1145-92-2005 **James Greene*** (`j.c.greene@rutgers.edu`), Hill 216, 110 Frelinghuysen Road, Piscataway, NJ 08854, and **Eduardo Sontag**, **Jana Gevertz** and **Cynthia Sanchez-Tapia**. *The Impact of Induced Drug Resistance in Cancer Chemotherapy.*

Resistance to chemotherapy is a major impediment to successful cancer treatment that has been extensively studied over the past three decades. Classically, resistance is thought to arise primarily through random genetic mutations, after which mutated cells expand via Darwinian selection. However, recent experimental evidence suggests this evolution to resistance need not occur randomly, but instead may be induced by the application of the drug. Indeed, phenotype switching via epigenetic alterations is just recently beginning to be understood. In this work, we present a mathematical model to that describes both random and induced resistance. We discuss issues related to both structural and practical identifiability of model parameters. A time-optimal control problem is formulated and analyzed utilizing differential-geometric techniques. Specifically, the control structure is precisely characterized, and therapy outcome is analyzed for different levels of resistance induction through a combination of analytic and numerical results. Further extensions to combination therapies are also considered, and questions of combination vs. sequential therapy are studied. (Received September 24, 2018)