Johns Hopkins Engineering

Immunoengineering

Immunoengineering: Modeling

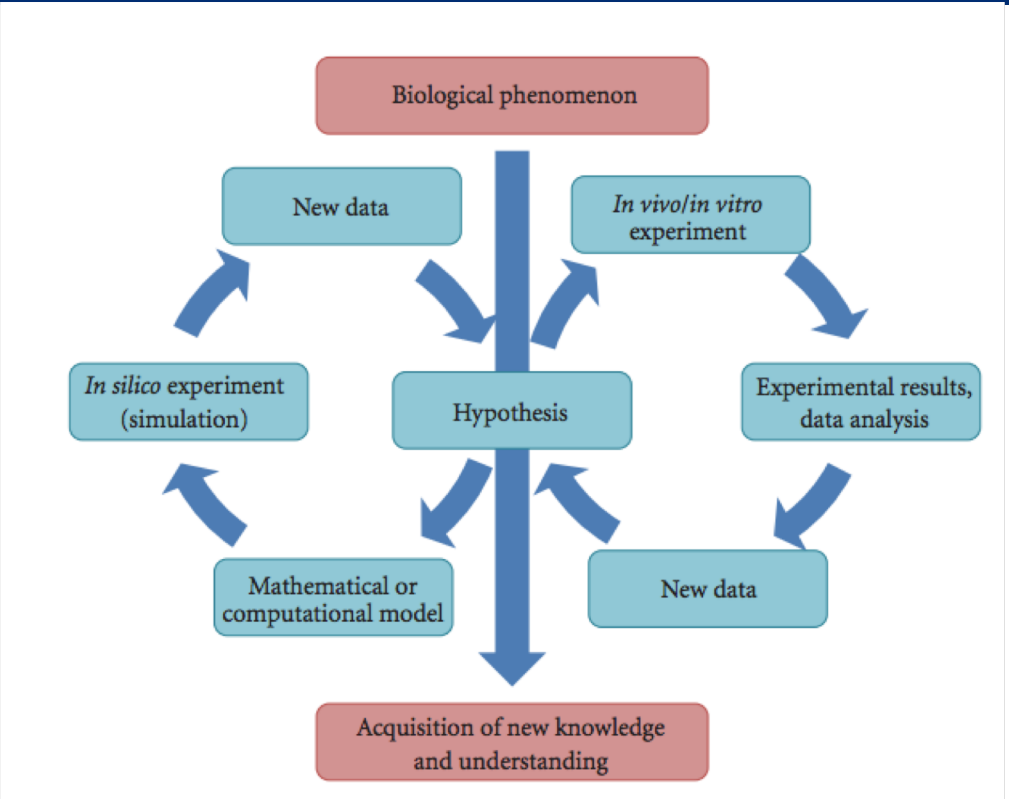
Introduction

JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Modeling Immunology: Motivation

- Modeling is more cost effective and often faster than experiments
- Can provide non-intuitive insights
- The immune system is very complex and experiments often simplify the true biology
- Guide the development of new therapeutics
- Use modeling to identify mechanistic pathways based on experimental data
- Rational design of therapeutics

Systems Biology Paradigm

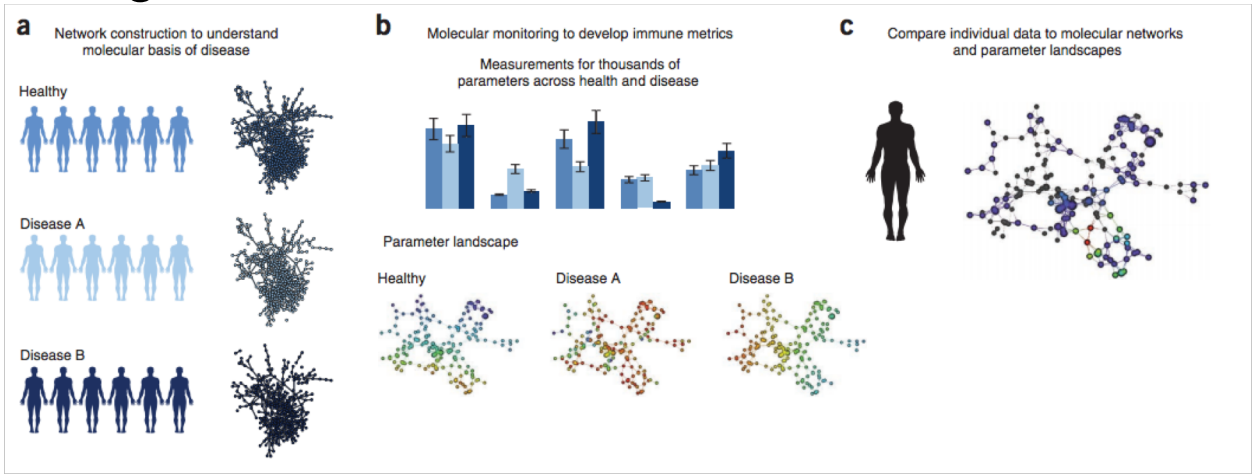


Woelke et al. “Theoretical Modeling Techniques and Their Impact on Tumor Immunology” *Clinical and Developmental Immunology,* (2011): 1-11.

Clinical Examples

- Drug interactions: quickly and easily scan through combinatorial library of drug targets or other clinical approaches that would be difficult to test

- Characterizing disease



Kidd et al. “Unifying immunology with informatics and multiscale biology” *Nature Immunology* 15(2), (2014): 118-127.

Modeling Examples

- Cancer Antigens
- T cell killing
- Combination anti-retroviral therapy for HIV