphylococcus aureus*

Student: Yang Chang-Heng

Advisor: Dr. Chen Chung-Yuan

Institute of Environmental Engineering
National Chiao Tung University

ABSTRACT



Over the past years, *E. coli* and *P. phosphorium* were used as laboratory bacterium to conduct mixture toxicity research of organic toxins developed to study the toxicity of organic toxicants in our group. The study was found, when toxicants have a small slope tend to act synergistically while have a large slope may produce antagonistic effect. From the results of this study, it was found that the proportion of synergism was likely to be observed high when the combination of antibiotics which were different mechanism and small dose-response curve slopes.

The emergence and escalation of antimicrobial resistance in the Gram-positive cocci (including enterococci and staphylococci) has been observed, especially Methicillin- resistant *Staphylococcus aureus* (*MRSA*). This research used *MSSA* and *MRSA* as the test bacterium, chose six types

of antibiotic, and divided into four categories based on its bacteria-suppressing mechanism. The post-categorized results were used to proceed mixture toxicity testing of the Time-kill curve, and to observe its growth-suppression situation of the *MRSA and MSSA*, as well as discussing prediction method Mtox7 Model of the mixture toxicity model and to make comparison with previous test results done on organic toxic materials using turbidity method, together with checking the applicability of Time-kill curve between different objects and different toxic materials, in addition to comparing test results.

From the results of the study, we were found that synergism was produced with the combination of antibiotics which were different mechanism and small dose-response curve slopes. Comparison with two different method, Mtox7 model predicted the combined effect and time-kill curve was in defining the effects of antibiotics combination in treatment, we also can get most the same result and the possibility of the same result about 87.2%. This shows that the parameter as the slope of dose-response curve is good at application on predicting the combined therapeutic effects of mixtures of antibiotics. Time-kill curve allowed us to understand the actual suppression situation of the bacterium, and was consistent with the turbidity method, able to substantiate the feasibility of applying toxicology to pharmacology.