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Bistable dynamics between primed and tolerant states following challenge with exdotoxin

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Presenter Information Mirjam Sarah Kadelka, Brittany Boribong, Liwu Li, and Stanca Ciupe

Bistable dynamics between primed and tolerant states following challenge with exdotoxin

Biological experiments have shown different molecular dynamics after challenge and boosting with different doses of endotoxin, with high-high challenge leading to a tolerant state and low-high challenge leading to a primed state. To provide insight into the relationship between dose and dynamics, we developed a mathematical model of molecular interactions within a pathway. We analyzed the model using asymptotic stability and bifurcation techniques. Our model exhibits bistable dynamics between a tolerant and a primed state. We used the model to determine the feedback mechanisms needed for bistability and determined the relationship between our results and the experimental data.