Intra-tumor Heterogeneity and Data-Guided Modeling of Cancer

Sivasomasundari (Sundari) Arunarasu, *Emory University*
Dr. Subhajyoti De, *Rutgers Cancer Institute of New Jersey*
Introduction

- Intratumor heterogeneity
  - Within a tumor, all cells originate from one mutated cell
  - Cells within a tumor are not identical; they show genetic and nongenetic variability

- Sources of tumor heterogeneity:
  - Genetic: accumulation of mutations and evolution
  - Nongenetic: epigenetic, transcriptomic variations → affect cell state
  - Environmental: dynamic microenvironment influences tumor progression and clinical outcomes
Cancer Stem Cells

- CSC model: certain tumor cells have stem cell characteristics
  - Can self-renew or differentiate into cancer cells
- Where do CSCs originate?
  - Arise from mutated regular (tissue) stem cells
  - Cell state transition of tumor cells (dedifferentiation)
    - Epithelial-mesenchymal transition during metastasis
- Possible that stemness is a dynamic characteristic
Deeper understanding of CSCs could guide cancer treatment strategies
Research Goals

- Investigate phenotypes and “stemness” of cancer cells during tumor growth, and possible changes over time
Acknowledgements

Thank you to:

- NSF grant CCF-1852215
- DIMACS REU program
- My mentor: Dr. Subhajyoti De and Antara Biswas (Postdoc)
Sources