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Mathematical models of population dynamics of probiotics, pathogens and established microflora: the case of iron chelation

Microorganisms inhabit the gastrointestinal tract and have adapted by having individual growth niches so that the concentration of each species is fairly consistent. In order for the intestine to function properly, this balance of microbial flora must be maintained. However, a number of factors in modern life, such as increased stress and the consumption of pharmaceutical compounds (e.g. antibiotics), have contributed to shifting this microbial balance away from its optimal levels and towards an increase in harmful pathogenic microorganisms. The introduction of probiotics has been recommended as a preventive approach to maintaining a normal balance and thereby enhance well-being.

A comprehensive literature survey of mathematical formulations for probiotic theory showed that this field is nearly untouched. This talk will focus on the development of models that can describe the population dynamics of microbial systems and which also takes into account the mechanism of probiotic activity that can be useful for targeting iron overload and toxicity, to treat cancer, and to prevent heart and other organ damage.