




May 31st, 2:15 PM - 3:15 PM

Turning Cancer Discoveries Into Effective Treatments With The Aid Of Mathematical Modeling

Trachette Jackson
University of Michigan

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Increased understanding of the molecular drivers of tumor initiation and progression has led to targeted manipulation of intracellular signaling pathways for therapeutic benefit. In this talk, a general modeling strategy is outlined for linking: (i) intracellular signaling pathways critical to cell proliferation, apoptosis, and migration; (ii) receptor-ligand binding on the cell surface that lead to intracellular signaling cascades; and (iii) population-level tumor growth dynamics and response to treatments targeting these pathways. Integration of these tiers of information is precisely the level of detail required to uncover possible hidden mechanisms that mediate both expected and potentially counterintuitive therapeutic effects of novel, targeted drugs on the multiple cell types responsible for tumor progression.