

HOW CLASSICAL AND ADAPTIVE REGIMES INTERACT WITH HOST IMMUNITY IN ANTIBIOTIC TREATMENT OF RESISTANT INFECTIONS

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ABSTRACT

Antimicrobial resistance of infectious agents is a growing problem worldwide, calling for a more rational design of antibiotic therapy. In this work, we study aggressive and moderate antibiotic treatment, accounting for host immunity effects. We develop a within-host dynamic model to understand the interplay between pathogen-dependent host immune responses and antibiotic treatment, in infections with pre-existent resistance. We compare classical (fixed dose and duration) and adaptive (coupled to pathogen load) protocols, assessing systematically different infection outcomes such as time to clearance, immunopathology, and resistance selection. Our analysis and simulations uncover the effectiveness of treatment strategies that promote synergistic infection clearance by the antimicrobial drug and host immunity, where treatment timing and the strength of the immune response are critical drivers of success. The study brings new quantitative insight into the ongoing debate of resistance management, highlighting the balance between external intervention and endogenous host defenses.

References

[1] Gjini E. and Brito P.H. (submitted) *Integrating antimicrobial therapy with host immunity to fight drug-resistant infections: classical vs. adaptive treatment.*