(R)evolutionary Therapies: Game-Theoretic Perspectives on 75 Years of Mathematical Oncology

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The field of mathematical oncology has grown from early mechanistic descriptions of cancer progression into a rich interdisciplinary area that blends applied mathematics, evolutionary theory, and clinical insight. Over the past seventy-five years, quantitative models have increasingly been used to frame cancer not simply as uncontrolled growth, but as a dynamic and evolving system of interacting subpopulations subject to selection pressures. By viewing cancer evolution through the lens of game theory, we gain conceptual tools to understand how heterogeneous cell populations compete and evolve in response to changing conditions. These game-theoretic perspectives have helped shape evolutionary therapies that steer eco-evolutionary dynamics to delay the emergence of resistance and improve patient outcomes.