

KEYNOTE TALK

Thursday, October 8, 2020 at 9:00am

Fighting drug resistance with math

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Abstract: The emergence of drug-resistance is a major challenge in chemotherapy. In this talk we will overview some of our recent mathematical models for describing the dynamics of drug-resistance in solid tumors. These models follow the dynamics of the tumor, assuming that the cancer cell population depends on a phenotype variable that corresponds to the resistance level to a cytotoxic drug. Under certain conditions, our models predict that multiple resistant traits emerge at different locations within the tumor, corresponding to heterogeneous tumors. We show that a higher drug dosage may delay a relapse, yet, when this happens, a more resistant trait emerges. We will show how mathematics can be used to propose an efficient drug schedule aiming at minimizing the growth rate of the most resistant trait, and how such resistant cells can be eliminated.



Speaker Bio-Sketch: Doron Levy is a Professor of Mathematics and the Department Chair at the University of Maryland, College Park. He is also a member of the Center for Scientific Computation and Mathematical Modeling, and the Maryland BioPhysics Program. Previously he held positions at Stanford University, UC Berkeley, Lawrence Berkeley National Lab, the University of Paris 6, and the Ecole Normale Supérieure (ENS) Paris. In 2013 Dr. Levy was named a Distinguished Scholar-Teacher by the University of Maryland, and in 2014 he was named a Fellow of the John Simon Guggenheim Memorial Foundation. He is also a Pauli Fellow at the Wolfgang Pauli Institute in Vienna. His research focuses on biomedical applications of mathematics: cancer dynamics, drug resistance, immunology, imaging, and cell motility. He is a member of ten editorial boards of mathematical and biomath journals. Dr. Levy has been a plenary

and keynote speaker in many national and international conferences, including the keynote speaker in the American Mathematical Society briefing to the US Congress, and the SIAM representative in the Coalition for National Science Founding Meeting on Capitol Hill.