# Mathematical modeling in dosing regimen design

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Dosing regimen design in antimicrobial therapy involves a complex interplay of drug potency, pathogen susceptibility and toxicity propensity in the host. The number of possible combinations of dose, dosing interval and duration of therapy is prohibitory for comprehensible evaluation of all regimens, in pre-clinical and clinical settings. By capturing key dose-response relationships quantitatively, mathematical modeling provides a framework to evaluate the likelihood of success in an efficient fashion. A large number of dosing regimens can be screened virtually, selectively guiding study design to be performed in the next phase of investigation. This model-aided approach is more logical than the conventional trial-and-error approach in determining optimal dosing regimens.

Our research group has a primary focus of examining the pharmacokinetics (PK) and pharmacodynamics (PD) of antimicrobial agents, as they relate to the optimal treatment of infectious diseases. In this presentation, basic PK/PD concepts will be briefly reviewed. Specific examples will be discussed in using mathematical modeling to minimize the development of drug resistance and toxicity associated with antimicrobial therapy.