VANDERBILT SCHOOL OF MEDICINE | Basic Sciences

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Biosketch

Carlos F. Lopez received his BSc and BLA degrees from University of Miami, his PhD in Physical Chemistry from University of Pennsylvania, and had postdoctoral positions at UT-Austin and Harvard Medical School. His work employs novel theoretical, computational, and numerical tools, in combination with experimental data, to explain and predict cellular dynamic processes. He incorporates Machine Learning, Bayesian Statistics, and Artificial Intelligence methods to link molecular-level interactions with cell-population dynamics processes. He is currently the Vanderbilt University Liaison to Oak Ridge National Laboratory.

Key Publications

"PyDREAM: High-dimensional parameter inference for biological models in Python," ***Bioinformatics*****, 34(4), 695-697 (2018)**

"An unbiased metric of antiproliferative drug effect in vitro," ***Nature Methods*****, Vol 13, pp. 497-500 doi:10.1038/nmeth.3852, (2016)**

"Competition and allostery govern substrate selectivity of cyclooxygenase-2," ***Proc. Nat. Acad. Sci. USA*** **,Vol 112, Iss 40, pp. 12366-12371 doi:10.1073/pnas.1507307112 (2015)**

"From Molecules to Organisms: Numerical methods to explain and predict how cells make good and bad decisions"

The work in the Lopez lab is driven by two overarching goals:

1. Can we **understand the physical and chemical rules that govern cellular processes**?

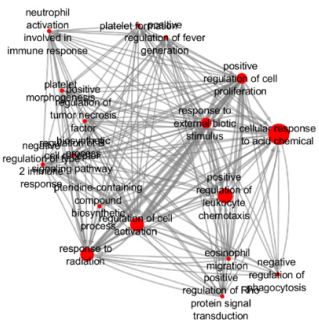
2. Can we **predict how a cell will respond** to a perturbation in health or disease?

Cells must respond to external and internal perturbations such as mutations or toxins. How do cells employ complex biochemical reaction networks to process these intra- and extracellular signals to commit to a given outcome?

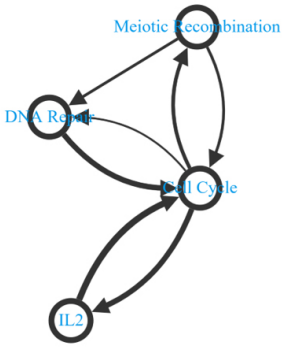
The Lopez lab **employs computational modeling, Machine Learning, and dynamic network analysis methods** to **explain and predict cell behaviors in health and disease**. A central goal in the lab is to **understand the molecular mechanisms that drive cancer cells to respond to treatments or avoid treatment and seed drug resistance and cancer relapse**.

Despite the immediate significance of this work to cancer, a fundamental understanding of cell-decision processes will be generalizable to other areas of biology, including **drug development and bioengineering applications**.

Combination drugs mechanism of action



Cisplatin Mechanism of action



Misoprostol mechanism of action