

Mathematics and the battle against antibiotic resistance

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The rise of antibiotic-resistant microbes poses an urgent threat to public health. Understanding the genetics, population dynamics, and control of antibiotic resistance requires integrative interdisciplinary approaches. In our research we use mathematical models to describe, simulate and study such processes, interpolating between the individual and population level. In this talk I will focus on a recent mathematical model for bacterial infection dynamics [1], which we have developed to study optimal antibiotic treatment and the role of host immunity. I will illustrate how mathematical modeling can enhance our fundamental understanding of infection ecology, provide fresh insights on resistance control and effective treatment, and pave the way to clinical applications.

Keywords: ordinary differential equations; infection dynamics; antibiotic resistance ; host immunity

REFERENCES

- [1] E. Gjini, P.H.Brito, Integrating antimicrobial therapy with host immunity to fight drug-resistant infections: Classical vs. Adaptive Treatment, *PLOS Computational Biology*, **12**(4), e1004857. doi:10.1371/journal.pcbi.1004857, 2016.