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**MUDASSAR IMRAN**, North Carolina State University  
*The Pharmacodynamics of Antibiotic Treatment*

We derive models of the effects of periodic, discrete dosing or constant dosing of antibiotics on a bacterial population whose growth is checked by nutrient-limitation and possibly by host defenses. Mathematically rigorous results providing sufficient conditions for treatment success, i.e., the elimination of the bacteria, as well as for treatment failure, are obtained. Our models can exhibit bi-stability where the infection-free state and an infection-state are locally stable when antibiotic dosing is marginal. In this case, treatment success may occur only for sub-threshold level infections.