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## Exploring the Dynamics of Bacterial Populations in the Gut Microbiota

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Abstract Submitted by Shaikh Obaidullah

## Exploring the Dynamics of Bacterial Populations in the Gut Microbiota

The gut microbiota plays a critical role in human health and disease. In this study, we investigate the dynamics of bacterial populations in the gut microbiota using mathematical modeling and numerical simulations. We consider a system of ordinary differential equations that describe the interactions between multiple bacterial species and analyze the steady-state solutions and their stability properties. Our results show that the system exhibits a rich variety of dynamical behaviors, including coexistence of multiple bacterial species and competitive exclusion. We also examine the impact of different parameters on the dynamics of the system, including the growth rates and carrying capacities of the bacterial populations. Our findings provide important insights into the complex dynamics of bacterial populations in the gut microbiota and have potential implications for the development of novel interventions and therapies for various gut-related diseases.